Multi-line pump units of the series FB-XL

for use in progressive centralized lubrication systems

Assembly instructions

acc. to Machinery Directive 2006/42/EC

EN

Version 04
951-170-227-EN

LINCOLN

SKF

EC Declaration of Incorporation acc. to Machinery Directive 2006/42/EC, Appendix II Part 1 B

The manufacturer, SKF Lubrication Systems GmbH, Hockenheim Plant, 2. Industriestraße 4, DE - 68766 Hockenheim, hereby declares the conformity of the partly completed machinery

Designation: Multi-line pump unit
Model: FB*D4145* / FB*D4152*
Item number: 767-744-*
Year of manufacture: See type plate
with the essential protection requirements of Machinery Directive 2006/42/EC at the time of placing on 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 technical documentation described in Annex VII, Part B of this Directive has been prepared. We undertake to transmit, in response to a reasoned request by the national authorities, the special documents for this partly completed machine. The Head of Technical Standards is the authorized representative for the technical documentation. See the manufacturer information for the address.

Furthermore, the following Directives and (harmonized) standards were applied in the applicable areas:
2011/65/EU RoHS II
20014/30/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	Correction	2011	DIN EN 60947-5-1	2010
DIN EN 60204-1	2007	Correction	2009	DIN EN 61000-6-3	2011		
Correction	2010	DIN EN 60034-1	2015	Correction	2012		
DIN EN 50581	2013	DIN EN 61000-6-1	2007				

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

Hockenheim, March 4, 2019

Jürgen Kreutzkämper
Manager R&D Germany
SKF Lubrication Business Unit

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

951-170-227-EN
Version 04

Masthead

Manufacturer

SKF Lubrication Systems Germany GmbH
Address of manufacturer plants
Headquarters

Walldorf Plant
Heinrich-Hertz-Str. 2-8
69190 Walldorf
Germany
Tel: +49 (0) 6227 33-0
Fax: +49 (0) 6227 33-259

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

Hockenheim Plant
2. Industriestraße 4
68766 Hockenheim
Germany
Tel. +49 (0)62 05 27-0
Fax +49 (0)62 05 27-101
E-mail: Lubrication-germany@skf.com
www.skf.com/lubrication

Training

SKF conducts detailed training in order to enable the maximum safety and efficiency. SKF recommends taking advantage of this training. For information, contact the relevant SKF service address.

Warranty
The instructions do not contain any information on the warranty. This can be found in our General Terms and Conditions.

Disclaimer of liability

The manufacturer shall not be held liable for damage resulting from:

- Improper usage, assembly, operation, configuration, maintenance, repair, or accidents
- Improper reaction to malfunctions
- Unauthorized modifications to the product
- Intentional or gross negligence
- Use of non-original SKF spare components

The maximum liability for loss or damage resulting from the use of our products is limited to the purchase price. Liability for indirect damage of any kind is excluded.

Table of contents

Explanation of symbols, signs, and abbreviations

These symbols may be used in the instructions: Symbols within safety instructions indicate the nature and source of the hazard

	General warning		Risk of electrical shock		Risk of slipping		Hot surfaces
	Being drawn into machinery/ Crushing hazard		Pressure injection		Suspended load		Wear personal protective gear (protective clothing)
	Electrostatic sensitive components		Potentially explosive atmosphere		Unauthorized persons must be kept away.		
	Wear personal protective gear (goggles)		Wear personal protective gear (face mask)		Wear personal protective gear (gloves)		
	Wear personal protective gear (protective footwear)		Unlock the product		General requirement		
	CE mark		Disposal, recycling		Disposal of waste electrical and electronic equipment		

	Warning level	Consequence	Probability
	DANGER	Death, serious injury	Immediate
	WARNING	Death, serious injury	Possible
	CAUTION	Minor injury	Possible
	IMPORTANT NOTE	Property damage	Possible

Symbol	Meaning
●	Chronological instructions
○	Bullet list items
☞	Refers to other facts, causes, or consequences

