

FB/FB-ATEX Multiline pump units

Assembly instructions acc. to EC Dir. 2006/42/EC for
partly completed machinery with associated operating instructions

EN

Operating instructions acc. to Dir. 2014/34/EC, Annex X



Version 04



Multiline pump units FB; FB ATEX

Masthead

These assembly instructions with associated operating instructions according to EC Machinery Directive 2006/42/EC are an integral part of the described product and must be kept for future use.

These assembly instructions with associated operating instructions have been prepared in accordance with the established standards and rules for technical documentation, VDI 4500 and EN 292.

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Service

If you have technical questions, please contact the following addresses:

SKF Lubrication Systems Germany GmbH

Berlin Plant

Motzener Straße 35/37
12277 Berlin
Germany
Tel. +49 (0)30 72002-0
Fax +49 (0)30 72002-111
www.skf.com/lubrication

Hockenheim Plant

2. Industriestraße 4
68766 Hockenheim
Germany
Tel. +49 (0)62 05 27-0
Fax +49 (0)62 05 27-101
www.skf.com/lubrication

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EC Declaration of Incorporation according to Machinery Directive 2006/42/EC, Annex II Part 1 B

The manufacturer SKF Lubrication Systems Germany GmbH Hockenheim Plant, 2. Industriestr. 4, DE - 68766 Hockenheim hereby declares that the partly completed machinery:

Designation: **FB/FB-ATEX Multiline pump units**

Type: **FB***

Part no.: **767-* außer 767-030-***

Year of construction: See type identification plate

complies with the following basic requirements of the EC Machinery Directive 2006/42/EC at the time when first being launched in the market.

1.1.2 · 1.1.3 · 1.3.2 · 1.3.4 · 1.5.1 · 1.5.6 · 1.5.8 · 1.5.9 · 1.6.1 · 1.7.1 · 1.7.3 · 1.7.4

The special technical documents were prepared following annex VII part B of this directive. Upon justifiable request, these special technical documents can be forwarded electronically to the respective national authorities. The person empowered to assemble the technical documentation on behalf of the manufacturer is the head of standardization; see manufacturer's address.

Furthermore, the following directives and harmonized standards were applied in the respective applicable areas:

2011/65/EU

RoHS II

2014/30/EU

Electromagnetic compatibility | Industry

Standard	Edition	Standard	Edition	Standard	Edition	Standard	Edition
DIN EN ISO 12100	2011	DIN EN 60947-5-1	2010	DIN EN 61000-6-2	2006	DIN EN 61000-6-4	2011
DIN EN 809	2012	DIN EN 61131-2	2008	Amendment	2011	DIN EN 60947-5-1	2010
DIN EN 60204-1	2007	Amendment	2009	DIN EN 61000-6-3	2011		
Amendment	2010	DIN EN 60034-1	2015	Amendment	2012		
DIN EN 50581	2013	DIN EN 61000-6-1	2007				

The partly completed machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of the EC Machinery Directive 2006/42/EC and any other applicable directives.

Hockenheim, den 17.10.2016

Jürgen Kreutzkämper
Manager R&D Germany
SKF Lubrication Business Unit



Stefan Schürmann
Manager R&D Hockenheim/Walldorf
SKF Lubrication Business Unit



EU Declaration of conformity following ATEX directive 2014/34/EU, annex X

The manufacturer SKF Lubrication Systems Germany GmbH Hockenheim Plant, 2. Industriestr. 4, DE - 68766 Hockenheim hereby declares that the apparatus

Designation: **FB/FB-ATEX Multiline pump units**
 Type: **FB*D4128*; FB*D4130*; FB*D4141***
 Part numbers: **769-*; 767-***
 Year of construction: See type identification plate

Explosion Protection Identification: **CE II 2G c IIC T4 Gb => FB*D4128; FB*D4141** **CE II 2D c IIIC T 125°C Db => FB*D4130**

complies with the following basic safety and health requirements of ATEX directive 2014/34/EU and the safety and health requirements of machinery directive 2006/42/EC at the time when first being launched in the market.

1.1.2, 1.1.3, 1.3.2, 1.3.4, 1.5.1, 1.5.6, 1.5.8, 1.5.9, 1.6.1, 1.7.1, 1.7.3, 1.7.4

The special technical documents were prepared following:

ATEX directive 2014/34/EU annex VIII (2) and stored at the named institute.

Machinery directive 2006/42/EC, annex VII, part B was prepared.

We undertake to send this in electronic form to the respective authorities upon justifiable request. The authorized representative of technical documentation on behalf of the manufacturer is the head of technical standardization. See manufacturer's address.

Furthermore, the following directives and harmonized standards were applied in the respective applicable areas:

2011/65/EU RoHSII directive
 2014/30/EU EMC directive | Industry

Standard	Edition	Standard	Edition	Standard	Edition	Standard	Edition
EN ISO 12100	2011	DIN EN 1127-1	2011	DIN EN 13463-1	2009	DIN EN 50581	2013
DIN EN 809	2012	DIN EN 60204-1	2007	DIN EN 13463-5	2011		

The machinery must not be put into service until the final machinery into which it is to be incorporated has been declared in conformity with the provisions of ATEX directive 2014/34/EU of machinery directive 2006/42/EC and any other applicable directives.

Hockenheim, 25/04/2016
 Jürgen Kreutzkämper
 Manager R&D Germany
 SKF Lubrication Business Unit



Stefan Schürmann
 Manager R&D Hockenheim/Walldorf
 SKF Lubrication Business Unit



Explanation of safety and informational symbols and safety signal words

You will find these symbols, which warn of specific dangers to persons, material assets, or the environment, next to all safety instructions in these operating instructions.

Please heed these instructions and proceed with special care in such cases. Please pass all safety instructions to other users.

Instructions placed directly on the machines/ grease lubrication pump unit, such as:

- Arrow indicators
- Labels for fluid connections must be followed and kept in fully legible condition.



You are responsible!

Please read the assembly and operating instructions thoroughly and follow the safety instructions.

Hazard symbols



General hazard
DIN 4844-2-W000



Electrical voltage/current
DIN 4844-2-W008



Hot surface
DIN 4844-2-W026



Danger of being drawn into machinery
BGV 8A



Slipping hazard
DIN 4844-2-W028



Warning of potentially explosive atmosphere
DIN 4844-2-W021

Indicators used with safety instructions and their meaning

Signal word Meaning

Danger!	Danger of bodily injury
Warning!	Risk of damage to property and the environment
Note!	Provides additional information

Informational symbols



Note

- Prompts an action
- Bullet list items
- ➔ Points out other facts, causes, or consequences
- ☞ Provides additional information

1. Safety instructions



The operator of the described product must ensure that the assembly instructions are read and understood by all persons assigned with the assembly, operation, maintenance, and repair of the product. The assembly instructions must be kept readily available.



Note that the assembly instructions form part of the product and must accompany the product if sold to a new owner.

The described product is manufactured in accordance with the generally accepted rules and standards of industry practice and with occupational safety and accident prevention regulations. Risks may, however, arise from its usage and may result in physical harm to persons or damage to other material assets. Therefore the product may only be used in proper technical condition and in observance of the assembly instructions. In particular, any malfunctions which may affect safety must be remedied immediately.



In addition to the assembly instructions, statutory regulations and other general regulations for accident prevention and environmental protection must be observed and applied.

1.1 Intended use

Pump units of SKF's FB series are used to supply centralized lubrication systems in vehicles, systems and machines.

They deliver mineral oils or environmentally friendly oils from ISO VG 46 and greases up to NLGI Grade 3. The technical data specifications in Chapter 10 in the operating instructions must be adhered to.

Only media approved for these types of pump units may be used. Unsuitable media may result in pump unit failure and potentially severe bodily injury and property damage. The use of synthetic and biodegradable oils requires prior approval from SKF Lubrication Systems Germany GmbH. Any other usage is deemed non-compliant with the intended use.

1.2 Authorized personnel

Only qualified technical personnel may install, operate, maintain, and repair the products described in the assembly instructions. Qualified technical personnel are persons who have been trained, assigned, and instructed by the operator of the final product into which the described product is incorporated. Such persons are familiar with the relevant standards, rules, accident prevention regulations, and assembly conditions as a result of their training, experience, and instruction. They are qualified to carry out the necessary actions and in doing so recognize and avoid potential hazards. The definition of trained personnel and the prohibition against employing non-qualified personnel are laid down in DIN VDE 0105 and IEC 364.

1.3 Electric shock hazard

Electrical connections for the described product may only be established by qualified and trained personnel authorized to do so by the operator, and in observance of the local conditions for connections and local regulations (e.g., DIN, VDE). Serious injury or death and property damage may result from improperly connected products.

**Danger!**

Performing work on an energized pump or product may result in serious injury or death.

Assembly, maintenance and repair work may only be performed on products that have been de-energized by qualified technical personnel. The supply voltage must be switched off before opening any of the product's components.

**Danger!**

The protective earth connector must always be connected. Ensure that the contact is secure and that the connector diameter is adequate and standard-compliant.

**Warning!**

Dangerous contact voltages may arise on the unit if the protective earth connector is not connected or is disconnected.

1.4 System pressure hazard



Lubrication systems are pressurized during operation. Centralized lubrication systems must therefore be depressurized before starting assembly, maintenance or repair work, or any system modifications or system repairs.

1.5 Hydraulic pressure hazard



The described product is pressurized during operation. The product must therefore be depressurized before starting assembly, maintenance or repair work, or any system modifications or system repairs.

1.6 Explosion protection information



Danger!

Only the FB pump models tested and approved by SKF Lubrication Systems Germany GmbH in accordance with ATEX Directive 2014/34/EC are permitted to be used in potentially explosive areas. The relevant class of protection is engraved on the pump's rating plate.

- When filling lubricant into the pump, make sure the lubricant is clean. The reservoir must be filled in good time (pay attention to fill level monitoring). The lubricant may only be filled via the filler socket G 12" on the pump flange. Lubricant may only be filled via the "reservoir cover" if absolutely certain that no potentially explosive atmosphere exists.
- In case of overfilling, the excessive amount of lubricant must be removed. Make sure there is no potentially explosive atmosphere when doing this.
- The switching circuits of the fill level monitor must be supplied by an intrinsically safe circuit, e.g., through the installation of an ATEX-compliant isolating

switch by the customer.

The unit must be grounded via a ground connection. The customer must install adequate overload protection for the power consumption of the motor.

- To avoid electrostatic discharge, lay hydraulic connecting lines in corrosion-resistant metal tubing, e.g., stainless steel pipe.
- When setting up the pump, make sure the setup location is level and not subject to vibrations or jolts.
- During maintenance work, use only tools intended for use in potentially explosive spaces or else make certain that there is no potentially explosive atmosphere present.
- The service life of the grease/oil lubrication pump is limited. It must therefore undergo a function and leak test at regular intervals. Perform appropriate repairs in the event of malfunctions, leaks, or rust. Replace the pump if necessary.
- The user must make sure through the choice of the lubricant to be delivered that no chemical reactions capable of serving

as ignition sources will occur in conjunction with the explosive atmospheres expected.

