ISTRUZIONI PER L'INSTALLAZIONE E LA MANUTENZIONE (IT)
INSTRUCTIONS FOR INSTALLATION AND MAINTENANCE (EN)
INSTRUCTIONS POUR L'INSTALLATION ET LA MAINTENANCE (FR)
INSTALLATIONS- UND WARTUNGSANLEITUNGEN (DE)
INSTRUCTIES VOOR INSTALLATIE EN ONDERHOUD (NL)
INSTRUCCIONES DE INSTALACIÓN Y MANTENIMIENTO (ES)
ΟΔΗΓΙΕΣ ΓΙΑ ΤΗΝ ΕΓΚΑΤΑΣΤΑΣΗ ΚΑΙ ΤΗ ΣΥΝΤΗΡΗΣΗ (EL)
INSTALLÁCIÓS ÉS KARBANTARTÁSI KÉZIKÖNYV (HU)
ИНСТРУКЦИИ ПО МОНТАЖУ И ТЕХОБСЛУЖИВАНИЮ (RU)
INSTRUÇÕES PARA A INSTALAÇÃO E A MANUTENÇÃO (PT)
INSTALLATIONS- OCH UNDERHÅLLSANVISNINGV(SV)
ASENNUS- JA HUOLTO-OHJEET (FI)
INSTRUKTIONER VEDRØRENDE INSTALLATION OG VEDLIGEHOLDELSE (DK)
KASUTUS- JA HOOLDUSJUHEND (EE)
POKYNY K INŠTALÁCII A ÚDRŽBE (SK)
NÁVOD K INSTALACI A ÚDRŽBĚ (CZ)
UPUTE ZA MONTAŽU I ODRŽAVANJE (HR)
NAVODILA ZA INŠTALACIJO IN VZDRŽEVANJE (SI)
INSTRUKCJA MONTAŻU I KONSERWACJI (PL)
INSTRUCTIUNI PENTRU INSTALARE SI INTRETINERE (RO)
ИНСТРУКЦИЯ ЗА МОНТИРАНЕ И ПОДДРЪЖКА (BG)
KURMA VE **BAKIM BİLGİLERİ (TR)**
UPUTSTVO ZA MONTAŽU I ODRŽAVANJE (RS)
(IR) **دستورالعمل برای نصب و نگهداری**
(AR) **إرشادات التركيب والصيانة**
ІНСТРУКЦІЇ З МОНТАЖУ ТА ТЕХНІЧНОГО ОБСЛУГОВУВАННЯ (UA)

FX RANGE

DAB
WATER•TECHNOLOGY

Translation from the original Italian version

INDICE

1. SYMBOLS KEY

1.1. Safety signs

The use and maintenance manual includes the signs illustrated below (where relevant). These signs have been included to draw users' attention to possible sources of danger. Failure to pay attention to the signs could result in personal injury, death and/or damage to the machine or equipment. As a general rule, there are three types of symbols (Table 1).

Symbol	Shape	Type	Description
	Outlined triangle	Danger	Indicates present or potential dangers
	Circular outline	Prohibition	Indicates actions that are to be avoided
	Solid circle	Obligation	Indicates information to be read and complied with
	Circular outline	Information	indicates useful information other than danger / prohibition / obligation

Table 1 Safety sign types

Depending on the information to be conveyed, the signs may contain symbols denoting the type of danger, prohibition or obligation.

The following symbols have been used in the discussion:

ATTENTION!
DANGER TO THE HEALTH AND SAFETY OF WORKERS.
Pay close attention to the instruction accompanied by this symbol.

ATTENTION!
DANGER OF ELECTROCUTION - DANGEROUS VOLTAGE.
The machine guards and protections marked with this symbol may only be opened by qualified personnel after disconnecting the machine's power supply.

These instructions must be observed for explosion-proof pumps.

ATTENTION!
DAMAGE TO THE MACHINE
Indicates useful information other than danger, prohibition and obligation. Can be found in any chapter of the manual

OBLIGATION TO COMPLY WITH A SAFETY REQUIREMENT.

PROHIBITION OF DANGEROUS ACTIVITY

INSTRUCTIONS MARKED WITH THIS SYMBOL INDICATE THE NEED TO:
Open the disconnect switch on the electrical control panel ("0/Off" position);
Lock it in open position with the appropriate system (e.g. padlock);
Follow the company's Lockout-Tagout procedures.

User
Indicates maintenance operations that can be carried out by the machine user.

Specialised Personnel
Indicates operations and maintenance work that can be carried out by qualified technicians.
The installation must be carried out or supervised by a person trained in electrical installations in possession of the technical requirements set out in the relevant regulations. Qualified personnel are those persons who, as a result of training, experience and education, as well as knowledge of the relevant standards, accident prevention regulations and operating conditions, have been authorised by the plant's safety officer to carry out any necessary task and in doing so to be familiar with and avoid any danger.(Definition of person trained in electrical installations IEC 60050-826:2004).

Notes and general information.
Please read the following instructions carefully before operating and installing the machine.
Installation and operation must comply with the safety regulations of the country where the product is installed.
The entire operation must be carried out in a workmanlike manner.

1.2. Danger

Generic hazard
This sign indicates dangerous situations that may harm people, animals or property.
Failure to comply with the instructions associated with this sign may lead to danger.

Risk of electrocution
This sign indicates the risk of direct or indirect contact and electrocution arising from the presence of live machine parts.
Failure to comply with the instructions associated with this sign may result in serious injury or death.

Risk of automatic start-up
This sign indicates the risk of the machine performing operations in automatic mode. Failure to comply with the instructions associated with this sign may result in serious injury or death.

Risk of crushing
This sign indicates the risk of crushing the hands or upper limbs by moving machine parts. Failure to comply with the instructions associated with this sign may result in the risk of crushing the hands or upper limbs.

Risk of cutting/severing
This sign indicates the risk of cutting/severing the hands by moving machine parts or tools. Failure to comply with the instructions associated with this sign may result in the risk of cutting-severing the hands.

Risk of entanglement and dragging
This sign indicates the risk of entangling the hands or upper limbs. Failure to comply with the instructions associated with this sign may result in the risk of crushing the hands or upper limbs.

Danger explosive atmosphere
This sign indicates the danger of potentially explosive atmosphere.
Failure to comply with the instructions associated with this sign may lead to explosions.

Danger heavy object
This sign indicates the risk associated with the presence of a heavy load equal to or above 20 kg. The load must be handled carefully by two people, making sure there are no obstacles in the way. Failure to comply with the instructions associated with this sign may lead to musculoskeletal injuries and crushing of the lower and upper limbs.