Abbreviations and conversion factors

re	regarding	°C	degrees Celsius	°F	degrees Fahrenheit
approx.	approximately	K	Kelvin	Oz.	ounce
i.e.	that is	N	Newton	fl. oz.	Fluid ounce
etc.	et cetera	h	hour	in.	inch
poss.	possibly	s	second	psi	pounds per square inch
If necessary	if necessary	d	day	sq.in.	square inch
usually	usually	Nm	Newton meter	cu. in.	cubic inch
incl.	including	ml	milliliter	mph	miles per hour
min.	minimum	ml/d	milliliters per day	RPM	revolutions per minute
max.	maximum	ccm	cubic centimeter	gal.	gallon
min	minute	mm	millimeter	lb.	pound
etc.	et cetera	l	liter	hp	horsepower
e.g.	for example	db (A)	sound pressure level	kp	kilopond
kW	kilowatt	>	greater than	fpsec	feet per second
U	voltage	<	less than	Conversion factors	
R	Resistance	±	plus minus	Length	1 mm = 0.03937 in.
I	current intensity	Ø	diameter	Area	1 cm^2 = 0.155 sq.in.
V	volt	kg	kilogram	Volume	1 ml = 0.0352 fl.oz.
W	watt	RH	relative humidity		1 l = 2.11416 pints (US)
AC	alternating current	≈	approximately	Mass	1 kg = 2.205 lbs
DC	direct current	=	equal to		1 g = 0.03527 oz.
A	ampere	%	percent	Density	1 kg/cm^3 = 8.3454 lb./gal(US)
Ah	ampere hour	‰	per mil (thousandth)		1 kg/cm^3 = 0.03613 lb./cu.in.
Hz	Frequency (Hertz)	≥	greater or equal	Force	1 N = 0.10197 kp
NC	normally closed contact	≤	less or equal	Pressure	1 bar = 14.5 psi
NO	normally open contact	mm^2	square millimeter	Temperature	°C = (°F-32) x 5/9
N/A	not applicable	rpm	Revolutions per minute	Power	1 kW = 1.34109 hp
				Acceleration	1 m/s^2 = 3.28084 $ft./s^2$
				Speed	1 m/s = 3.28084 fpsec
					1 m/s = 2.23694 mph

1. Safety instructions

1.1 General safety instructions

- The operator must ensure that the instructions are read by all persons tasked with working on the product or who supervise or instruct such persons. The operator must also ensure that the staff fully understands the content of the instructions. Putting the products into operation or operating them without having read the instructions is prohibited.
- Retain the instructions for further use.
- The products described here were manufactured according to the state of the art. Risks may, however, arise from non-compliant usage and may result in personal injury or damage to material assets.
- Any malfunctions which may affect safety must be remedied immediately. In addition to these instructions, the statutory regulations for accident prevention and environmental protection must be observed.
- The risk analysis of the workstation must assess the hazard arising from contact with hot surfaces, among other risks. If there is a risk of burns, appropriate protective measures must be taken.

1.2 General behavior when handling the product

- The product may only be used in awareness of the potential dangers, in proper technical condition, and according to the information in this manual.
- Familiarize yourself with the functions and operation of the product. The specified assembly and operating steps and their sequences must be observed.
- Any unclear points regarding proper condition or correct assembly/operation must be clarified. Operation is prohibited until issues have been clarified.
- Unauthorized persons must be kept away.
- Wear personal protective equipment.
- All safety regulations and in-house instructions relevant to the particular activity must be observed.
- Never use any part of the centralized lubrication system as a stand or step or for climbing.
- Responsibilities for different activities must be clearly defined and observed. Uncertainty seriously endangers safety.
- Protective and safety mechanisms must not be removed, modified, nor disabled during operation and must be checked for proper function and completeness at regular intervals.

- If protective and safety mechanisms must be removed, they must be reinstalled immediately following conclusion of work and then inspected for proper function.
- Any malfunctions that occur must be resolved according to responsibility. The supervisor must be notified immediately in case of malfunctions outside one's individual scope of responsibility.

1.3 Intended use

Feed lubricants only in compliance with the specifications, technical data, and limits presented in this manual.

Usage is permitted exclusively in the context of commercial or business activity by professional users.

Pump units of SKF's FB-XL series are used to supply centralized lubrication systems in vehicles, systems and machines.
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 or death and property damage.

They deliver mineral oils or environmentally friendly oils from ISO VG 46 and greases up to NLGI Grade 3.

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.