The lubricant's ignition temperature has to be at least 50 Kelvin above the pump's maximum surface temperature (temperature class).

- Prior to commissioning the FB-ATEX multiline pump, the operator must have performed all ATEX-relevant safety precautions and ATEX tests. The tests must conform with the prescribed standard.
- Prior to commissioning the FB-ATEX multiline pump, the operator must have checked that there is no explosive atmosphere in the vicinity of the FB-ATEX multiline pump.

2. Lubricants

2.1 General information



All products from SKF Lubrication Systems Germany GmbH may be used only for their intended purpose and in accordance with the information in the product's assembly instructions.

Intended use is the use of the products for the purpose of providing centralized lubrication/ lubrication of bearings and friction points using lubricants within the physical usage limits which can be found in the documentation for the devices, e.g., assembly instructions/operating instructions and the product descriptions, e.g., technical drawings and catalogs.

Hazardous materials of any kind, especially the materials classified as hazardous by CLP Regulation EC 1272/2008 may only be used to fill SKF centralized lubrication systems and components and delivered and/or distributed with the same after consulting with and receiving written approval from SKF.

No products manufactured by SKF Lubrication Systems Germany GmbH are approved for use in conjunction with gases, liquefied gases,

pressurized gases in solution, vapors, or such fluids whose vapor pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at their maximum permissible temperature.

Other media which are neither lubricant nor hazardous substance may only be fed after consulting with and obtaining written approval from SKF Lubrication Systems Germany GmbH. SKF Lubrication Systems Germany GmbH considers lubricants to be a component of the system design which must be factored into the selection of components and the design of centralized lubrication systems. The lubricating properties of the lubricants are critically important in these considerations.

2.2 Selection of lubricants



Observe the instructions from the machine manufacturer regarding the lubricants that are to be used.



Warning!

The amount of lubricant required at a lubrication point is specified by the bearing or machine manufacturer. It must be ensured that the required quantity of lubricant is provided to the lubrication point. The lubrication point may otherwise not receive adequate lubrication, which can lead to damage and failure of the bearing.

The selection of a lubricant suitable for the lubrication task is made by the machine/system manufacturer and/or the operator of the machine/system in cooperation with the lubricant supplier.

When selecting a lubricant, the type of bearings/friction points, the expected load during operating, and the anticipated ambient conditions must be taken into account. All economic and environmental aspects must also be considered.



SKF Lubrication Systems Germany GmbH supports customers in the selection of suitable components for feeding the selected lubricant and in the planning and design of a centralized lubrication system.

Please contact SKF Lubrication Systems Germany GmbH if you have further questions regarding lubricants. Lubricants can be tested in the company's laboratory for their suitability for pumping in centralized lubrication systems (e.g., "bleeding").

You can request an overview of the lubricant tests offered by SKF Lubrication Systems Germany GmbH from the company's Service department.

2.3 Approved lubricants



Only lubricants approved for the product may be used. Unsuitable lubricants can lead to failure of the product and damage to property.



Different lubricants must not be mixed, as mixing may result in damage and necessitate costly and complicated cleaning of the product/lubrication system. It is recommended that an indication of the lubricant in use be attached to the lubricant reservoir in order to prevent accidental mixing of lubricants.

The described product can be operated using lubricants that meet the specifications in the technical data. Depending on the product design, these lubricants may be oils, fluid greases, or greases.

Oils and base oils may be mineral, synthetic, and/or rapidly biodegradable. Consistency agents and additives may be added depending on the operating conditions.

Note that in rare cases, there may be lubricants whose properties are within permissible limit values but whose other characteristics render them unsuitable for use in centralized lubrication systems. For example, synthetic lubricants may be incompatible with elastomers.

2.4 Lubricants and the environment



Lubricants can contaminate soil and bodies of water. Lubricants must be properly used and disposed of. Observe the local regulations and laws regarding the disposal of lubricants.

It is important to note that lubricants are environmentally hazardous, flammable substances which require special precautionary measures during transport, storage, and processing. Consult the safety data sheet from the lubricant manufacturer

for information regarding transport, storage, processing, and environmental hazards of the lubricant that will be used.

The safety data sheet for a lubricant can be requested from the lubricant manufacturer.

2.5 Lubricant hazards



Centralized lubrication systems must always be free of leaks. Leaking lubricant is hazardous due to the risk of slipping and injury. Beware of any lubricant leaking out during assembly, operation, maintenance, or repair of centralized lubrication systems. Leaks must be sealed off without delay.

Lubricant leaking from centralized lubrication systems is a serious hazard. Leaking lubricant can create risks that may result in physical harm to persons or damage to other material assets.



Follow the safety instructions on the lubricant's safety data sheet.

Lubricants are hazardous substances. The safety instructions on the lubricant's safety data sheet must be followed. The safety data sheet for a lubricant can be requested from the lubricant manufacturer.

3. Overview

Components of the FB, FB-ATEX unit, Fig. 1



Components of the unit

Item Description

- | Item | Description |
|------|---|
| 1 | Fill level switch, 4 switching points |
| 2 | Reservoir cover (with fill level control) |
| 3 | Lubricant reservoir |
| 4 | Grease follower plate |
| 5 | Agitator |
| 6 | Pump element with ring connection, second row, pump elements 13 to 24 |
| 7 | Pump element with ring connection, first row, pump elements 1 to 12 |
| 8 | Filler socket |
| 9 | Gearbox |
| 10 | Pump motor |

Danger!

Prior to assembly of the FB-ATEX multiline pump, all safety-relevant ATEX guidelines and certificates must be present and observed. It must be ensured (checked) that no explosive atmosphere is present. The applicable ATEX guidelines must be observed.

4. Assembly

4.1 Setup and attachment

The product should be protected from humidity and vibration, and should be mounted so that it is easily accessible, allowing all further installation work to be done without difficulty. Ensure that there is sufficient air circulation to prevent the product from overheating. For the maximum permissible ambient temperature, see "Technical data."

The mounting position of the product is vertical as shown in the assembly drawing. Pressure gauges, oil level glasses, temperature gauges and other visual monitoring equipment must be clearly visible.

During assembly and especially when drilling, always pay attention to the following:

- Existing supply lines must not be damaged by assembly work.
- Other units must not be damaged by assembly work.

- The product must not be installed within range of moving parts.
- The product must be installed at an adequate distance from sources of heat.
- Maintain safety clearances and comply with local regulations for assembly and accident prevention.

4.1.1 Assembly of the pumps FB and FB in ATEX design

FB and FB-ATEX multiline pump units are already factory-mounted on a pump baseplate. The baseplate includes four assembly holes with which the multiline pump unit is flanged to the tunnel boring machinery. The pump's base plate must not be under stress. Ensure sufficient clearance during installation for later service and maintenance work (see page 16). When the reservoir is empty and its cover is removed, the agitator of the lubrication pump should be visible so that the functioning and direction of rotation of the pump can be

checked by switching the pump on briefly. The installed pump elements (see operating instructions, page 33) are set for full stroke, with the ring pieces with the check valve (5) pointing upwards. The cap nut (WAF 24) (6) keeps the ring piece pressed against the screw socket (2). If you want to point the ring piece in a different direction, loosen the cap nut and tighten it again with the prescribed tightening torque (see operating instructions, page 43) after moving the ring piece around.

The number of pump elements can also be changed later. The pump has to be shut down while this is done - see the Maintenance chapter in the operating instructions. Internal threads for installing pump elements have to be sealed off with screw plugs M 20 x 1.5 (see Chapter 11, Accessories) if not in use.

**Danger!**

The reservoir cover must be installed before turning on or commissioning the FB multiline pump units. The agitator may cause injury if the reservoir cover is not installed.

The multiline pump units are installed using 4 screws (and washers). If M18 tapped bores are used to fasten the unit, the screws must have a minimum length of 25 mm.

Fastening material to be provided by the customer:

- Hexagon head screws (3x) acc. to DIN933-M18x25-8.8
- Washers (4x) acc. to DIN 125-B21-St

- Drill assembly holes (M18) according to the assembly drawing (Fig. 2) and the conditions on the surface.
- Clean the surface to remove drilling chips.
- Place the pump unit with the mounting plate onto the surface and roughly align it.
- Pass hexagon head screws (4x) acc. to DIN933-M18-8.8 with associated washers (4x) acc. to DIN 125-B21-St through the fixing holes on the mounting plate and apply the screws to the M18 threads on the surface
- Gently tighten hexagon head screws (4x).
- Align the mounting plate and tighten the hexagon head screws with the following tightening torque:
Tightening torque 300 Nm

**Warning!**

When drilling the assembly holes, you must be careful of any supply lines or other units, as well as of other hazards such as moving parts.
Maintain safety clearances and comply with local regulations for assembly and accident prevention.

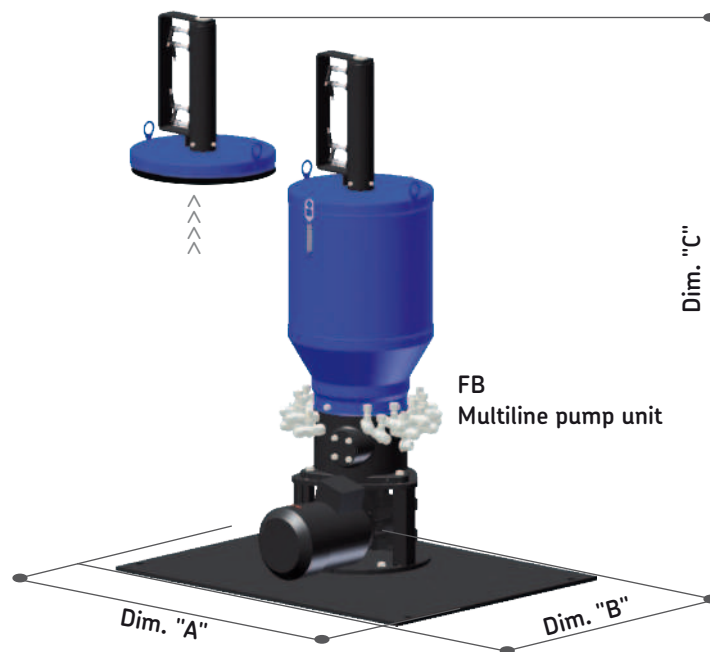
**Warning!**

Do not tilt or drop the FB multiline pump unit!