Danger magnetic field
This sign indicates the presence of strong magnetic fields and requires care to avoid exposure.
Failure to comply with the instructions associated with this sign may interfere with pacemakers and cause injury to tissues and internal organs in the case of prolonged exposure.

Danger laser radiation
This sign indicates the risk arising from the presence of sources emitting artificial optical radiation.
Failure to comply with the instructions associated with the sign may cause harm to the vision.

Danger, biohazard
Take care to avoid exposure to a biohazard.

Danger, hot surface
This sign indicates the risk of burning as a result of contact with hot surfaces (> 60 °C).
Failure to comply with the instructions associated with this sign may lead to the risk of burns to the hand or upper limbs.

Danger, low temperature or frost
Take care to avoid exposure to low temperatures or freezing conditions.

Danger of ignition.
Take care not to cause a fire by igniting flammable and/or combustible material.

Slip hazard
This sign indicates the risk of slipping and falling as a result of damp and/or wet surfaces. Failure to comply with the instructions associated with the sign may result in the risk of serious injury or death caused by slipping and/or falling.

1.3. Prohibition

Generic prohibition
This sign indicates a manoeuvre, operation or behaviour that is prohibited. Failure to comply with the prohibitions associated with this sign may cause harm to persons, animals and property.

Do not touch
This sign indicates that the operator must not touch a certain part of the machine.
Failure to comply with the prohibitions associated with this sign may cause harm to the hands.

Do not insert hands
This sign indicates that the operator must not insert the hands into a certain area.

Failure to comply with the prohibitions associated with this sign may cause harm to the hands and/or upper limbs.

Do not alter the state of the switch
This sign indicates that altering the state of the switch and/or control device is prohibited.
Failure to comply with the prohibitions associated with this sign may cause harm to persons, animals and property.

No smoking or open flames
This sign indicates that smoking and/or open flames are prohibited.
Failure to comply with the prohibitions associated with this sign may cause explosions and/or fires.

Do not extinguish with water
This sign indicates that extinguishing flames and/or the incipient stage of a fire with water is prohibited.
Failure to comply with the prohibitions associated with this sign may cause harm to persons, animals and property.

1.4. Obligation

Generic obligation
This sign indicates the operator's obligation to comply.
Failure to comply with the instructions associated with this sign may cause harm to persons, animals and property.

Wear ear protectors
This sign indicates the obligation to use ear muffs or ear protectors during operations.
Failure to comply with the instructions associated with this sign may lead to even permanent hearing loss.

Wear protective clothing
This sign indicates the obligation to wear appropriate clothing during operations.
Failure to comply with the instructions associated with this sign may result in serious injury or death.

Use appropriate PPE
These signs indicate the obligation to use appropriate personal protective equipment during operations. Failure to comply with the instructions associated with these signs may result in serious injury or death.

Connect an earth terminal to the ground
This sign indicates the obligation to connect the machine to an efficient earthing system.
Failure to comply with the instructions associated with this sign may cause harm to persons, animals and property.

Unplug from the socket
This signal indicates the obligation to unplug the power supply before carrying out any other operation.
Failure to comply with the instructions associated with this sign may cause harm to persons, animals and property.

Disconnect the power supply before maintenance
This sign indicates the obligation to disconnect the equipment before carrying out any maintenance work.
Failure to comply with the instructions associated with this sign may cause harm to persons, animals and property.

Check guards
This sign indicates the obligation to check the efficiency of the guards (removed during maintenance, repairs, cleaning, lubrication). Failure to comply with the instructions associated with this sign may cause harm to persons, animals and property.

Refer to instruction manual/booklet
This sign indicates the obligation to read the instructions (use and maintenance manual, data sheets, etc.) prior to installation, use or any other operation to be carried out on the machine!
Failure to comply with the instructions associated with this sign may cause harm to persons, animals and property.

DAB Pumps makes every reasonable effort to ensure that the contents of this manual (e.g. illustrations, texts and data) are accurate, correct and up-to-date. Nevertheless, they may not be free of errors and may not be complete or up-to-date at any time. The company therefore reserves the right to make technical changes and improvements over time, even without prior notice.
DAB Pumps accepts no liability for the contents of this manual unless subsequently confirmed in writing by the company.

2. GENERAL

2.1. Product name

FEKA FXV
FEKA FXC
FEKA FXS
GRINDER FX
DRENAG FX

2.2. Classification according to European Reg.

SEWAGE PUMPS

3. FIELD OF APPLICATION OF PUMPABLE LIQUIDS

The pumps in the FX RANGE are designed and suitable for pumping domestic and industrial sewage and waste waters compatible with the materials of which the pumps are made.
DO NOT USE THE PUMP WITH LIQUIDS WITH DIFFERENT CHARACTERISTICS!

3.1. Description and intended use

This manual contains the instructions for the installation, operation and maintenance of submersible pumps of the FX RANGE series. The pumps are equipped with electric motors with power between 0.75 and 3 kW. The pumps in the FX RANGE series are designed and suitable for pumping domestic and industrial sewage and waste waters compatible with the materials of which the pumps are made. The pumps can be installed on an auto-coupling system or stand freely on the bottom of a tank. The booklet also includes specific instructions for the explosionproof pumps.

This appliance must not be used by children.

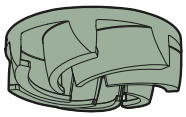
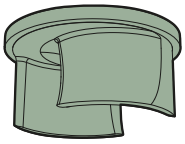
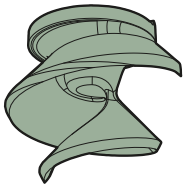
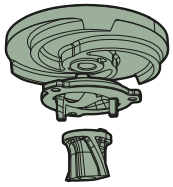
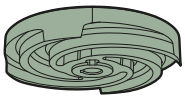
	FEKA FXV	**FEKA FXC**	**FEKA FXS**	**GRINDER FX**	**DRENAG FX**
Description	Submersible pumps with back-flowing impeller with complete free passage.	Submersible pump with ring impeller and with anti-locking disc.	Submersible pumps with an open single-blade spiral-wound anti-lock impeller with clearance	Submersible pump with ring impeller and grinder device at the front.	Submersible pump with ring impeller and with wear disc in abrasion-resistant rubber
					