1.4 Foreseeable misuse

Any usage of the product other than as specified in this manual is strictly prohibited. Particularly prohibited are:

- Use outside the specified operating temperature range
- Use of non-specified equipment
- Use without a pressure regulating valve
- Use in continuous operation
- Use in areas with aggressive, corrosive substances (e.g., high ozone loads)
- Use in areas with damaging radiation (e.g., ionizing radiation)

- Use to feed, forward, or store hazardous substances and mixtures as defined in Annex I Part 2-5 of the CLP Regulation (EC 1272/2008) that are marked with hazard pictograms GHS01-GHS 09
- Use to feed / forward / store gases, liquefied gases, dissolved gases, vapors, or fluids whose vapor pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at their maximum permissible operating temperature
- Use in an explosion protection zone
- Use to feed, forward, or store lubricants with solvents

1.5 Painting plastic components

The painting of all plastic components and seals of the products described here is prohibited.

Completely remove or mask affected components before painting the main machine.

1.6 Modifications to the product

Unauthorized modifications and changes can have an unpredictable effect on safety. Unauthorized modifications and changes are therefore prohibited.

1.7 Prohibition of certain activities

The following activities must be performed only by employees of the manufacturer or persons authorized by the manufacturer due to possibly undetectable sources of error or due to statutory requirements:

- Repairs, modifications to the drive
- Modifications to the pistons of the pump elements

1.8 Inspections prior to delivery

The following tests were performed prior to delivery:

- Safety and functional tests
- For electrically operated products: Electrical tests according to DIN EN 60204-1:2007, VDE 0113-1:2007

1.9 Referenced documents

In addition to this manual, the following documents must be observed by the respective target group:

- Operational instructions, approval rules
- The safety data sheet of the lubricant used

If necessary:

- Project planning documents
- Instructions from suppliers of purchased parts
- Instructions for other components for setting up the centralized lubrication system
- Other relevant documents for integration of the product into the main machine, system

1.10 Markings on the product

☞ See Figure 1

The warning labels listed below are affixed to the product. Before start-up, check that the labels are present and intact. Immediately replace warning labels if damaged or missing. The product must not be operated until then. Order number and item -see positioning diagram, Figure 1.

Pinch point
(on open reservoir)
Order No.: 44-1826-3096

Motor rotation arrow

Order No.: MS-WN 1021.038

Fig. 1 Positioning of warning labels

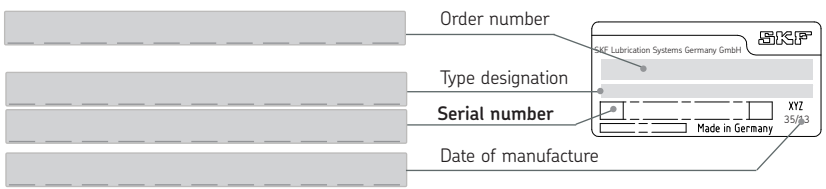
1.11 Notes on the type plate

☞ See Figure 2
The type plate provides important data such as the type designation, order number, etc.

To avoid loss of this data in case the type plate becomes illegible, these characteristics should be entered in the manual.

- Enter characteristics from type plate in Figure 2 below:

Fig. 2 **Key data from type plate**



1.12 Note on CE marking

The CE marking is based on the requirements of the applied Directives:

- 2014/30/EU
  Electromagnetic compatibility

- 2011/65/EU
  (RoHS II) Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Note on Low-Voltage Directive 2014/35/EU

The protection objectives of the Low-Voltage Directive 2014/35/EU are met in accordance with Annex I, No. 1.5.1 of Machinery Directive 2006/42/EC.

Note on Pressure Equipment Directive 2014/68/EU

Due to its performance characteristics, the product does not reach the limit values defined in Article 4, Paragraph 1, Subparagraph (a) item (i) and is, pursuant to Article 4, Paragraph 3, excluded from the scope of Pressure Equipment Directive 2014/68/EU.

1.13 Persons authorized to use the product

1.13.1 Operator

A person competent due to training, knowledge, and experience to execute the functions and activities associated with normal operation; this also includes the avoidance of possible hazards that may arise during operation.

1.13.2 Qualified mechanic

A person with appropriate technical training, knowledge, and experience who can recognize and avoid the hazards that may occur during transport, assembly, first start-up, operation, maintenance, repair, and dismantling

1.13.3 Qualified electrician

A person with appropriate technical training, knowledge, and experience who can recognize and avoid hazards that may result from electricity

1.14 Instruction of outside fitters

Before commencing work, the operator must inform outside fitters of the operational safety regulations, applicable accident prevention regulations, and the functions of the main machine and its protective devices.