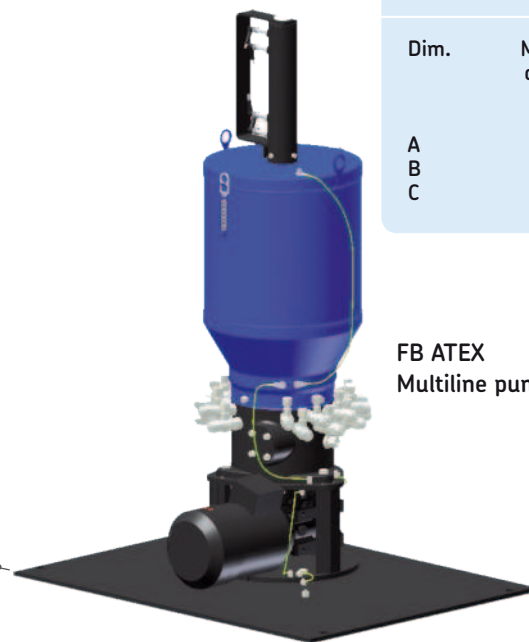
4.2 Port dimensions

4.2.1 Assembly drawing for FB and FB-ATEX

Assembly drawing for FB and FB-ATEX multiline pump unit, Fig. 2



FB
Multiline pump unit

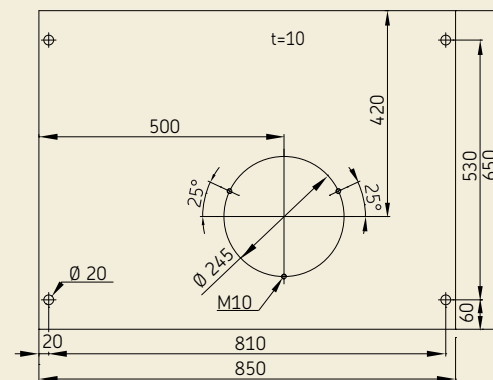
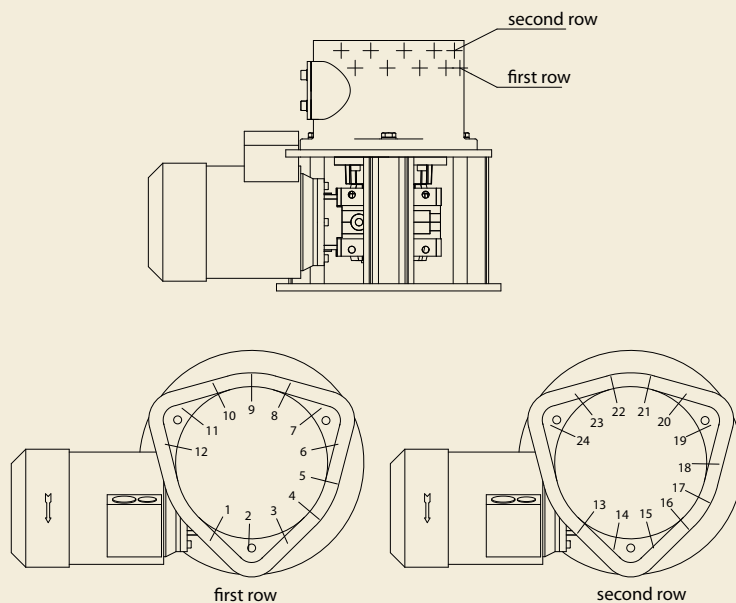


FB ATEX
Multiline pump unit

Minimum mounting dimensions

Dim.	Min. install dimension [mm]
A	950
B	750
C	1400

FB and FB-ATEX multiline pump unit, Fig. 3



Baseplate

Maximum dimensions

4.3 Electrical motor connection



Electric shock hazard

Electrical connections for the product may only be established by qualified and trained personnel authorized to do so by the operator. The local conditions for connections and local regulations (e.g., DIN, VDE) must be observed. Serious injury or death and property damage may result from improperly connected products.



Warning!

Connect lines in accordance with the technical specifications and the local conditions for connections and local regulations (e.g., DIN, VDE).

Consult the motor's rating plate for the electrical characteristics of the motor, such as rated power, rated voltage, and rated current. Observe the guidelines in EN 60034-1 (VDE 0530-1) for operation at the limits of the ranges A (combination of $\pm 5\%$ voltage deviation and $\pm 2\%$ frequency deviation) and B (combination of $\pm 10\%$ voltage deviation and

$\pm 3/-5\%$ frequency deviation). This applies especially with regard to heating and deviations in operating parameters from the ratings on the motor's rating plate. The limits must never be exceeded.

The mains voltage (supply voltage) must match the specifications on the rating plate of the motor or of the electrical components. Check the fuse protection of the electrical circuit. Use only fuses with the prescribed amperage, else bodily injury and property damage may result.

Be sure to connect the motor so as to guarantee a continuously safe electrical connection (no protruding wire ends); use the assigned cable end fittings (e.g., cable lugs, wire end ferrules). Select connecting cables conforming to DIN VDE 0100 taking into account the rated current and the conditions of the specific system (e.g., ambient temperature, type of routing, etc. in accordance with DIN VDE 0298 or IEC / EN 60204-1).

Details regarding electrical connection of the motor to the power supply, especially terminal and connector pin assignment, can be taken from the customer's drawing for the reservoir unit.



Warning!

When establishing electrical connection of the pump motor, be mindful of the correct direction of rotation of the motor.

If the direction of motor rotation is marked on the product by an arrow indicator, the motor's direction of rotation must match the arrow.

- Connect the pump unit motor according to the specifications on the motor rating plate and the motor characteristics.

4.3.1 FB motor ratings

FB motor ratings

Synchron. speed [min ⁻¹]	Frequen- cy [Hz]	Rated power [kW]	Rated voltage [V]	Rated current [A]	Order code
1500	50	0.55	230/400 (3~ AC)	2.45/1.41	AG07

Protection class IP 55, temperature class F

Note!

These data relate to the Siemens three-phase motor 1LAA 7080-4AA12. There may be differences with motors from other manufacturers.

**Danger!**

The protective earth connector must always be connected. Ensure that the contact is secure and that the connector diameter is adequate and standard-compliant.

**Warning!**

Dangerous contact voltages may arise on the unit if the protective earth connector is not connected or is disconnected.

4.3.2 FB-ATEX motor ratings

FB motor ratings

Synchron. speed [min ⁻¹]	Frequen- cy [Hz]	Rated power [kW]	Rated voltage [V]	Rated current [A]	Order code
1800	60	0.55	280/480 (3~ AC)	¹⁾	AG34

acc. to ATEX EExde II CT4, protection class IP 55, temperature class F

Note!

These data relate to the Siemens three-phase motor 1MJ60804CA12. There may be differences with motors from other manufacturers.

**Warning!**

1) For the rated current, see the ATEX motor's rating plate.

4.3.3 FB- Assembly of the electric fill level switches

Fill level switch J

Proximity switch (4x)

Design PNP, XOR,
short-circuit-proof,
reverse-polarity-
protected

Function indicator LED

Switch design 1 switching point

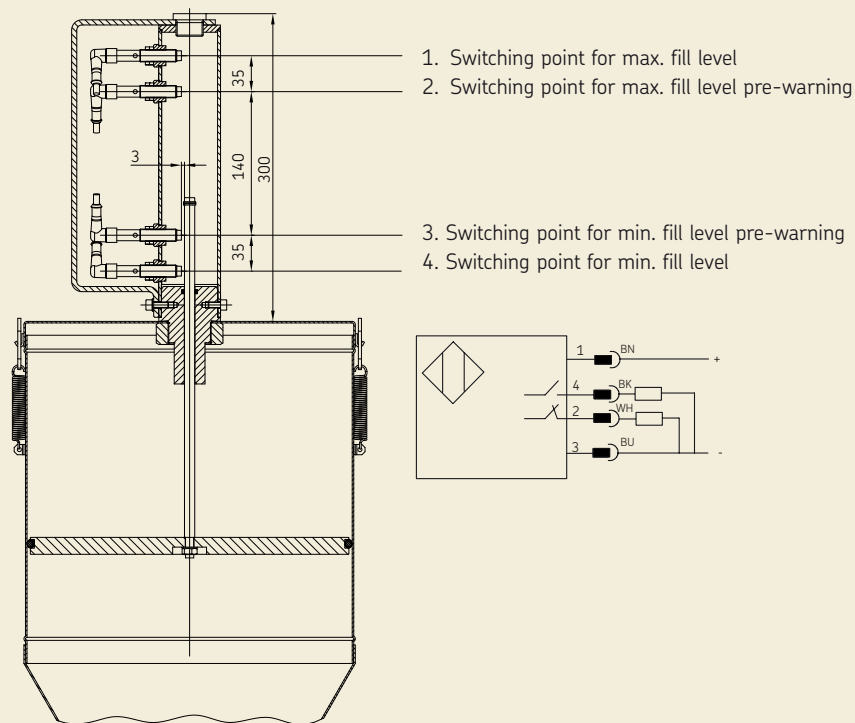
Switching capacity, max. 60 W/VA

Switching voltage, max. 10-30VDC

Connection via plug with cable . . . (3 m)

Protection class of plug/socket . . . IP 68

Dimensions for fill level switch on FB multiline pump unit, Fig. 4



4.3.4 FB-ATEX Assembly of the electric fill level switches

Inductive proximity switch per Namur
DIN EN50227



WARNING!

Connect to permissible switching amplifiers with maximum values $U = 15 \text{ V}$;
 $I = 50 \text{ mA}$, $P = 180 \text{ mW}$



WARNING!



For the design according to ATEX Directive 94/9/EC, you must comply with the safety instructions in Chapter 1, "Explosion protection information!"



The inductive proximity switch in the ATEX design does not have a function indicator (LED).

ATEX proximity switch

Proximity switch (4x)

Design inductive, per Namur
. DIN EN50227

Rated sensing distance 4 mm
Function NC contact
System voltage 5 to 25 VDC
Power consumption
Unattenuated < 2.2 mA
Attenuated < 1 mA
Self-capacitance < 230 nF
Self-inductance < 130 μH
Switching frequency . . 1500 Hz

Ambient temperature . -25°C to + 70°C
Protection class IP67 EN60947-5-2

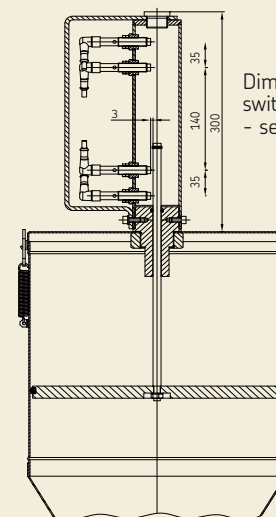
Housing material Thread housing:
. Brass, nickel-plated
. Plastic: Pocan (PBT)

Connector PVC cable, . 2 m long/ 2x0.34 mm²

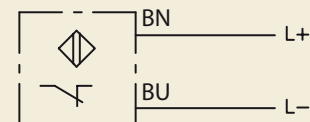
Certification PTB approval no.
. Ex-94.C.2128

Equipment classification EEx ia IIC T6

Dimensions fill level switch on FB-ATEX, Fig. 5



Dimensions and switching points
- see Fig. 4



Normally closed (NC)