Free impeller passage	50 mm (FEKA FXV 20) 65 mm (FEKA FXV 25)	50 mm	50 mm	-	10 mm
Standards					
EN 12050-1	X		X	X	
EN 12050-2		X			X
Type of liquid					
Clear water	X	X	X		X
Groundwater	X	X	X		X
Rainwater	X	X	X		
Clear water containing sand	X	X	X		X
Waste water	X	X	X	X	
Without large solids or long fibres	X	X	X	X	
Waste water with small solids and without long fibres	X		X	X	

Table 2

3.1.1. Product drawing

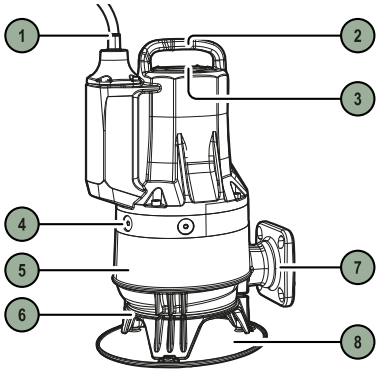


Figure 4 FX RANGE pump

Pos.	Description	Material
1	Cable plug	H07RN8-F
2	Lifting bracket	GJL200
3	Nameplate	Acciaio AISI 304
4	Oil screws	OT58 NICKEL
5	Pump housing	GJL200
6	Support feet	GJL200
7	Discharge flange	GJL200
8	Support disc	PP

Table 3

3.2. Improper use

The equipment is designed to be used solely for the purposes described in the dedicated section of the manual (paragraph 3.1 Description and intended use). Uses other than those described in this manual are improper and do not therefore comply with safety regulations.

ATTENTION!
Improper use may result in personal injury, death and/or damage to the equipment or installations.

Below is a list of improper uses that could cause personal injury or damage to the machine or equipment for which DAB Pumps. S.p.A. shall not be held liable:

- unauthorised changes to or replacement of equipment parts;
- failure to follow safety instructions;
- failure to follow instructions on installation, use, operation, maintenance, repairs or having such operations carried out by unqualified personnel;
- use with improper and incompatible materials or unintended auxiliary equipment;
- failure to comply with workplace safety rules or relevant legal regulations.

3.3. Specific product references

For technical data, refer to the CE marking (data plate) or the dedicated chapter 1 TECHNICAL CHARACTERISTICS.

4. WARNINGS AND RESIDUAL RISKS

Before installation it is necessary to check that all the internal parts of the product (components, leads, etc.) are completely free from traces of humidity, oxide or dirt: if necessary, clean accurately and check the efficiency of all the components in the product. If necessary, replace any parts that are not perfectly efficient. When starting up for the first time, check the direction of rotation of the motor as indicated in paragraph 8.3 Direction of rotation (for three-phase pumps).

The capacitor of the direct current intermediate circuit remains charged with dangerously high voltage even after the mains power has been turned off. Only firmly wired mains connections are admissible. The appliance must be earthed (IEC 536 class 1, NEC and other applicable standards).

Before working on the equipment, disconnect the power and make sure there are no fluid and/or gas leaks in the surrounding environment. Do not open and do not operate if powered.

NEVER LET THE PUMP RUN WITHOUT WATER.
Water also acts as a lubricant, coolant and seal protector: running dry can cause permanent damage to the pump and void the warranty

CAUTION – DANGER OF BURNS
The pump can reach high temperatures during operation: beware of accidental contact and wait for it to cool down after disconnection before carrying out maintenance and inspection work.

CAUTION - CUTTING HAZARD
The pump has sharp moving parts: do not carry out any maintenance or cleaning while it is running.

4.1. Operating conditions

FX RANGE pumps are suitable for continuous operation always immersed in the pumped liquid. The FX RANGE pumps allow operation with the motor NOT IMMERSED for short periods (10min).
pH value: 6.5-12 (Warning: indicative range, the pH value alone is not exhaustive in defining the aggressiveness of the pumped liquid)
Temperature of the operating liquid: 0 °C to +50 °C (non-Ex versions only).
For short periods a temperature of up to +60 °C is permissible (non-Ex versions only).

Explosion-proof pumps must never pump liquids of a temperature higher than +40 °C.

4.1.1. Ambient temperature

For non-explosion proof pumps, the ambient temperature may exceed +40 °C for a short period.

For explosion-proof pumps, the ambient temperature on the installation site must be in the range from 0°C + 40 °C.

Density and viscosity of the pumped liquid: viscosity and density comparable to those of water.
Flow velocity: It is advisable to keep a minimum flow velocity to avoid sedimentations in the piping system. Recommended flow velocities:

- in vertical pipes: 1.0 m/s
- in horizontal pipes: 0.7 m/s

4.1.2. Operating mode

Maximum 20 starts per hour.
FOR FURTHER LIMITATIONS OF THE OPERATING RANGE, REFER TO THE IDENTIFICATION PLATE.

4.2. Product disposal

This product or its parts must be disposed of according to the instructions in the WEEE disposal sheet included in the packaging.

5. MANAGEMENT

5.1. Storage

All pumps must be stored in a dry covered place with constant air humidity where possible, free from vibrations and dust. They are supplied in their original packaging where they must remain until installation.
During long periods of storage, the pump must be protected against moisture and heat.
Storage temperature: -30 °C to +60 °C. If the pump has been in use, the oil should be changed before storage. 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.

The impeller may have sharp edges – wear protective gloves.

If stored outside the limits indicated, pay particular attention to the conditions of the mechanical seal, the O-rings, the oil and the cable gland.

5.2. Transport

Avoid subjecting the product to needless impacts and/or collisions.
Avoid placing material that could damage the pump on top of the packaging..

5.3. Handling

Handling must be carried out in accordance with company regulations.

Before lifting the pump, check that the tools and equipment used for handling, lifting and lowering it into the sinkhole are suitable for the weight to be lifted, efficient and complying with the applicable safety laws.

The weight of the pump is declared on the pump identification plate and on the label on the packaging.

Always lift the pump by its lifting bracket or by means of a fork-lift truck if the pump is fixed on a pallet. Never lift the pump by means of the motor cable or the hose/pipe.

For manual handling of loads, check the presence of any dedicated markings on the packaging.

CAUTION - heavy load
Take care when handling to avoid injury and musculoskeletal strain

OBLIGATION - Two people are required to manually handle the pump and casing

Use appropriate PPE when handling loads, according to company instructions.