1.15 Provision of personal protective gear

The operator must provide personal protective gear appropriate for the location and intended application.

1.16 Operation

The following must be observed during first start-up and operation:

- All information within this manual and all information within the referenced documents
- All laws and regulations that the operator must observe

1.17 Emergency shutdown

Shut down the product in an emergency by:

- Switching off the main machine in which the product is integrated
- If necessary, pressing the on/off switch on the main machine

1.18 Transport, assembly, maintenance, malfunction, repair, shutdown, disposal

- All relevant persons must be informed of the activity prior to the start of this work. Precautionary operational measures, work instructions must be observed.
- Transport only with suitable transport and lifting gear on suitable paths.
- Maintenance and repair work can be subject to restrictions at low or high temperatures (e.g., altered flow properties of the lubricant). Maintenance and repair work should therefore preferably be performed at room temperature.
- Prior to performing work, the product and the machine in which the product will be integrated must be de-energized, depressurized, and secured against unauthorized activation.
- Take appropriate measures to ensure that moving, detached parts are immobilized during the work and that no limbs can be pinched by unintended movements.
- Assemble the product only outside the operating range of moving parts, at an adequate distance from sources of heat or cold. Other units of the machine, the vehicle must not be damaged or impaired in their function by the installation.
- Dry any wet, slippery surfaces or cover appropriately.
- Cover hot or cold surfaces appropriately.
- Work on electrical components may be performed only by qualified electricians. Note possible waiting times for discharge. Work on electrical components may be performed only in a voltage-free state and using tools suitable for electrical work.

- Establish the electrical connection only in accordance with the valid circuit diagram and in observance of the relevant regulations and the local electrical operating conditions.
- Do not touch cables or electrical components with wet or moist hands.
- Fuses must not be bridged. Always replace defective fuses with fuses of the same type.
- Drill required holes only on non-critical, non-load-bearing parts of the operator's machine/infrastructure. Use existing boreholes. Do not damage lines or cables when drilling. Modifications to SKF products are prohibited. This also includes all drilling, welding, firing, and grinding work.
- Observe any possible wearing spots. Protect components appropriately.
- All components used must be designed for:
  - The maximum operating pressure
  - The maximum/minimum ambient temperature
  - The lubricant to be delivered
  - The operating and ambient conditions at the place of use.
- No parts may be subjected to torsion, shear, or bending.
- Check parts for contamination before use and clean if necessary.
- Lubrication lines should be filled with lubricant prior to assembly. This simplifies subsequent venting of the system.
- Adhere to the specified torques. Use a calibrated torque wrench when tightening.
- Use suitable hoisting equipment when working with heavy parts.
- Avoid mixing up/incorrectly assembling disassembled parts. Label parts.

1.19 First start-up, daily start-up

Ensure that:

- All safety mechanisms are fully present and functional.
- All connections are properly connected.
- All parts are correctly installed.
- All warning labels on the product are fully present, visible, and undamaged.
- Illegible or missing warning labels are immediately replaced.

1.20 Cleaning

- There is a fire hazard from the use of flammable cleaning agents. Use only non-flammable cleaning agents that are suitable for the intended purpose.
- Do not use corrosive cleaning agents.
- Do not use steam-jet equipment or high-pressure cleaners. This may damage electrical components.
  Observe the IP protection class.
- Cleaning work must not be performed on conducting components.
- Mark wet areas accordingly.

1.21 Residual risks

Residual risk	Possible in lifecycle	Avoidance / Remedy
Personal injury / property damage due to falling of hoisted parts	A, B, C, G, H, K	Unauthorized persons must be kept away; nobody is allowed to be present below hoisted parts. Lift parts using suitable and tested lifting gear.
Personal injury/property damage due to tilting or falling product due to non-compliance with specified torques	B, C, G	Adhere to the specified torques. Secure the product only to components with a sufficient load-carrying capacity. If no torques are specified, use those specified for the screw size for screws of strength class 8.8.
Personal injury / property damage due to electric shock resulting from power lead damage	B, C, D, E, F, G, H	Inspect power leads for damage prior to initial use and then at regular intervals. Do not install the cable on moving parts or wearing spots. If this cannot be avoided, use anti-kink coils and/or conduits.
Personal injury / property damage due to spilled, leaked lubricant	B, C, D, F, G, H, K	Be careful when filling the reservoir and then connecting or disconnecting the lubricant lines. Use only hydraulic screw unions and lubrication lines suitable for the specified pressure. Do not install lubrication lines on moving parts or wearing spots. If this cannot be avoided, use flexible hose lines or anti-kink coils and/or conduits.
Lifecycles: A = Transport, B = Assembly, C = First start-up, D = Operation, E = Cleaning, F = Maintenance, G = Malfunction, repair, H = Shutdown, K = Disposal		