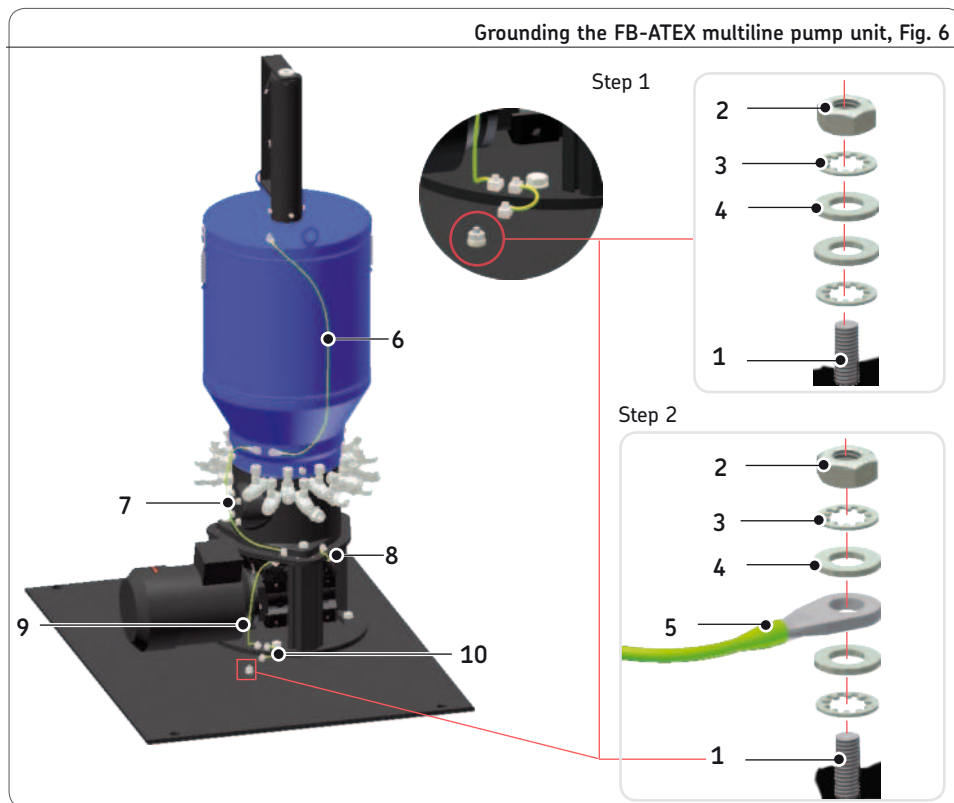
4.3.5 Attaching ground connection to FB-ATEX



Warning!

The standard grounding cable provided by the customer must have a minimum cross-section of 6 mm².

- On the grounding bolt (1), loosen the mounting nut (2) (WAF 13).
- Remove the mounting nut (2), the serrated lock washer (3) (1x), and the plain washer (4) (1x) from the grounding bolt (1).
- Insert the cable lug (of the grounding cable (5) supplied by the customer) into the grounding bolt.
- On the grounding bolt (1), apply the plain washer (4), the serrated lock washer (3) and mounting nut (2).
- Tighten the mounting nut (2).
- Check the grounding cables (6 to 10) for proper seating and tighten the cable fittings if necessary.



4.4 Lubrication line connection

The lubrication line must be connected to the lubrication unit in such a way that no forces can be transferred to the assembled lubrication unit (stress-free connection).



Danger!

The fittings used to connect the lubrication line should be rated for the maximum operating pressure of the lubrication unit. If they are not, the lubrication line system needs to be protected from excessive pressure by means of a pressure-limiting valve.

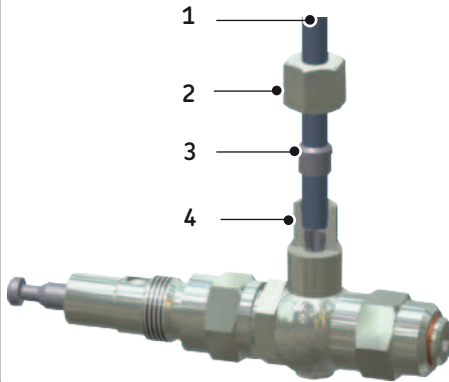
For higher operating pressures up to 350 bar as can occur especially in progressive centralized lubrication systems, SKF cutting-sleeve screw unions conforming to DIN 2353 can be used.

If using fittings from other manufacturers, pay careful attention to the assembly instructions and technical specifications provided by the manufacturer.

4.4.1 Assembly of the lubrication lines

- Deburr the connecting end of the lubrication line (1).
- Remove the union nut (2) and cutting sleeve (3) from the ring piece (4).
- Insert the lubrication line (1) into the union nut (2) and cutting sleeve (3).
- Insert the lubrication line (1), union nut (2), and cutting sleeve (3) into the ring piece (4).
- Put the union nut (2) on the thread of the ring piece (4), and slightly tighten the union nut (2) by hand.
- Tighten the union nut (2) with an open-end wrench.

Lubrication line connection, Fig. 7



Legend to Figure 7

Item	Description
1	Lubrication line, varying acc. to pipe connection
2	Union nut
3	Cutting sleeve
4	Ring piece

4.5 Lubrication line arrangement

When arranging the main and secondary lubricant lines, observe the following instructions in order to ensure that the entire lubrication system functions smoothly. The main lubricant line must be dimensioned in accordance with the maximum operating pressure occurring in the lubrication unit used and the displacement of that lubrication unit. If possible, the main lubricant line should rise upward from the lubrication unit and be ventable at the highest point on the lubrication line system.

Lubricant distributors at the end of the main lubricant line must be installed such that the outlets of the lubricant distributors point upwards. If the system configuration requires that the lubricant distributors be arranged below the main lubricant line, they should not be placed at the end of the main lubricant line. The pipes, tubes, shutoff valves, directional control valves, fittings, etc. that will be used must be designed for the maximum operating pressure of the lubrication unit, the permissible temperatures, and the lubricants that will be delivered.

In addition, the lubrication line system needs to be protected from excessive pressure by means of a pressure-limiting valve. All components of the lubrication line system such as pipes, tubes, shutoff valves, directional control valves, fittings, etc. must be carefully cleaned before assembly. No seals should point inward in the lubrication line system, as this could hinder lubricant flow and introduce contaminants into the lubrication line system.



Warning!

Centralized lubrication systems must always be free of leaks. Lubrication lines should always be arranged so that air pockets cannot form anywhere. Avoid changes in the cross-section of the lubrication line from small to large cross-sections in the direction of flow of the lubricant. When the cross-section does change, the transition should be gentle.


The flow of lubricant in the lubrication lines should not be hindered by the installation of sharp bends, angle valves, or flap valves. Unavoidable changes in the cross-section in lubrication lines must have smooth transitions. Sudden changes of direction should be avoided if possible.



Warning!

Centralized lubrication systems must always be free of leaks. Leaking lubricant is hazardous due to the risk of slipping and injury. Beware of any lubricant leaking out during assembly, operation, maintenance, or repair of centralized lubrication systems. Leaks must be sealed off without delay.

Lubricant leaking from centralized lubrication systems is a serious hazard. Leaking lubricant can create risks that may result in physical harm to persons or damage to other material assets.

 **Warning!**
Follow the safety instructions on the lubricant's safety data sheet.

Lubricants are hazardous substances. The safety instructions on the lubricant's safety data sheet must be followed. The safety data sheet for a lubricant can be requested from the lubricant manufacturer.

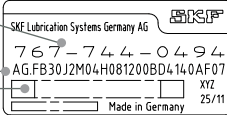

4.6 Note on the rating plate

The rating plates on the multiline pump units provide important data such as the type designation, order number, barcode, and serial number.

To avoid loss of this data in case the rating plate becomes illegible, these characteristics should be entered in the following table.

- Enter key data from rating plate in the following table.

Key data from rating plate, Fig. 8

		FB ATEX
Order number		
Typ number		
Serial number		
		ATEX designation
		Typ number
		Order number

FB/FB-ATEX
Multiline pump units

**Operating instructions associated
with assembly instructions**
according to EC Dir. 2006/42/EC for partly completed machinery

1. Safety instructions

General information



Warning!

These operating instructions must be read and properly understood by the assembler and the responsible technical personnel/operator before assembly and commissioning.

The safety instructions listed in Chapter 1, "Safety instructions," of the assembly instructions also apply without restrictions to these operating instructions.



In addition to the operating instructions, general statutory regulations and other binding regulations for accident prevention and for environmental protection (recycling/disposal) must be observed and applied.

Disclaimer of liability

SKF Lubrication Systems Germany GmbH shall not be responsible for damages:

- Caused by contaminated or unsuitable lubricants
- Caused by the installation of non-original SKF components or SKF spare parts
- Caused by inappropriate usage
- Resulting from improper assembly, configuration or filling
- Resulting from improper response to malfunctions
- independent modification of system components
- Only media approved for these types of pump units may be used. Unsuitable media may result in pump unit failure and potentially severe bodily injury and property damage.

2. Lubricants



Warning!

The information on lubricants listed in Chapter 2, "Lubricants," of the assembly instructions also applies without restrictions to these operating instructions.

3. Transport, delivery, and storage

SKF Lubrication Systems Germany GmbH products are packaged in accordance with standard commercial practice according to the regulations of the recipient's country and DIN ISO 9001. During transport, safe handling must be ensured and the product must be protected from mechanical effects such as impacts. The transport packaging must be marked "Do not drop!".



Warning!

The product must not be tilted or dropped.

There are no restrictions for land, air or sea transport.

After receipt of the shipment, the product(s) must be inspected for damage and for completeness according to the shipping documents. The packaging material must be preserved until any discrepancies are resolved.

SKF Lubrication Systems Germany GmbH products are subject to the following storage conditions:

3.1 Lubrication units

- Ambient conditions: dry and dust-free surroundings, storage in well ventilated dry area
- Storage time: max. 24 months
- Permissible humidity: < 65%
- Storage temperature: 10 - 40°C
- Light: avoid direct sun or UV exposure and shield nearby sources of heat

3.2 Electronic and electrical devices

- Ambient conditions: dry and dust-free surroundings, storage in well ventilated dry area
- Storage time: max. 24 months
- Permissible humidity: < 65%
- Storage temperature: 10 - 40°C
- Light: avoid direct sun or UV exposure and shield nearby sources of heat

3.3 Notes

- The component(s) can be enveloped in plastic film to provide low-dust storage
 - Protect against ground moisture by storing on a shelf or wooden pallet.
 - Bright-finished metallic surfaces, especially wearing parts and assembly surfaces, must be protected using long-term anti-corrosive agents before storage.
- At approx. 6-month intervals: Check for corrosion. If there are signs of corrosion, reapply anti-corrosive agents.
- Drives must be protected from mechanical damage.

3.4 Lifters

Four lifting lugs are attached to the baseplate of FB and FB-ATEX multiline pumps for transport purposes. These are color coded. FB and FB-ATEX multiline pump units with baseplate may only be lifted and transported using these lifting lugs.

The lifters provided by the customer, such as belts, pulleys, etc. must be designed for a total weight of 200 kg.

The customer must secure/assemble the lifters in accordance with its respective national laws and regulations.