6. INFORMATION ON PRODUCTS WITH THE EX MARKING

Marking for explosion-proof versions according to the ATEX scheme

Marking: II2G
Ex db IIB T4 Gb
Ex h IIB T4 Gb
Ⓔx explosion-proof appliance designed for use in a potentially explosive atmosphere;
II: group. identifies an electrical appliance for use in an environment other than mines with possible presence of firedamp;
2: category. pump designed for use in places where it is probable that there will be explosive atmospheres caused by mixtures of air and gas, vapours or mists, or mixtures of air and dust;
G: gas. the pump is protected in environments with gas, vapours or inflammable mists;
Ex: explosion-proof appliance designed for use in a potentially explosive atmosphere;
db: electrical constructions for potentially explosive atmospheres – Explosion-proof housings “d”;
h: non electrical constructions for potentially explosive atmospheres – Protection with immersion in liquid “h”;
IIB: characteristic of the gas for which the appliance is intended;
T4: corresponds to 135°C, and is the maximum surface temperature that can be safely reached by the pump;
Gb Level of protection of the appliances, appliances for explosive gas atmospheres having a “HIGH” protection level.

Marking for explosion-proof versions according to the IECEx scheme

Marking: Ex db IIB T4 Gb
Ex h IIB T4 Gb
Ex: Area classification according to AS 2430.1.
db: Flame protection in compliance with IEC 60079-1:2014.
IIB: Suitable for use in explosive atmospheres (not in mines).
Gas classification, see IEC 60079-0:2004, Attachment A. Gas group B includes gas group A.
T4: The max. surface temperature is 135°C according to IEC 60079-0.
Gb Appliance protection level.

7. INSTALLATION

The product must only be installed in dedicated technical spaces and/or premises, accessible only to qualified, trained and experienced personnel. Access to these rooms must be controlled and/or restricted, e.g. by means of keys and/or padlocks.

Installation, electrical and hydraulic connections, testing and commissioning must only be carried out by qualified, trained and experienced personnel.

Installation, maintenance, repairs or transport must only be carried out by Specialised Personnel who must only follow operations and manoeuvres within their competence and of which they are fully aware

Wear protective clothing

Wear goggles and gloves

When using the system for domestic water supply, follow the local regulations put in place by water management authorities.

Wear ear protectors

- The pumps may contain a small quantity of water left over from testing.
- pumps may be blocked due to inactivity and/or prolonged storage: check and unblock as described in paragraph Direction of rotation (for three-phase pumps).
- Prevent metal pipes from transmitting excessive stresses to the pump ports, so as not to create deformation or breakages.
- The diameter of the suction pipe must be greater than/equal to the diameter of the pump port.
- The pump must be installed under conditions appropriate to the specificities of the product.
- The pump must be installed as described in the manual, in compliance with the laws, directives and standards in force at the use site and in accordance with the application.
- The location must allow for proper operability without requiring awkward postures to be maintained.

Carefully follow the advice in this chapter to carry out correct electrical, hydraulic and mechanical installation. Before attempting installation work, make sure that the power supply is switched off. Strictly respect the electric supply values indicated on the electrical data plate.

The pump must be connected to an efficient earthing system. Failure to comply with the instructions associated with this sign may cause harm to persons, animals and property.

7.1. Setup

The construction of tanks, reservoirs or sinkholes where the electropump is to be housed, as well as its positioning with respect to the level of the sewage network, are subject to standards and legal regulations that must be respected.

7.1.1. Types of installation

The FX RANGE pumps are designed for two installation types:

- free-standing submersible installation with anti-sinking disc accessory. (Fig.8)
- submerged installation on automatic coupling. The automatic coupling system facilitates maintenance and service as the pump can be easily removed from the tank. (Fig.10)

Before installation, check that the bottom of the tank is flat and uniform.

Check that pit, pool or tank are well dimensioned and that water level assures a correct running of electric pump with limited number of starts per hour.

For mobile installations we recommend the use of a support disc kit (Fig 8) to prevent the pump from sinking into the ground during operation due to suction. In any case, create a support surface that is as solid as possible.

7.2. Level switches

FX RANGE Automatic Pumps, version MA (Fig.12)

The pumps in the FX RANGE range in the MA single-phase automatic version are supplied complete with adjustable float switch. This allows the pump to be switched on and off autonomously according to the level of the liquid inside the tank.

Make sure that the float switch can move freely in the tank without obstacles. Adjust the float switch so that it switches off before the minimum pumping level. The pump can work with the motor uncovered only for short periods (10min).

FX RANGE Non Automatic Pumps. version MNA and TNA (Fig.13)

The non-automatic version of the FX RANGE range of pumps (MNA and TNA) requires a control panel connected to float switches or to another level monitoring system.

Stop Level: The stop level or float switch must be positioned so that the pump or pumps, for multiple installations, stop before the minimum pumping level is reached.

Start level: In tanks with one pump, set the start level so that the pump is started once the requested level is reached, the pump must always be started before the liquid level reaches the bottom inlet pipe to the tank.

2-pump start level: In tanks with two pumps, the **start level switch** for pump 2 must start the pump before the liquid level reaches the bottom inlet pipe to the tank, and the start level switch for pump 1 must start this pump correspondingly earlier.

If installed, always install the **high-level alarm switch** about 10 cm above the start level switch; however, the alarm must always be given before the liquid level reaches the bottom inlet pipe to the tank.

For further information on electric panels and the respective use of level switches, contact DAB Pumps.

Switches or sensors in potentially explosive environments must be certified for this application.

7.3. Installation with accessories

See Fig.9, 10, 11.

7.4. Electrical connection

Installation, electrical and hydraulic connections, testing and commissioning must only be carried out by qualified, trained and experienced personnel.

Attention: always respect the safety regulations!

A device must be provided in the power supply network to ensure complete disconnection under the conditions of overvoltage category III. When the switch is in open position, the distance between contacts must comply with that shown in the table below:

Minimum distance between power switch contacts		
Power supply range (V)	> 127 and ≤ 240	> 240 and ≤ 480
Minimum distance (mm)	> 3	> 6

Table 4

Ensure that the mains voltage is the same as that stated on the product's CE marking (data plate).

In order to improve immunity to radiated noise to other equipment, we recommend using a separate, isolated and dedicated electrical duct to supply the product.

Single-phase motors are equipped with thermo-amperometric protection and are connected directly to the mains.

Three-phase motors must be protected with a circuit breaker (e.g. magnetothermal switch) calibrated to the pump's plate data.

The control panel and respective electrical equipment, when contemplated, must be of a type approved by the safety regulations in force. Instruments and components of the panel must be of an adequate capacity and quality to maintain reliable operation over time.

In potentially explosive environments, the electrical connection and the control panel must be provided with explosion-proof protection.