2. Lubricants

2.1 General information

Lubricants are used specially for specific applications. To fulfill the task, lubricants must meet various requirements to varying degrees. The most important requirements for lubricants are:

- Reduction in friction and wear
- Corrosion protection
- Noise reduction
- Protection against contamination/ ingress of foreign matter
- Cooling (primarily for oils)
- Durability (physical/chemical stability)
- Compatible with as many materials as possible
- Economic and environmental aspects

2.2 Selection of lubricants

SKF Lubrication Systems considers lubricants to be an element of system design. The selection of a suitable lubricant should reasonably be made during the design of the machine and forms the basis for planning the centralized lubrication system.

The manufacturer/operator of the machine should preferably make the selection with the supplier of the lubricant on the basis of the requirements profile of the specific task.

If you have no or little experience selecting lubricants for centralized lubrication systems, please contact SKF.

We gladly assist our customers in the selection of suitable components for feeding the selected lubricant and in the planning and design of a centralized lubrication system.

This will spare you potentially costly downtime due to damage to the machine/system and/or damage to the centralized lubrication system.

Only lubricants specified for the product may be used (see “Technical data” chapter). Unsuitable lubricants may lead to failure of the product.

Do not mix lubricants. This can have unpredictable effects on the usability and this function of the centralized lubrication system.

Due to the large number of possible additives, it is possible that individual lubricants that meet the required specifications according to the manufacturer's data sheet are not suitable for use in centralized lubrication systems (e.g., incompatibility between synthetic lubricants and materials). To avoid this, always use lubricants that have been tested by SKF.

2.3 Material compatibility

The lubricants must generally be compatible with the following materials:

- Steel, gray cast iron, brass, copper, aluminum
- NBR, FKM (FPM), ABS, PA, PU

2.4 Aging of lubricants

In case of extended machine downtime, check before putting back into operation that the lubricant is still suitable for use in terms of chemical and physical signs of aging. We recommend performing this inspection after one week of machine downtime.

In case of doubt regarding the suitability of the lubricant, replace it before putting back into operation and, if necessary, perform an initial lubrication manually.

It is possible for lubricants to be tested in the company's laboratory for their suitability for pumping in centralized lubrication systems (e.g., "bleeding").

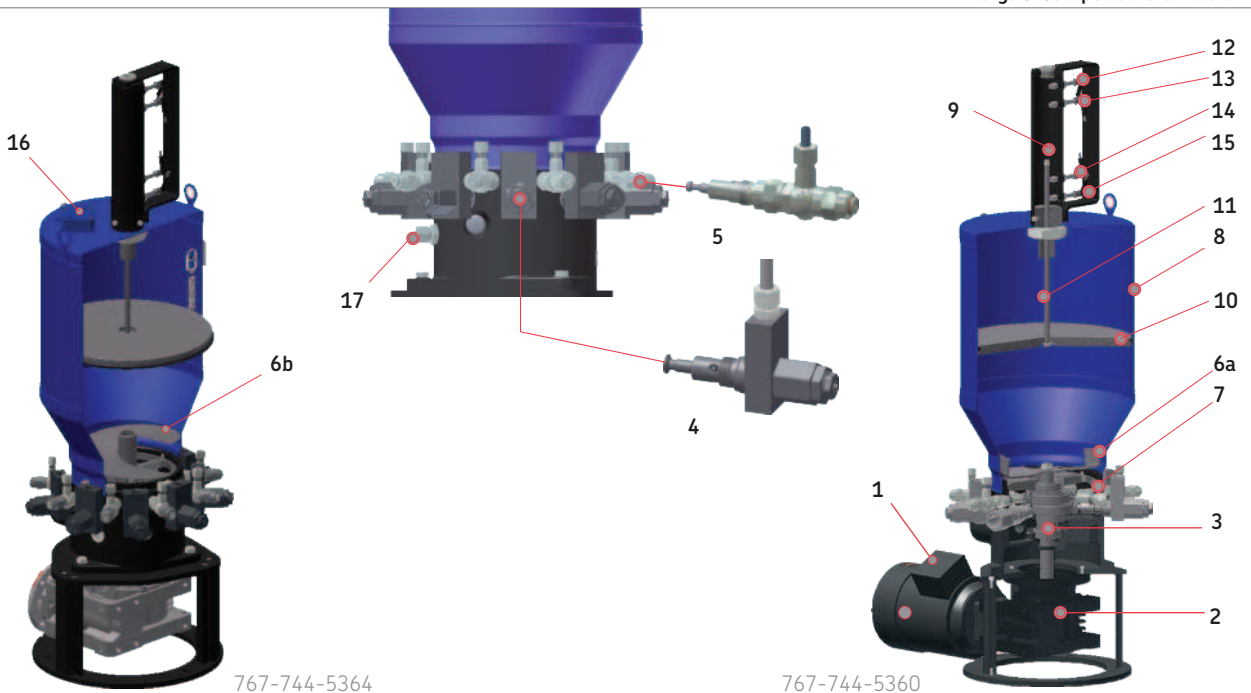
Please contact SKF if you have further questions regarding lubricants.