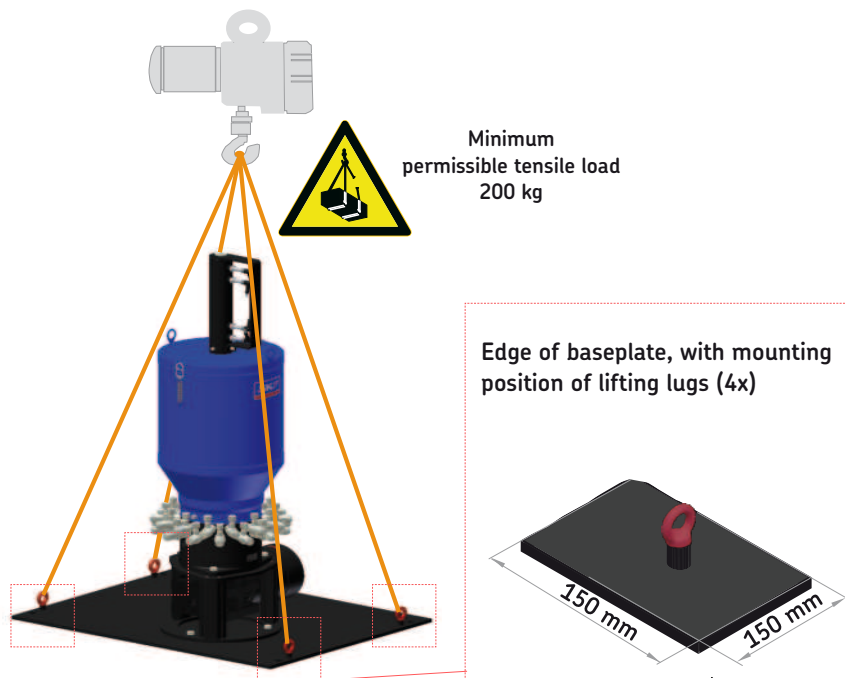
SKF Lubrication Systems Germany GmbH is not responsible for improperly designed, assembled, or defective lifters.



Danger! -Suspended load

Do not step below the elevated or suspended baseplate of the FB pump unit. Follow the safety instructions in Chapter 1 of the assembly instructions.

Transport device, Fig. 1



4. Assembly

4.1 Information on assembly

The assembly procedure for the FB and FB-ATEX multiline pump units is described in detail in the assembly instructions associated with these operating instructions. Information/instructions about assembling the FB and FB-ATEX multiline pump units beyond the scope of the assembly instructions are contained later in this chapter.

4.2 4.2 Assembly of FB multiline pump units

- Assembly must be performed in accordance with the enclosed assembly instructions and the additional information/instructions contained in this chapter.

4.3 Dismantling and disposal



Warning!

The applicable national environmental regulations and statutes are to be adhered to when dismantling and disposing of the multiline pump unit.

The product can also be returned to SKF Lubrication Systems Germany GmbH for disposal, in which case the customer is responsible for reimbursing the costs incurred.

5. Design and function

5.1 Pump operation

The pump is driven by an electric motor (1), which also drives the eccentric drive shaft (2) via a gearbox (2).

Two cam discs running in bearings are flanged on top of each other on the eccentric shaft (3). The lower cam disc (row 1) (4) controls the attached pump pistons of pump elements 1 to 12. The cam disc above these (row 2) (5) controls the attached pistons of pump elements 13 to 24.

Additionally, an agitator (6) is mounted at the end of the eccentric shaft (3). Its task is to deliver the lubricant to the pump's inlet chamber through the strainer (7) on the bottom of the reservoir.

The eccentric movement of the cam discs (4) (5) forcibly moves the attached delivery pistons of the pump elements, which ensures a continuous lubricant delivery rate.

The pump elements (8) are available in designs with a delivery piston diameter of 6 mm, 8 mm, or 10 mm. The delivery rate range is

0.04 to 7 cm³ at maximum operating pressures of 350, 250, or 125 bar.

The lubricant reservoir (9) holds 30 kg of lubricant. A grease follower plate (10) in the reservoir continuously collects lubricant from the reservoir wall. It is connected to a contact rod (11) for fill level monitoring.

Fill level monitoring of the lubricant quantity is performed by four proximity switches in PNP design.

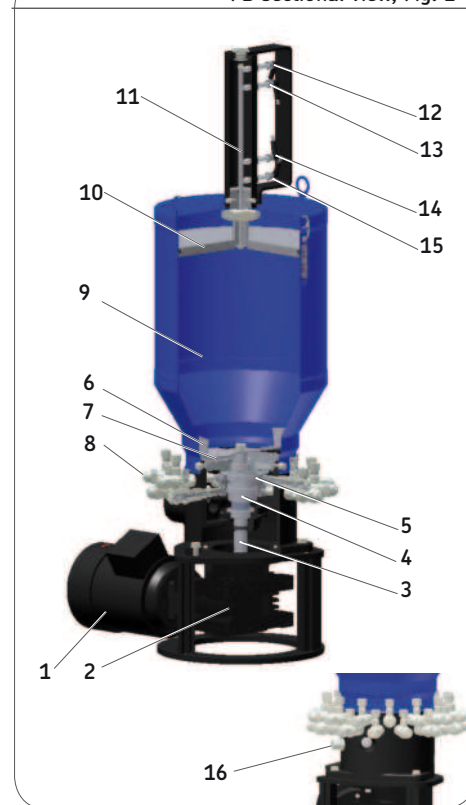
Switch 1 (12) displays the max. fill level; switch 2 (13) the maximum pre-warning; switch 3 (14) the minimum pre-warning; and switch 4 (15) the minimum.

The customer evaluates the signals.

FB multiline pump units are filled exclusively through the filler socket attached to the pump housing (16).

A lubricant filter and ball valve are typically located upstream.

FB sectional view, Fig. 2

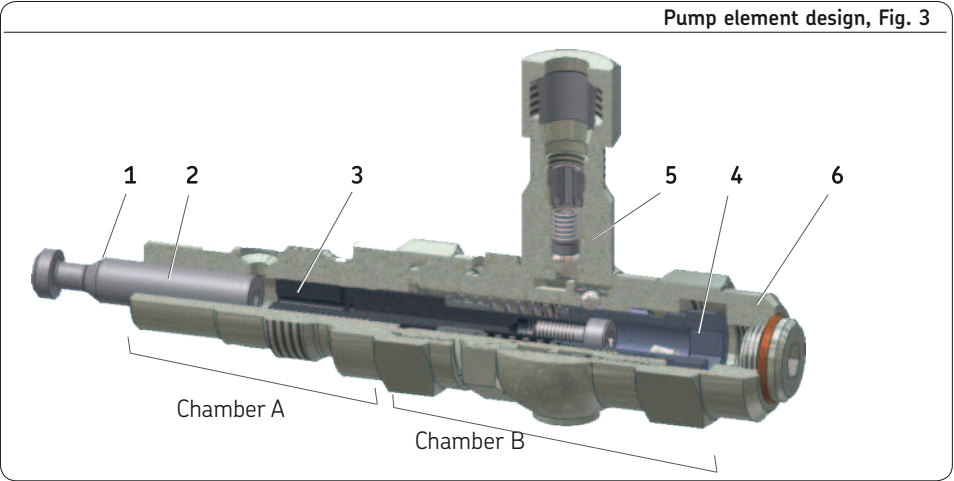


5.2 Pump element operation

The delivery piston is forcibly actuated as described in "Pump operation." In the suction stroke position (as illustrated), the cross hole of the delivery piston (3) is closed. At the start of the pressure stroke, the delivery piston (1) closes the suction hole. The suctioned lubricant in chamber A is pressed against the spring-loaded control piston (3). The cross hole in the control piston (3) is opened. The lubricant reaches chamber B under pressure through the cross and longitudinal hole of the control piston (3), where it flows through the ring duct and the check valve (5) to the outlet. Once the pressure stroke is complete, the suction stroke of the delivery piston (1) begins. Moving the delivery piston (1) also brings the control piston (3) back to its normal position using spring tension. The suction stroke movement of the delivery piston (1) generates negative pressure in chamber A. When the intake hole opens, the lubricant flows into chamber A due to the negative pressure.

The pump element is now prepared for the next lubrication cycle.

! With the ATEX design, the screw plug is replaced by a pressure regulating valve.



Legend to Fig. 3

Item	Description		
1	Delivery piston	4	Setting sleeve
2	Screw-in cylinder	5	Ring piece with check valve
3	Spring-loaded control piston	6	Cap nut with screw plug

6. Commissioning



Observe the instructions from the machine manufacturer regarding the lubricants that are to be used.



Warning!

Only fill with clean lubricant and an appropriate device. Contaminated lubricants can result in severe system malfunction. The lubricant reservoir must be filled without introducing bubbles.



Warning!

Different lubricants must not be mixed, as mixing may result in damage and necessitate costly and complicated cleaning of the product/lubrication system. It is recommended that an indication of the lubricant in use be attached to the lubricant reservoir in order to prevent accidental mixing of lubricants.

6.1 Commissioning / recommissioning



See Figure 4. Filling with oil as described below is only intended for the pump unit's venting procedure.

Fill the reservoir with oil

- Remove the reservoir cover **(1)** with grease follower plate **(2)** and place to one side
- Fill the reservoir **(3)** with oil (see Chapter 10 for characteristics) up to about 1 cm above the strainer **(4)**

Check the direction of rotation of the drive shaft



Warning!

The direction of driveshaft rotation is indicated on each pump by an arrow. This marking ensures the correct direction of rotation of the agitator for each pump type. The pump should never be put into operation without the reservoir cover fitted properly in place.

- Switch on the grease lubrication pump briefly (for about 1 second) and check the direction of rotation
- Fit the reservoir cover **(1)** with grease follower plate **(2)** back on the reservoir **(3)**



Warning!

Actual filling of the grease lubrication pump may only be performed via the filler socket **(5)**. Filling with grease via the "reservoir cover" **(1)** is not permitted.

- Fill the reservoir **(3)** with grease (see Chapter 10 for characteristics) using the filler socket **(5)** or upstream ball valve.

Vent the pump elements

- Loosen and remove the screw plugs **(6)** from all pump elements



Note!

With the ATEX design, loosen and remove the pressure regulating valves (WAF 24) from all pump elements.

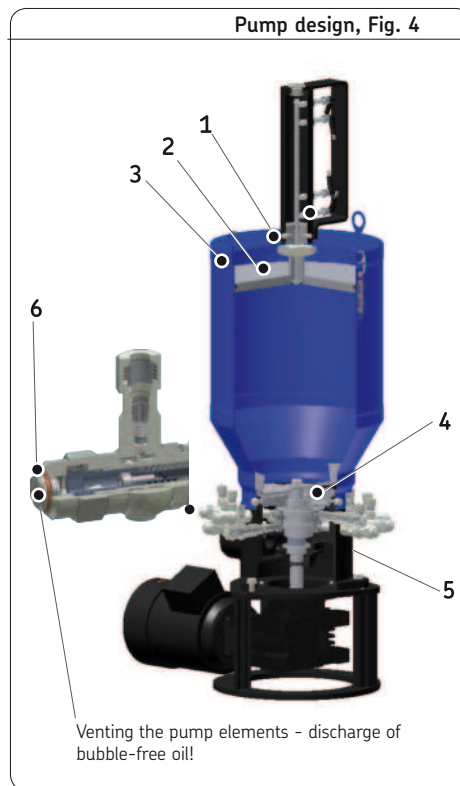
- Start (switch on) the grease lubrication pump
- ☞ Allow pump to run until bubble-free grease (or oil) can be seen discharging from all pump elements.
- Attach and tighten the screw plugs (6) on all pump elements



Warning!