Before making the electrical connection, turn off the power and ensure that it cannot be reconnected accidently. Connect the earth lead before connecting the line leads; if the electropump has to be removed or dismantled, the earth lead must be removed last.
The installer is responsible for ensuring that the earthing system is efficient and made in compliance with the regulations in force.

For explosion-proof pumps the electrical and equipotential connection must be made according to standard EN 60079-14.

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

If the power cable is damaged, it must be replaced by the manufacturer's service centre or by another qualified person.

On explosion-proof pumps, make sure that an external earth conductor is connected to the external earth terminal on the pump. The section of the earth lead must be at least 4mm², yellow/green.

Make sure that the earth connection is protected from corrosion. Make sure that all protective equipment has been connected correctly. Float switches used in potentially explosive environments must be approved for this application.

Set the motor-protective circuit breaker to the rated current of the pump. The rated current is stated on the pump nameplate.

The supply voltage and frequency are marked on the pump nameplate. The voltage tolerance must be within - 10 %/+ 10 % of the rated voltage. Make sure that the motor is suitable for the power supply available at the installation site.
All the pumps are supplied with a 10 m cable and a free cable end. For greater lengths contact the DAB Pumps technical assistance service. The connections of the pump protection system, such as thermal protections and oil-in-water sensor, are to be provided by the user, who must use a control panel with suitable characteristics.

7.4.1. Power supply connection and earthing

Connect the prepared earthing terminal (with the adjacent symbol in the terminal board) to the protective conductor (PE) as required by the relevant regulations.

Attention: always respect the safety regulations! The electrical installation must be carried out by an experienced, authorised electrician who assumes all responsibility

The power input terminals are marked with the letters L and N if a single-phase power supply is used, and with the letters U, V, W if a three-phase power supply is used. See (Fig.15A and 15B). Be careful to connect the phases correctly.

7.4.2. Wiring diagrams

See Fig.24 and 25.

7.5. Thermal switch

CAUTION: to avoid risks arising from inadvertent resetting of the thermal protection device, this appliance must not be powered via an external switching device, such as a timer, nor connected to a circuit that is regularly switched on and off from the mains.

The installation must provide suitable means for disconnection, which must be incorporated into the fixed wiring according to the regulations in force in the country where the product is to be installed.

Overcurrent and short-circuit protection must be correctly sized.
Omnipolar protective devices must be installed.

All FX RANGE pumps have thermal protection incorporated in the stator windings (see wiring diagrams, contacts k1, k2) See parag. 7.4.2.
In some motors the thermal switches are fitted inside and in series with the motor winding and intervene by opening and interrupting the circuit when an excessive temperature is reached in the windings (about 150°C).
In some motors, the thermal switches are fitted inside the motor windings and it is recommended to connect the 2 output wires (white K1-K2) to a device with a coil located inside a control panel. They intervene by opening and interrupting the circuit when an excessive temperature is reached in the windings (about 150°C).

Non explosion-proof pumps

For correct operation the thermal switch must be connected to a device for interrupting the power supply circuit of the electropump. When the electropump has cooled, once the circuit of the thermal switch has been reset, the device can automatically restart the pump.

Explosion-proof pumps

The device for interrupting the power supply circuit of explosion-proof pumps must not restart the pump automatically. This ensures protection against over temperature in potentially explosive environments.

8. COMMISSIONING

When starting up for the first time, open the valve on the suction side completely and then power the system.

8.1. Start-up

For the first start-up, follow the steps below:

- For correct start-up, make sure you have followed the instructions given in 7 INSTALLATION
- and 8 COMMISSIONING and the respective subsections;
- Check water is present;
- Provide electric power supply;
- Check direction of rotation.

Before starting work on the pump, check that the main switch is off. It must be ensured that the power supply cannot be accidentally switched on. Make sure that all protective equipment has been connected correctly. The pump must not run dry.

The pump must not be started if the atmosphere in the tank is potentially explosive.

Before starting the pump, check that it is suitably connected to the pumping system to avoid uncontrolled leakage of liquid.

Do not put your hands or any tool into the pump suction or discharge port after the pump has been connected to the power supply.

8.2. General start-up procedure

This procedure applies to new installations as well as after service inspections if start-up takes place some time after the pump was placed in the tank.

- After long periods of storage, check the conditions of the oil in the oil chamber. See also section 9.2 Routine maintenance.
- Check that the system, bolts, gaskets, pipework and valves etc. are in correct condition.
- Mount the pump in the system.
- Switch on the power supply.
- Check whether the monitoring units, if used, are operating satisfactorily.
- Check the setting of the float switches or of the level sensors.
- Check that the impeller can turn freely by briefly starting the motor.
- Check the direction of rotation. See section 8.3 Direction of rotation (for three-phase pumps).
- Open the isolating valves, if fitted.
- Check that the liquid level is above the pump motor.
- Start the pump and let the pump run briefly, and check if the liquid level is falling.
- Observe if the discharge pressure and input current are normal. If not there might be air trapped inside the pump (See section 7 INSTALLATION)

In case of abnormal noise or vibrations from the pump, other pump failure or power supply failure or water supply failure, stop the pump immediately. Do not attempt to restart the pump until the cause of the fault has been found and the fault corrected.

After one week of operation or after replacement of the shaft seal, check the condition of the oil in the chamber. For pumps without sensor, this is done by taking a sample of the oil. See section 9 MAINTENANCE for procedure. Every time the pump has been removed from the tank, go through the above procedure when starting up again.

8.3. Direction of rotation (for three-phase pumps)

The pump may be started for a very short period without being submerged to check the direction of rotation.

At first start-up and/or after long periods of inactivity (approx. two months), with three-phase power supply, check the direction of rotation.

Check the direction of rotation before starting up the pump. An arrow on the motor housing indicates the correct direction of rotation. Correct direction of rotation is clockwise when viewed from above.

8.3.1. Checking the direction of rotation

The direction of rotation should be checked in the following way every time the pump is connected to a new installation.

Procedure

- Let the pump hang from a lifting device, e.g. the hoist used for lowering the pump into the tank.
- Start and stop the pump while observing the movement (jerk) of the pump. If connected correctly, the pump will rotate clockwise, i.e. it will jerk counter-clockwise. See Fig.14. If the direction of rotation is wrong, interchange any two of the phases in the power supply cable.

8.4. Stopping

The appliance must be switched off whenever a malfunction occurs (see chap. 12 TROUBLESHOOTING).
The product is designed for continuous operation. It can only be switched off by disconnecting the power supply using the disconnection systems provided (see 7.4 Electrical connection).