An overview of the lubricants we have tested is available on request.

3. Overview, functional description

3.1 Design 767-744-5360 with agitator blade and design 767-744-5364 with worm technology

Fig. 3 Components of the FB-XL unit



Item	Description
1	Pump motor (electric motor)
2	**2a** Gear
	2b Worm drive
3	Eccentric drive shaft
4	Pump element with outlet port, first row, (large series) Pump elements 1 to 8
5	Pump element with ring connection, second row, (small series) Pump elements 9 to 16
6	**6a** Agitator blade (767-744-5360)
	6b Screw conveyor (767-744-5364)
7	Inlet chamber
8	Lubricant reservoir
9	Level gauge J 4 switching points Reservoir cover (with fill level control)
10	Grease follower plate
11	Contact rod

Item	Description
12	Maximum fill level indicator
13	Maximum pre-warning indicator
14	Minimum pre-warning indicator
15	Minimum fill level indicator
16	Ultrasonic sensor (optional)
17	Fill connection

3.2 Operation of the pump design

☞ See Figure 3

FB-XL multi-line pumps are available in designs with electric motor (**1**), gearbox (**2a**) and agitator blade (**6a**) (design 767-744-5360) and without motor, with worm drive (**2b**) and screw conveyor (**6b**) (design 767-744-5364).
Both designs drive an eccentric drive shaft (**3**). 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 8. The pump elements of the large series are installed in row 1.
The cam disc above these (row 2) (**5**) controls the attached pistons of pump elements 9 to 16. The pump elements of the small series are installed in row 2.

Additionally, an agitator blade (**6a**) (on design 767-744-5360) or a screw conveyor (**6b**) (on design 767-744-5364) is installed at the end of the eccentric shaft (**3**). The agitator blade (**6a**) or the screw conveyor (**6b**) feeds the lubricant into the pump's inlet chamber (**7**).
The eccentric movement of the cam discs (**3**) forcibly moves the attached delivery pistons of the pump elements (**4**) (**5**), which ensures a continuous lubricant delivery rate.

The pump elements of row 1, large series (**4**), have a delivery piston diameter of 7 mm or 12 mm.
Depending on the settings, the delivery volume is 0.07 to 1 cm^3/stroke at a maximum operating pressure of 350 bar.

The pump elements of row 2 (**5**), small series, are available in designs with a delivery piston diameter of 6, 8, or 10 mm. Depending on the settings, the delivery volume is 0.027 to 0.23 cm^3/stroke at a maximum operating pressure of 350, 250, or 125 bar.

The lubricant reservoir (**8**) holds 30 kg of lubricant.

The FB-XL multi-line pump is optionally available with two fill level indicators.
With level gauge J (**9**), a grease follower plate (**10**) is located in the reservoir. This plate continuously collects lubricant medium from the reservoir wall. The grease follower plate is connected to the contact rod (**11**) of fill level control J.
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 max. pre-warning; switch 3 (**14**) the min. pre-warning; and switch 4 (**15**) the minimum fill level. The customer evaluates the signals.
Level gauge U2 is an ultrasonic sensor with two switching points. The switching points can be programmed freely.
The signals are likewise evaluated by the customer.
On the pump side, the two level switches (J/U2) can be used separately or jointly.
FB-XL multi-line pump units are filled exclusively through the fill connection (**16**) attached to the pump housing.
A customer-supplied lubricant filter with ball valve is typically located upstream.