With the ATEX design, attach and tighten the pressure regulating valves (WAF 24) on all pump elements

- Allow grease lubrication pump to run until grease discharges instead of oil
- ☞ The venting procedure is complete with bubble-free grease discharges.
- Shut down (switch off) the grease lubrication pump



6.2 Varying pump displacement

The pump elements are factory-set to maximum pump output. After commissioning, the output can be adjusted to meet output requirements, as described in the following.

Remove screw plug

- Loosen and remove the screw plug (1) using a hexagon socket screw key (WAF 8)
- ⓘ With the ATEX design, loosen and remove the pressure regulating valve (WAF 24)

Adjust the displacement

☞ See Figure 5

- Place a hexagon socket screw key (WAF 6) on the setting sleeve (2)



When adjusting:

Clockwise rotation results in decreased displacement, **counterclockwise rotation** results in increased displacement.



The pump element's displacement may be reduced to 1/3 of its maximum displacement. This corresponds to clockwise rotation of the setting sleeve (2) by eight notches. With settings below 1/3 of maximum displacement, fluctuations in displacement volume cannot be ruled out.

- Using the hexagon socket screw key, adjust the setting sleeve (2) for the required displacement (notches 1 to 8 – see displacement chart).

☞ For displacement variation, the setting sleeve is divided into 8 notch positions (making one full revolution). It is possible to feel the setting sleeve engaging in each notch position.

- Setting displacement

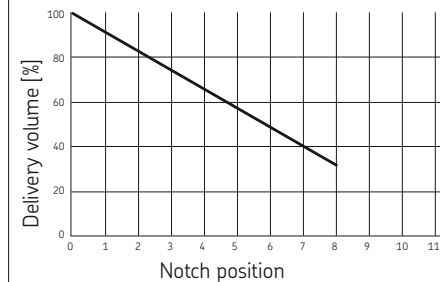
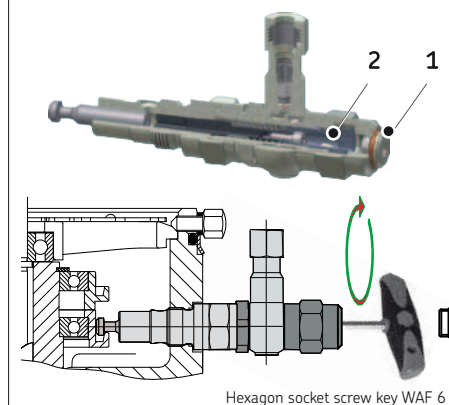
Attach the screw plug

- Put the screw plug (1) in position and tighten it using a hexagon socket screw key (WAF 8)



With the ATEX design, tighten the pressure regulating valve (WAF 24).

Displacement chart, Fig. 5



7. Shutdown and disposal

7.1 Temporary shutdown

The described product can be temporarily shut down by disconnecting the electrical, pneumatic, and/or hydraulic supply connections.

The safety instructions in these assembly instructions must be observed when doing so.

If the product is to be shut down for an extended period of time, follow the instructions in Chapter 3, "Transport, delivery, and storage," in these operating instructions.
Notes Assembly instructions.

7.2 Permanent shutdown

If the product will be permanently shut down, the local regulations and laws regarding the disposal of contaminated equipment must be observed.

Lubricants can contaminate soil and bodies of water.



Warning!

Lubricants must be properly used and disposed of. Observe the local regulations and laws regarding the disposal of lubricants.

The product can also be returned to SKF Lubrication Systems Germany GmbH for disposal, in which case the customer is responsible for reimbursing the costs incurred.

The parts are recyclable.

8. Maintenance



Warning!

Performing work on an energized pump or product may result in serious injury or death. Assembly, maintenance, and repair work may only be performed on products that have been de-energized by qualified technical personnel. The supply voltage must be switched off before opening any of the product's components.

Products from SKF Lubrication Systems Germany GmbH are low-maintenance. However, all connections and fittings must be regularly inspected for proper seating to ensure proper function and to prevent hazards from arising.

If necessary, the product can be cleaned using mild cleaning agents that are compatible with the product's materials (non-alkaline, non-soap). For safety reasons, the product must be disconnected from the power supply and the hydraulic and/or compressed air supply.

Do not allow any cleaning agent to enter the interior of the product during cleaning. It is not necessary to clean the interior of the product if the product is operated normally and intercompatible lubricants are used. The interior of the product must be cleaned if incorrect or contaminated lubricant is accidentally filled into the product. If this occurs, please contact the Service department of SKF Lubrication Systems Germany GmbH for assistance.



Dismantling of the product or individual parts thereof within the statutory warranty period is not permitted and voids any claims.



Only original spare parts from SKF Lubrication Systems Germany GmbH may be used. Unauthorized alterations to products and the use of non-original spare parts and accessories are not permitted and nullify the statutory warranty.

SKF Lubrication Systems Germany GmbH shall not be held liable for damages resulting from improperly performed assembly, maintenance or repair work on the product.

8.1 General information

FB multiline pump units function without maintenance in principle. However, make sure that the grease level does not fall below the strainer, in order to prevent air being drawn into the pump elements.

If a synthetic oil is used as the pumped fluid, you must consult the lubricant manufacturer beforehand to find out whether it will corrode the seals (Perbunan) and whether it can be mixed with the previous lubricant. Switches for the oil level or grease level are only suitable for use with oil or with grease, and should be replaced if necessary. When removing and installing individual pump elements, proceed as described in the following.



Only fill with clean grease. The purity of the lubricants used is the decisive factor in the service life of the pump and the lubricated machinery elements.

Only fill grease via the filler socket.

8.2 Visual inspection

Visual inspection every 100 operating hours

Item	Component	Check
1	Geared motor	<ul style="list-style-type: none"> Inspect fan slots on fan impeller for contamination Inspect for loosened screw unions Inspect for undesired grease discharge
1	Geared motor	<ul style="list-style-type: none"> Inspect for loose cable connections and damage
2	Fill level switch	
4	Multiline pump unit FB-ATEX multiline pump unit	<ul style="list-style-type: none"> Inspect for contamination and damage Check for proper seating/screw connection of the ground cables

8.3 Removing a pump element

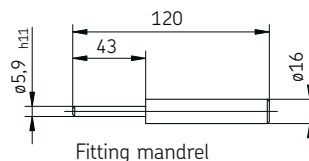
☞ See Figure 7

- Release the union nut (1) on the ring piece (2)
- Remove the lubrication line from the ring piece (2)
- Loosen the cap nut (5) and pull off the ring piece (2)
- Loosen and remove screw socket (3)
- Carefully unscrew and remove the screw-in cylinder (4) from the pump housing
- Tilt the front part of the pump element about 30° until the delivery piston (6) is no longer held back by the guide ring (7).
- Remove the front part of the pump element using a circular motion

☞ The circular motion prevents the delivery piston from getting stuck in the grease. If the delivery piston becomes stuck in the

grease, remove it from the pump housing with tweezers or a magnet.

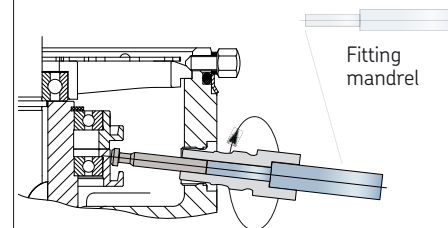
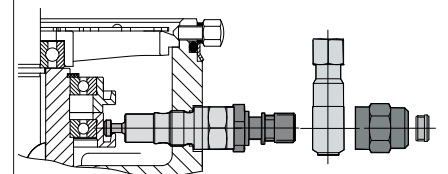
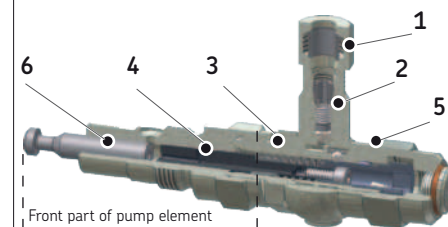
Installing pump element - fitting mandrel, Fig. 6



Separate accessory - fitting mandrel

Usage	Installation of a pump element
Order No.	44-1827-2010

Sectional view of pump element, Fig. 7



8.4 Installing a pump element

☞ See Figure 8



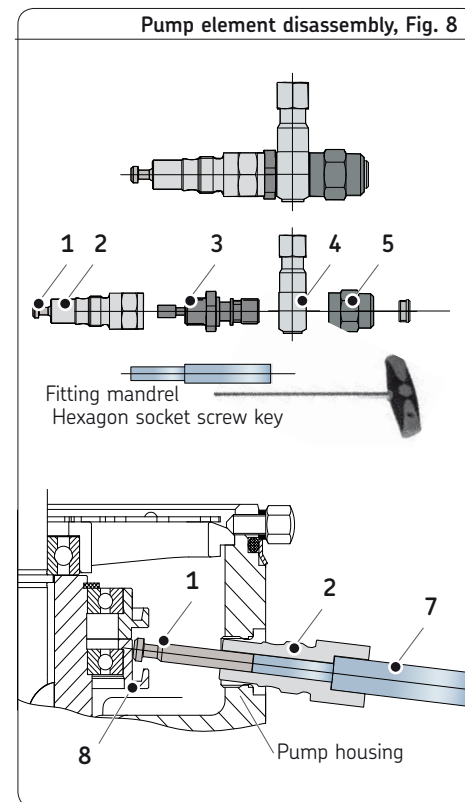
Warning!

Pump elements must not be connected to the connection for the lubrication line.

The number of pump elements can also be changed later. Internal threads for installing pump elements have to be sealed off with screw plugs M 20 x 1.5 (see Accessories, Page 51) if not in use.

- Turn off pump unit.
- Loosen and remove screw plug.
- On a clean surface, disassemble **the pump element you wish to install** into its individual components: delivery piston (1), screw-in cylinder (2), screw socket (3), ring piece with check valve (4), cap nut (5), and screw plug (6).

- Fill the cylinder chamber of the screw-in cylinder (2) with (clean) grease.
- Carefully guide the delivery piston (1) into the cylinder chamber of the screw-in cylinder (2) (about 5 to 10 mm).
- Insert the fitting mandrel (7) into the screw-in cylinder (2).
- Guide the front part of the pump element into the pump element hole on the pump housing and align it, hooking the delivery piston (1) into the guide ring (8) at the same time.
- Remove the fitting mandrel (7).