9. MAINTENANCE

Routine maintenance work, limited to checking, cleaning or replacing limited parts, may be carried out only by expert and qualified personnel, provided with suitable equipment, who know the safety regulations for the working environment and have read and carefully checked the content of this manual and of any other documentation attached to the product.
Special maintenance or repairs must be entrusted to authorised Dab Pumps service centres.

Disconnect and padlock the power supply before starting any work on the system.

Disconnect the pump from the power supply (electrical and water) before carrying out any maintenance work, including cleaning the filter.

Before starting any work on the system or troubleshooting, ensure that the main switch is off and that the power supply cannot be switched on again accidentally. Check that all the protection systems are correctly connected and that all the rotating parts are stopped.

Maintenance work on explosion-proof pumps must be carried out by DAB Pumps or a service workshop authorized by DAB Pumps. However, this does not refer to hydraulic components such as the pump body, the impeller and the mechanical seal.

The replacement of the cable must be carried out exclusively by the manufacturer's service centre or by another qualified person.

The pump may have been used for pumping liquid that is harmful to health, contaminated or toxic. Take all the precautions concerning health and safety before carrying out maintenance or repairs.

Wear protective clothing

Wear goggles and gloves

Wear ear protectors

After a prolonged period of use it may become difficult to remove parts in contact with the water: for this purpose use a suitable solvent found on the market and where possible a suitable extractor. It is recommended not to apply force on the various parts with unsuitable tools.

Use genuine spare parts only for repairs.
Select the spare parts to be ordered, consulting the exploded drawings available on the DAB Pumps site or the DNA selection software.
The manufacturer declines any responsibility for eventual damages to persons, animals or things for maintenance and repair interventions carried out by unauthorized personnel or with no genuine spare parts.

Specify the following information when ordering spare parts:
- The type of electric pump.
- Serial number and manufacturing year.
- Denomination and reference number of the spare parts.
- Required number of parts.

Installation, maintenance, repairs or transport must only be carried out by Specialised Personnel who must only follow operations and manoeuvres within their competence and of which they are fully aware.
Cleaning, checks and inspections to be carried out by the user must not be carried out in the presence of unsupervised children.

9.1. Periodic checks

After long periods of inactivity (approx. two months), use a flat blade screwdriver similar to the one shown to check the direction of rotation, to check that the parts are released.

Checks may be carried out by the equipment operator, whereas maintenance work must be carried out by trained, experienced and authorised personnel.

Monthly checks and inspections:

- Clean the filter regularly;
- Integrity of the casing and controls;
- Integrity of the power supply;
- Functionality of the residual current device (monthly RCD test) protecting the equipment;
- No chemicals in the vicinity of the equipment;
- No dirt, dust and build-up on the hidden parts of the equipment and on the motor vents;
- No degradation or wear of the covering and power cables;
- No water leaks;
- No abnormal noise;
- No functional or performance faults on the equipment and/or pump;
- Check that there are no swimming pool chemicals inside the pump and filter compartment.

Routine maintenance, to be carried out if common problems are detected:

- Tighten pipes and replace seals where necessary;
- Replace fuses and/or protective devices when tripped;
- Regularly check the current absorption, the manometric head with the port closed and the maximum flow rate, which will enable faults or wear to be detected early.
- Clean mechanical components.

Other generic regular checks are outlined below.

MAINTENANCE, CHECKS, INSPECTIONS AND CLEANING	FREQUENCY
General cleaning General cleaning of the line (especially dust) and surrounding areas.	Daily or according to use
Electrical cables Check the protective covering on the electrical cables for cuts, stripping, crushing, etc. and replace them if necessary.	Yearly
Electric control devices Check that there is no cracking or deformation, and check the condition of the connecting cables. Check the efficiency of the cooling systems, connectors and piping. Check the lettering and symbols are legible and in good condition and restore them if necessary.	Six-monthly
Electric motors Check that there is no cracking or deformation. Check that there are no breakages. Check the tightness of cables, seals, screws and bolts on parts that are subject to vibration and loads during operation. Check the efficiency of the cooling systems. Check the power cables for cuts, stripping and crushing.	Yearly
Safety signs Check the safety signs are legible and in good condition.	Weekly
Abnormal noise Check for vibrations and malfunctions.	Daily
Capacitors Replace the capacitors	Class A expected service life 30,000 hours Class B expected service life 10,000 hours

Table 5

9.2. Routine maintenance

Pumps running normal operation should be inspected every 3000 operating hours or at least once a year. If the pumped liquid is very muddy or sandy, inspect the pump at shorter intervals.

Check the following points:

9.2.1. Power consumption

See pump nameplate.

9.2.2. Oil level and oil condition

When the pump is new or after replacement of the shaft seal, check the oil level and water content after one week of operation. If there is more than 20 % extra liquid (water) in the oil chamber, the shaft seal is defective. The oil should be changed after 3000 operating hours or once a year.

9.2.3. Cable entry

Make sure that the cable entry is watertight (visual inspection) and that the cable is not sharply bent and/or pinched.

9.2.4. Pump parts

Check impeller, pump housing, etc. for possible wear. Replace defective parts.

9.2.5. 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 done by an assistance workshop authorised by **DAB Pumps**.
The ball bearings used are sealed and lubricated, using a special lubricant for high temperatures (-40°C + 150°C).

Defective bearings may reduce the Ex safety.
The bearings must be replaced every 10.000 hours.

9.2.6. O-rings and similar parts

During service/replacement, it must be ensured that the grooves for the O-rings as well as the seal faces have been cleaned before the new parts are fitted.

Used rubber parts must not be reused.

9.2.7. Oil change (Fig.15)

After 3000 operating hours or once a year, change the oil in the oil chamber as described below.
If the shaft seal has been replaced, the oil must be changed.

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

9.2.8. Draining of oil

- Place the pump on a plane surface with one oil screw pointing downwards.
- Place a suitable container (approx. 1 litre), for instance made of transparent plastic material, under the oil screw.

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

- Remove the lower oil screw.
- Remove the upper oil screw. If the pump has been in operation for a long period of time, if the oil is drained off shortly after the pump has been stopped, and if the oil is greyish white like milk, it contains water. If the oil contains more than 20 % water, it is an indication that the shaft seal is defective and must be replaced. If the shaft seal is not replaced, the motor will be damaged. If the quantity of oil is smaller than the quantity stated, the shaft seal is defective.
- Clean the faces for the gaskets for oil screws.