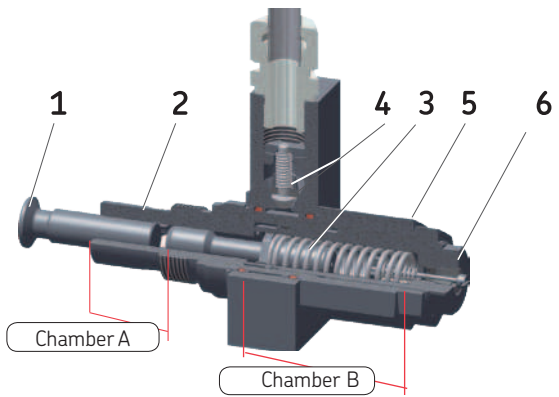
3.3 Operation of a pump element of the large series

☞ See Figure 4

The delivery piston is forcibly actuated as described in “Pump operation.”
At the start of the pressure stroke, the delivery piston (**1**) closes the suction hole in the screw-in cylinder (**2**). The suctioned lubricant in chamber **A** is pressed against the spring-loaded control piston (**3**). After displacement of the control piston (**3**), lubricant reaches chamber **B** under pressure through the bores in the element body , where it flows through the ring duct and the check valve (**4**) 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 in the screw-in cylinder (**2**) opens, the lubricant flows into chamber **A** due to the negative pressure.

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

Fig. 4 Design of pump elements of row 1 (large series)



Item	Description
1	Delivery piston
2	Screw-in cylinder
3	Spring-loaded control piston

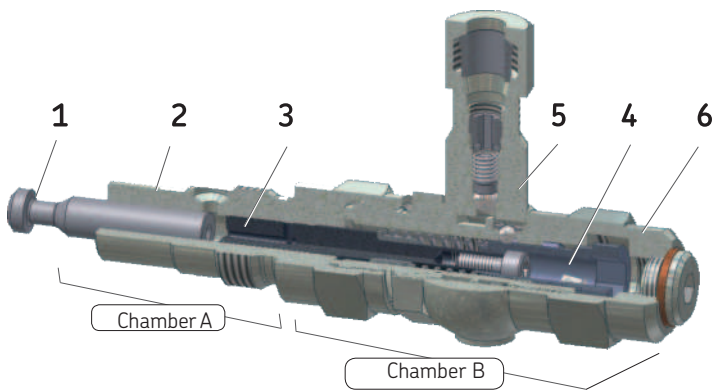
Item	Description
4	Outlet port with check valve
5	Pump cylinder assembly
6	Control spindle with locknut

3.4 Operation of a pump element of the light series

☞ See Figure 5

The delivery piston is forcibly actuated as described in “Pump operation.”
In the suction stroke position (as illustrated), the cross hole of the control 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.

Fig. 5 Design of pump elements of row 2 (small series)



Item	Description
1	Delivery piston
2	Screw-in cylinder
3	Spring-loaded control piston

Item	Description
4	Setting sleeve
5	Ring piece with check valve
6	Cap nut with plug screw

4. Technical data

4.1 General technical data

General		
Type	Multipiston pump with 1 to 16 outlet ports	
Mounting position	Vertical	
Ambient and lubricant temperature range	-15 °C to 40 °C *(At higher ambient temperatures, note that there is reduction in (motor) performance of approx. 1% per Kelvin.)*	
Number of pump elements	Row 1 Row 2	1 to 8 9 to 16
Weight empty, without pump elements	Approx. 51 kg	FB multi-line pump unit with foot guard, with monitoring, without pump elements
Gearbox step-down ratios	45:1	
Pump elements - row 1 (large series)		
Delivery volume of pump elements *Data refers to Renocal FN745/95 grease, NLGI 2, at +20°C and max. back pressure of 350 bar.*	Piston Ø 7 mm Piston Ø 12 mm	0.07 to 0.39 cm^3/stroke 0.23 to 1.13 cm^3/stroke
Operating pressure at pump elements	Piston Ø 7 mm Piston Ø 12 mm	max. 350 bar
Pump elements - row 2 (small series)		
Delivery volume of pump elements	Piston Ø 6 mm Piston Ø 8 mm Piston Ø 10 mm	0.027 to 0.08 cm^3/stroke 0.050 to 0.15 cm^3/stroke 0.077 to 0.23 cm^3/stroke
Operating pressure at pump elements	Piston Ø 6 mm Piston Ø 8 mm Piston Ø 10 mm	max. 350 bar max. 200 bar max. 125 bar