☞ See Figure 9

- Screw the screw-in cylinder (2) into the pump housing and tighten.
- ☞ See the "Torques" table for the torque to be applied to the screw-in cylinder (2)
- Screw the screw socket (3) into the screw-in cylinder (2) and tighten.
- ☞ See the "Torques" table for the torque to be applied to the screw socket (3).

Torques in Nm

Pump element with piston diameter of:

6 mm

Screw-in cylinder (2)	80 Nm
Screw socket (3)	70 Nm

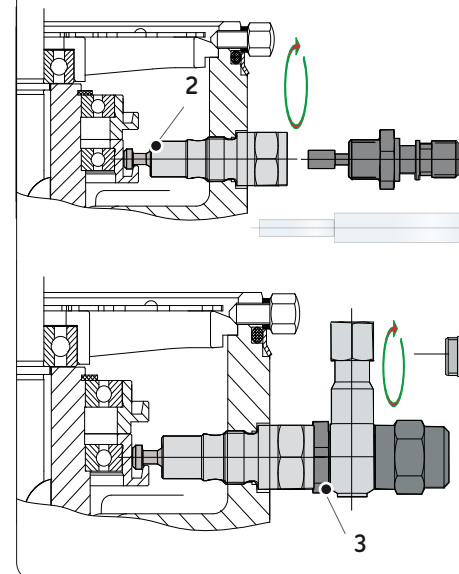
8 mm

Screw-in cylinder (2)	60 Nm
Screw socket (3)	50 Nm

10 mm

Screw-in cylinder (2)	40 Nm
Screw socket (3)	40 Nm

Screw-in cylinder installation, Fig. 9



☞ See Figure 10

- Fit the ring piece (4) and cap nut (5) on the screw socket (3) and tighten by hand.
- Insert the lubrication line (6) into the ring piece.

- Tighten the union nut (7) by hand

- Tighten the cap nut (5).

☞ See the "Torques" table for the torque to be applied to the cap nut (5).

- Tighten the union nut (6).
- Vent the pumps completely
- See Chapter 6.1, "Commissioning and recommissioning"
- Set the displacement - see Chapter 6.2, "Varying pump displacement"

- Put the screw plug (8) in position and tighten it using a hexagon socket screw key (WAF 8).



With the ATEX design, tighten the pressure regulating valve (WAF 24).

Torques in Nm

Pump element with piston diameter of:

6 mm

Cap nut	(5)	60 Nm
---------	-----	-------

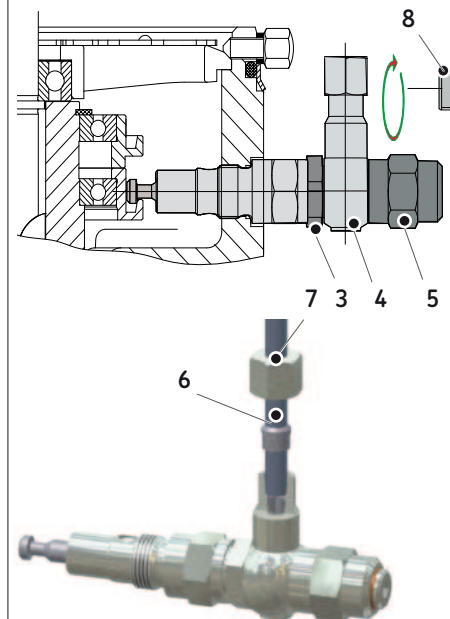
8 mm

Cap nut	(5)	40 Nm
---------	-----	-------

10 mm

Cap nut	(5)	40 Nm
---------	-----	-------

Installation of ring piece and cap nut, Fig. 10



9. Malfunction

The following tables provide an overview of possible malfunctions and their causes. Contact the Service department of SKF Lubrication Systems Germany GmbH if you cannot remedy the malfunction.



Dismantling of the product or individual parts thereof within the statutory warranty period is not permitted and voids any claims.



All assembly, maintenance and repair work beyond this scope must be performed by the Service department of SKF Lubrication Systems Germany GmbH.



Only original spare parts from SKF Lubrication Systems Germany GmbH may be used. Unauthorized alterations to products and the use of non-original spare parts and accessories are not permitted and nullify the statutory warranty.



Warning!

Performing work on an energized pump or product may result in serious injury or death. Assembly, maintenance, and repair work may only be performed on products that have been de-energized by qualified technical personnel. The supply voltage must be switched off before opening any of the product's components.



Warning!

The hot surface of a motor may cause burns. Motor surfaces may only be touched with appropriate gloves or after the motor has been shut off for an extended time.



Warning!

Lubrication systems are pressurized during operation. Lubrication systems must therefore be depressurized before starting assembly, maintenance or repair work, or any system modifications or system repairs.

9.1 Commissioning malfunctions

Commissioning malfunctions

Malfunction	Cause	Remedy
Displacement volume and/or delivery pressure too low without supply lines connected	Air in the pump element	<ul style="list-style-type: none"> ● Vent and fill as instructed in Chapter 6.1, "Commissioning"
	Driveshaft rotating in wrong direction Driveshaft speed is too low	<ul style="list-style-type: none"> ● Check electrical connections and voltage ● Remove foreign substances if agitator or pump element is jammed ● Replace motor if necessary
No delivery (with pipe connections and supply lines not yet connected)	Air in the pump element	<ul style="list-style-type: none"> ● Vent the pump element ● Set notch position 0 (max. delivery rate) ● Remove and install the pump element as instructed in Chapters 8.2 and 8.3
	Pump element set too low	
	Pump element not hooked in properly	
	Motor does not run	<ul style="list-style-type: none"> ● Check electrical connections ● Clean venting slots on motor ● Replace geared motor if necessary
	Grease too stiff	<ul style="list-style-type: none"> ● Only use approved grease

9.2 Operational malfunctions

Operational malfunctions, Table 1 of 2

Malfunction	Cause	Remedy
Displacement volume or delivery pressure too low without lines connected	Air in the pump element	<ul style="list-style-type: none"> ● Vent and fill as instructed in Chapter 6.1.
	Pump element is clogged	<ul style="list-style-type: none"> ● Malfunction „No delivery“
	Driveshaft speed is too low	<ul style="list-style-type: none"> ● Check electrical connections and motor voltage ● Remove foreign substances if agitator or pump element is jammed ● Permissible operating temperature range of -15 °C to + 40 °C not maintained ● Replace defective motor
No delivery	Pump element is clogged	<ul style="list-style-type: none"> ● Empty and clean lubricant reservoir ● Remove and clean pump element with ring piece ● Vent and fill as instructed in Chapter 6. ● Replace the woodruff key, vent the pump elements as instructed in Chapter 6.1, "Commissioning"
	Woodruff key on the drive shaft is defective Motor stopped	<ul style="list-style-type: none"> ● Check supply voltage, replace motor if necessary

Operational malfunctions, Table 2 of 2

Malfunction	Cause	Remedy
No delivery	Pump element is defective	<ul style="list-style-type: none">● Replacing the pump element● Vent and fill as instructed in Chapter 6.1.
	Spring pressure, delivery piston breaking loose	<ul style="list-style-type: none">● Install the pump element as instructed in Chapter 8.4
	Guide ring for the pump element piston heads is worn or broken	<ul style="list-style-type: none">● Replace the guide ring, and vent the pump as instructed in Chapter 6.1 - Commissioning
	Grease too stiff	

9.3 Malfunctions on fill level control

Fill level control malfunctions

Malfunction	Cause	Remedy
Lubricant over grease follower plate	Seal on the grease follower plate is leaking	<ul style="list-style-type: none"> ● Replace the seal
Lubricant comes out of the cover when filling the reservoir	No signal Signal «max» ignored Seal on the grease follower plate is leaking	<ul style="list-style-type: none"> ● Check the cable connection; replace plug or cable if necessary ● Remove the excess grease. ● Replace the seal
No signal from fill level switch «min.», «pre-warning min.», «pre-warning max.», «max.»	Cable connection incorrect or defective Plug is disconnected Grease follower plate is tilted Grease follower plate is jammed	<ul style="list-style-type: none"> ● Correct or repair the cable connection ● Connect the plug ● Straighten the grease follower plate and secure it to the contact rod ● Check the reservoir for dents and remove them if necessary

10. Technical data

10.1 FB and FB-ATEX multiline pump unit

FB characteristics

General information

Mounting position Vertical

Ambient and lubricant

temperature range . . . -15 °C to + 40 °C ¹⁾

Number of pump elements

Lower row 1 to 12

Upper row 13 to 24

Filling Filler socket G 1/2"

Dry weight, without pump elements

Weight. Approx. 51 kg

(FB multiline pump unit with foot guard, with monitoring, without pump elements)

Gearbox

Type

Step-down ratio. 45:1

Motor

See the "Motor ratings" table and the rating plate ²⁾

Pump

Type Multipiston pump with 1 to 24 outlet ports

Delivery volume of pump elements

piston Ø 6 0.027 to 0.08 cm³/stroke

piston Ø 8 0.050 to 0.15 cm³/stroke

piston Ø 10 . . 0.077 to 0.23 cm³/stroke

Operating pressure for pump elements

piston Ø 6 . . . max. 350 bar

piston Ø 8 . . . max. 200 bar

piston Ø 10 . . max. 125 bar

Lubricants ³⁾

Mineral oils (base oils) or environmentally compatible oils from ISO VG 46 to greases of NLGI Grade 3

- Operating viscosity (oil) ≥ 50 to 5000 mm²/s
- Worked penetration (grease) > 220 ¹/10 mm
- Max. flow pressure < 750 mbar
- Proportion of solid lubricants < 5% ²⁾
- In accordance with DIN 51825 lubricant specification

1) At higher ambient temperatures, note that there is reduction in (motor) performance of approx. 1% per Kelvin.

2) Other specifications available on request.

3) Synthetic and biodegradable oils and greases require approval from SKF. When using oils, only use safety valves with a tank return.

Warning!

The characteristics of lubricants such as operating viscosity, worked penetration, and flow pressure, depend in large part on the temperature of the lubricant. A low temperature means a higher starting current on the motor and worse suction capability by the pump elements.

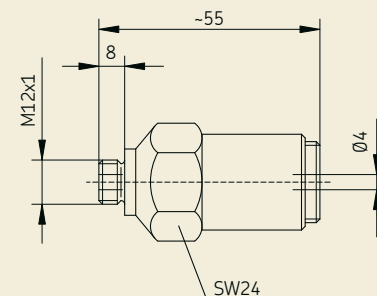
When used by the customer (system design), these physical characteristics must be taken into consideration.