9.2.9. Filling with oil

- Rotate the pump so that one of the two oil holes in a vertical position facing upwards.
- Pour the oil into the chamber. The suitable amount of oil is indicated by the second oil venting hole (positioned beside the vertical filling hole). Once the oil has reached and escapes from the hole at the side, the oil quantity is correct.
- Fit the oil screws with new gaskets.

The table shows the quantity of oil in the oil chamber of FX RANGE pumps. Oil type: ESSO MARCOL 152.

	Motor type		
	2poles >= 1.5kw	**2poles <= 1.1kw**	**4poles**
NoAtex	0.68 [l]	0.58 [l]	0.65 [l]
Atex	0.75 [l]	0.65 [l]	0.72 [l]

Table 6

9.2.10.Screws

Replace any damaged screws only with equivalent screws ISO 4762/DIN 912.

Material	Property class UNI EN ISO 3506-1	Minimum tensile strength [MPa]	Minimum yield stress [MPa]
Stainless Steel AISI 304	A2-70	700	450

Table 7

9.2.11.Capacitor change (Fig.16)

9.2.12.Impeller cleaning (Fig. 17)

9.2.13.Mechanical Seal replacement (Fig.18)

9.2.14.Float replacement (Fig.22)

9.2.15.Cutter change (for FX-G Fig.23)

9.3. Special maintenance

Special maintenance operations must be carried out exclusively by an assistance workshop authorised by **DAB Pumps**.

For explosion-proof pumps, flameproof joints are not intended to be repaired.

9.4. Contaminated pumps

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

If you are asking to have a pump repaired, you must contact the service centre to give them the details about the pumped liquid, etc., before sending the pump for repair. Otherwise, the service centre may refuse to accept the pump.
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.
Before a pump is returned, it must be cleaned in the best possible way before it is returned.

9.5. CE Marking

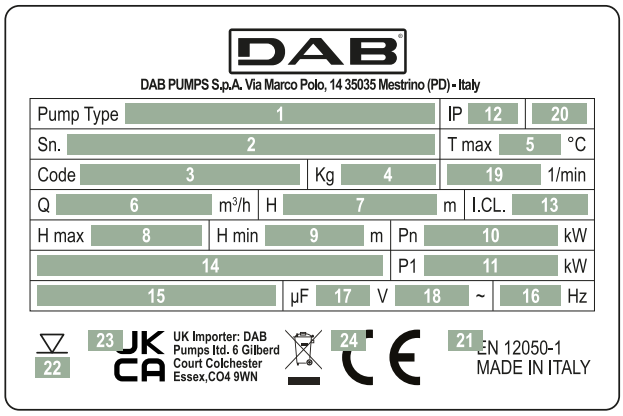


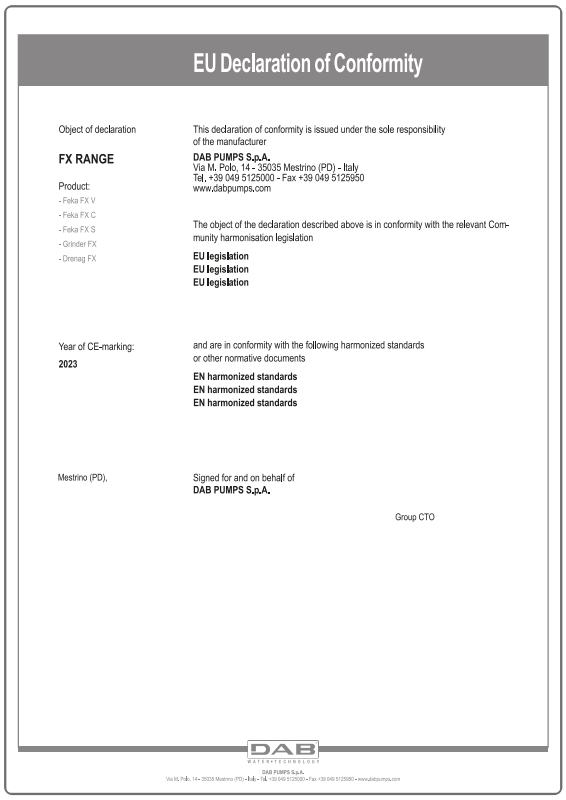
Figure 5 Facsimile Product Name CE Marking

Consult the Product configurator (DNA) available on the DAB PUMPS website.
The platform allows you to search for pumps by hydraulic performance, model or article number. Technical data sheets, spare parts, user manuals and other technical documentation can be obtained.

https://dna.dabpumps.com/

10. DECLARATION OF CONFORMITY

For the product indicated in chapter 2.1, we declare that the device described in this instruction manual and marketed by us complies with the relevant EU health and safety regulations.
A detailed and updated declaration of conformity is available with the product.
If the product is modified in any way without our consent, this statement will become invalid.



EU Declaration of Conformity

Object of declaration

FX RANGE

Product:
- Feka FX V
- Feka FX C
- Feka FX S
- Grinder FX
- Drenag FX

This declaration of conformity is issued under the sole responsibility of the manufacturer

DAB PUMPS S.p.A.
Via M. Polo, 14 - 35035 Mestrino (PD) - Italy
Tel. +39 049 5125000 - Fax +39 049 5125950
www.dabpumps.com

The object of the declaration described above is in conformity with the relevant Community harmonisation legislation

EU legislation
EU legislation
EU legislation

Year of CE-marking:
2023

and are in conformity with the following harmonized standards or other normative documents

EN harmonized standards
EN harmonized standards
EN harmonized standards

Mestrino (PD),

Signed for and on behalf of
DAB PUMPS S.p.A.

Group CTO

Figure 6 Facsimile of EU Declaration of Conformity

11. GUARANTEE

DO NOT ALTER THE PERFORMANCE, CHARACTERISTICS, FUNCTIONALITY AND USE INTENDED BY THE MANUFACTURER.
Any modification made without prior authorisation relieves the manufacturer of all responsibility.

The manufacturer is not liable for the proper functioning of pumps or any damage caused by them if they are tampered with, modified and/or operated outside the recommended working range or contrary to other provisions in this manual.

DAB undertakes to ensure that its Products comply with what has been agreed and are free from original defects and faults connected with their design and/or manufacture that make them unsuitable for the use for which they are normally intended.

For more details on the Legal Guarantee, please read the DAB Guarantee Conditions published on the website https://www.dabpumps.com/en or request a printed copy by writing to the addresses published in the “contact” section.

12. TROUBLESHOOTING

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 power supply cannot be accidentally switched on. All rotating parts must have stopped moving.