11. Accessories

Pressure regulating valves for grease (for insertion into pump elements)

Set pressure [bar][kg/each]	Weight	Order No.
50	0.13	24-2103-2273
100	0.13	24-2103-2344
125	0.13	24-2103-2345
150	0.13	24-2103-2342
175	0.13	24-2103-2272
200	0.13	24-2103-2346
350	0.13	24-2103-2271

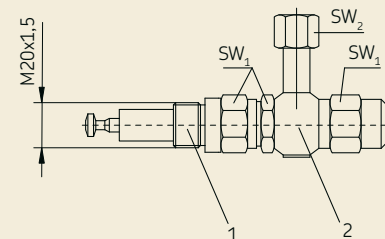
Pressure regulating valve



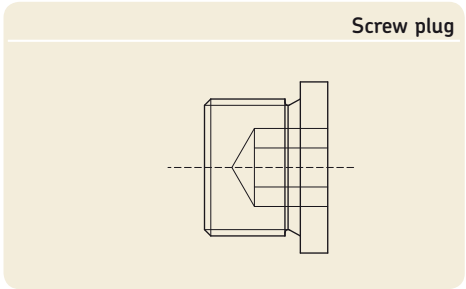
Pump element with ring piece (for installing a pump element)

Description	Piston Ø	WAF ₁	WAF ₂	Weight [kg/each]	Order No.
Pump element (item 1 in figure)	6 mm	24	-	0.26	24-1557-3680
	8 mm	24	-	0.26	24-1557-3681
	10 mm	24	-	0.28	24-1557-3683
Ring piece (item 2)	6 mm	-	14	0.10	24-2255-2003
	8 mm	-	17	0.08	24-2255-2004
Pipe diameter	10 mm	-	19	0.10	24-2255-2005

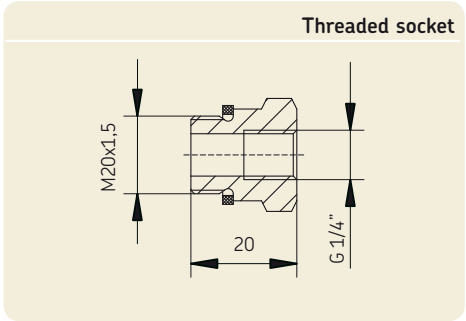
Pump element



Screw plug		
(for closing unused pump outlets)		
Design	Weight kg/each	Order No.
M20x1.5	0.037	95-1520-0908



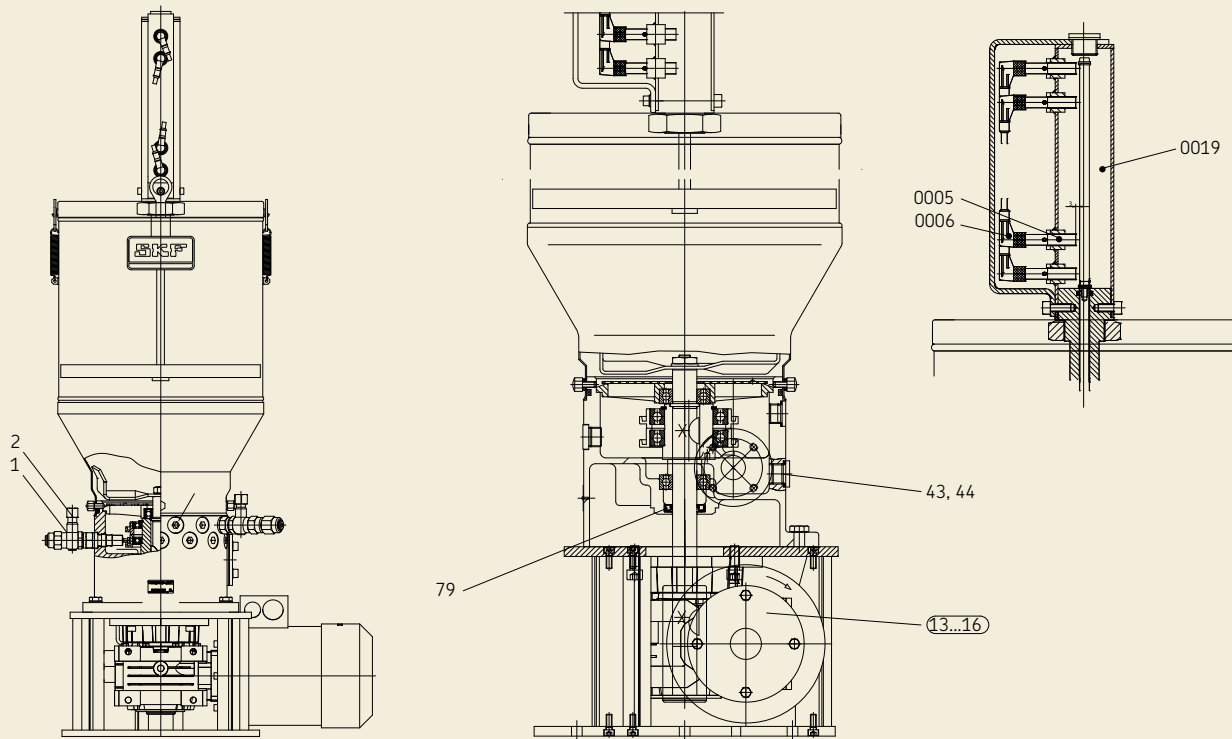
Threaded socket for grease recirculation	
(in place of a pump element to recirculate grease into pump housing)	
Design	Order No.
Steel, galvanized surface, with copper (Cu) washer	24-1755-2003



12. Spare parts

12.1 Spare parts list for FB multiline pump unit

Spare parts for FB multiline pump unit

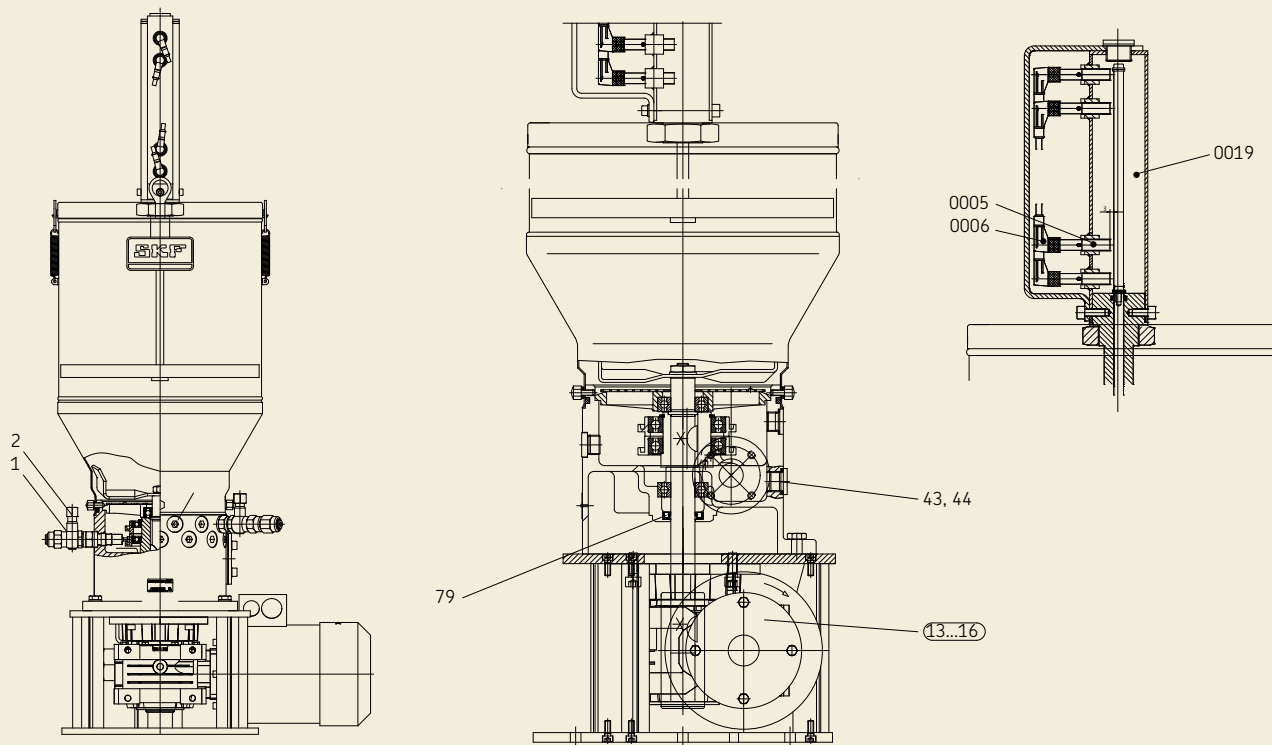


Spare parts for FB multiline pump unit

Item	Quantity	Description	Order number
1	1	Pump element, piston Ø 6 mm	24-1557-3680
	1	Pump element, piston Ø 8 mm	24-1557-3681
	1	Pump element, piston Ø 10 mm	24-1557-3683
2	1	Ring piece for pipe connection Ø 8 mm	24-2255-2004
13	1	Worm drive	24-0701-3518
14	1	Electric motor 0.55 kW, 230/400 VAC, 50 Hz	84-5202-4400
15	4	Hexagon head bolt	DIN 933-M6x20-8.8
16	4	Flat washer J 6.4	95-1064-6798
43	1	Sealing ring	DIN 7603-A21x26 CU
44	1	Plug DIN 908-ST Z1	95-0012-0908
79	1	Shaft seal 25x35x7 DIN 3760	3300-59-0058
0005	4	Proximity switch, inductive	24-1884-2273
0006	4	Plug connector for proximity switch	24-1882-2137
0019	1	Foot guard	44-1061-2581

12.2 Spare parts list for FB-ATEX multiline pump unit

Spare parts for FB-ATEX multiline pump unit



Spare parts for FB multiline pump unit

Item	Quantity	Description	Order number
1	1	Pump element, piston Ø 6 mm	24-1557-3680
	1	Pump element, piston Ø 8 mm	24-1557-3681
	1	Pump element, piston Ø 10 mm	24-1557-3683
2	1	Ring piece for pipe connection Ø 8 mm	24-2255-2004
13	1	ATEX worm drive	24-0701-3520
14	1	ATEX electric motor 0.55 kW, 280/480 VAC, 60 Hz	84-6212-5801
15	4	Hexagon head bolt	DIN 933-M6x20-8.8
16	4	Flat washer J 6.4	95-1064-6798
43	1	Sealing ring	DIN 7603-A21x26 CU
44	1	Plug DIN 908-ST Z1	95-0012-0908
79	1	Shaft seal 25x35x7 DIN 3760	3300-59-0058
0005	4	ATEX proximity switch, inductive	24-1884-2288
0006	4	Plug connector for proximity switch	24-1882-2137
0019	1	Foot guard	44-1061-2581

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SKF Lubrication Systems Germany GmbH

Motzener Straße 35/37 · 12277 Berlin · Germany
PF 970444 · 12704 Berlin · Germany
Tel. +49 (0)30 72002-0 · Fax +49 (0)30 72002-111
www.skf.com/lubrication

SKF Lubrication Systems Germany GmbH

2. 4. Industriestraße 68766 · 68766 Hockenheim · Germany
Tel. +49 (0)62 05 27-0 · Fax +49 (0)62 05 27-101
www.skf.com/lubrication