Before starting to look for faults it is necessary to disconnect and padlock the power supply to the pump (unplug from the socket).

All regulations applying to pumps installed in potentially explosive environments must be observed. It must be ensured that no work is carried out in potentially explosive atmosphere.

When performing checks or inspections refer to the safety regulations stated in this manual or the attachment.

Installation, maintenance, repairs or transport must only be carried out by Specialised Personnel who must only follow operations and manoeuvres within their competence and of which they are fully aware.
Cleaning, checks and inspections to be carried out by the user must not be carried out in the presence of unsupervised children. If the causes require maintenance, see chapter 9 MAINTENANCE.

PROBLEMS	PROBABLE CAUSES	REMEDIES
Failure in electric pump.	1. Insufficient voltage	1. Check the motor input voltage value (see 1 TECHNICAL CHARACTERISTICS).
	2. No motor power	2. Check the power line, the power wiring, the connections and the fuses.
	3. Thermal overload switch has tripped. a) single-phase motor b) three-phase motor	a) Wait until cooling has occurred b) Reset the thermal overload switch and check it is calibrated properly.
	4. The thermal switch on the panel or automatic residual current device on the main electrical panel have tripped.	4. Check the insulation on the electric pump wires, the electric pump itself or the floats. Reset the thermal switch inside the panel or the residual current device on the main electrical control panel.
	5. Automatic float switch jammed.	5. Clean, inspect and make sure it is working properly
	6. Level sensors or floats fail to enable start.	6. Wait for level to be restored, inspect the sensors, floats and relative equipment and make sure they are all working properly.
	7. Faulty control panel.	7. Where possible try to bypass the control panel by connecting the pumps directly to the power supply. If necessary contact the DAB Assistance Service.
	8. Impeller jammed.	8. Remove obstruction, wash and clean: if necessary contact the DAB Assistance Service.
	9. Electric pump not working.	9. Contact the DAB Assistance Service.
Electric pump starting with thermal protection intervention	1. Power voltage differs from that stated on ID plate.	1. Check motor input voltage. If necessary contact electricity provider.
	2. Three-phase motor. Phase interruption.	2. Restore motor power connections, then check for proper current absorption.
	3. Three-phase motor. Relay calibrated at too low a value.	3. Adjust relay calibration, set it to a value slightly higher than that shown on the motor ID plate.
	4. Thermal overload relay faulty	4. Replace the faulty relay, check the system is working properly.
	5. Impeller jammed.	5. Remove obstruction, wash and clean: if necessary contact the DAB Assistance Service.
	6. Incorrect direction of rotation	6. Reverse direction of rotation (see 8.3 Direction of rotation (for three-phase pumps))
	7. Pumped liquid too dense.	7. Dilute the liquid. Check the pumped liquid is suitable (see 1 TECHNICAL CHARACTERISTICS).
	8. Electrical pump dry-running.	8. Check the level of liquid in the tank and the level control instruments.

	9. Operation point outside working range.	9. Check electric pump operation point, check delivery pipe characteristics and components. If necessary contact the DAB Assistance Service.
	10. Electric pump not working.	10. Contact the DAB Assistance Service.
Electric pump drawing more power than value shown on ID plate.	1. Power voltage differs from that stated on ID plate.	1. Check motor input voltage. If necessary contact electricity provider.
	2. Three-phase motor. Phase interruption.	2. Restore motor power connections, then check for proper current absorption.
	3. Incorrect sense of rotation.	3. Reverse direction of rotation (see 8.3 Direction of rotation (for three-phase pumps))
	4. Impeller jammed.	4. Remove obstruction, wash and clean: if necessary contact the DAB Assistance Service.
	5. Pumped liquid too dense.	5. Dilute the liquid. Check the pumped liquid is suitable (see 1 TECHNICAL CHARACTERISTICS).
	6. Operation point outside working range.	6. Check electric pump operation point, check delivery pipe characteristics and components. If necessary contact the DAB Assistance Service.
	7. Electric pump not working.	7. Contact the DAB Assistance Service.
Performance too low, the pump does not perform as required.	1. Incorrect direction of rotation	1. Reverse direction of rotation (see 8.3 Direction of rotation (for three-phase pumps))
	2. Operation point outside working range.	2. Check electric pump operation point, check delivery pipe characteristics and components. If necessary contact the DAB Assistance Service.
	3. Liquid pumped with air or gas present.	3. Increase collection tank size. Install de-gassing devices.
	4. Pumped liquid too dense.	4. Dilute the liquid. Check the pumped liquid is suitable (see 1 TECHNICAL CHARACTERISTICS).
	5. Pump not primed, air inside pumping body	5. Check pump priming
	6. Electric pump not working.	6. Contact the DAB Assistance Service.

Table 8 Troubleshooting

APPENDICES SECTION

1. TECHNICAL CHARACTERISTICS

Consult the Instructions Booklet and the data plate to check the following technical data:

- Electric Power Supply.
- Construction Characteristics.
- Hydraulic Performance.
- Working Conditions.
- Pumped liquids.

Pos.	Description
1	Pump Designation
2	Serial number
3	Model Code
4	Weight (with 10m cable)
5	Maximum liquid temperature
6	Range of flow
7	Range of head
8	Maximum head
9	Min. head
10	Rated power at the shaft
11	Rated input power
12	Enclosure class to IEC
13	Insulation class
14	Rated voltage
15	Rated current
16	Frequency
17	Capacitor capacity (not applicable)
18	Number of phases
19	Rated speed
20	Level of duty
21	Country of production
22	Maximum installation depth
23	Marking Ex/Quality marks
24	CE mark

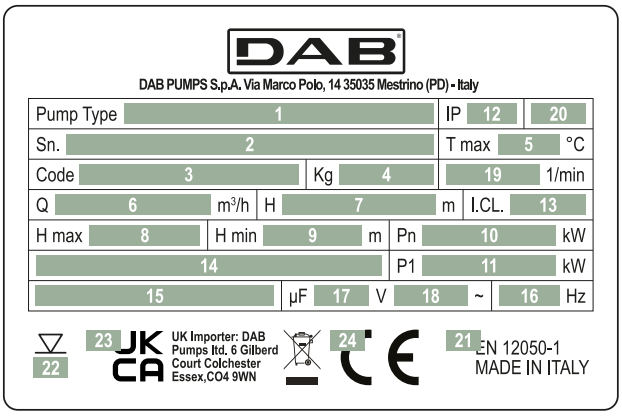


Figure 7 Nameplate