Lubricants		
with:	Mineral oils (base oils) or environmentally compatible oils from ISO VG 46 to greases of NLGI Grade 3. (Synthetic and biodegradable oils or greases require approval from SKF. When using oils, only use safety valves with a tank return.)	
Operating viscosity (oil)	≥ 50 to 5000 mm^2/s	
Worked penetration (grease)	> 220 1/10 mm	
Maximum flow pressure	< 750 mbar	
Proportion of solid lubricants	< 5% (Other specifications available on request)	in accordance with DIN 51825 lubricant specification
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 pump motor and worse suction capability by the pump elements. When used by the customer (system design), these physical characteristics must be taken into consideration.	
We recommend using high-conductivity lubricants (if possible, >1000 pS/m at 20°C) to minimize the electrostatic charge of the lubricants		

4.2 U2 analog ultrasonic sensor

Analog ultrasound sensor U2	Order No. 237-11204-7
Blind zone	0 to 65 mm
Operating range, max.	500 mm
Sensing range	600 mm
Opening angle of switching loop	-See Fig. 25
Ultrasonic frequency	approx. 400 Hz
Reproducibility	± 0.15%
Operating voltage U_B	9 V to 30 V DC, reverse polarity resistant
Residual ripple	± 10%
No-load power consumption	≤ 40 mA
Housing	PBT, polyester
Protection class	IP67
Setting option	LCA-2 with LinkControl (optional)
Display elements	LED D2 green (teach-in) LED D1 green/red object in/outside analog window
Operating temperature	-40°C to +70°C
Current output 4-20 mA	R_L ≤ 100 Ω at 9 V ≤ U_B ≤ 15 V R_L ≤ 500 Ω at U_B ≥ 15 V Rising/falling characteristic
Voltage output 0-10 V	R_L ≤ 100 kΩ at U_B ≥ 15 V Short-circuit-proof Rising/falling characteristic

4.3 FB-XL motor ratings for model 767-744-5360

Rated speed	Frequency	Rated power	Rated current	Order codes
[rpm]	[Hz]	[V]	[A]	
1500	50	0.55	230/400 (3~ AC)	AF07
Note. This data refers to the Siemens three-phrase motor 1LAA 7080-4AA12. There may be differences with motors from other manufacturers.				

4.4 FB-XL, without motor, with worm drive, 767-744-5360

Step-down ratio	Input speed	Nominal Power	Torque	Dynamic efficiency	Motor mounting flange	Ø-Drive flange	Order codes
[i]	[rpm]	[kW]	[Nm]	[%]		[mm]	
40	1400	1.3	255	72	90 B14	130	24-0701-3564

4.5 Tightening torques

The specified torques must be observed during assembly and repair.	
Multi-line pump unit hexagon head bolts M10x20-8.8	50 Nm ± 2.0 Nm
Pressure regulating valve	8 Nm ± 1.0 Nm
Inlet and outlet screws	25 Nm ± 2.0 Nm
Cable glands	2 Nm ± 0.5 Nm

5. Delivery, returns, storage, transport

5.1 Delivery

After receipt of the supply, it must be inspected for any shipping damage and for completeness according to the shipping documents. Immediately inform the transport carrier of any shipping damage.
The packaging material must be preserved until any discrepancies are resolved. Safe handling must be ensured during on-site transport.

5.2 Return shipment

Before return shipment, all contaminated parts must be cleaned and properly packed (i.e., according to the requirements of the recipient country).
The product must be protected from mechanical effects such as impacts. There are no restrictions for land, air, or sea transport.

The following must be marked on the packaging of return shipments:

5.3 Storage

Before usage, check products for damage that may have occurred during storage. This applies in particular to parts made of plastic and rubber (due to embrittlements) as well as components pre-filled with lubricant (due to aging).

The following conditions apply to storage:

- The permissible storage temperature range corresponds to the operating temperature range (see “Technical data”).
- Dry, low-dust, vibration-free, in closed rooms
- No corrosive, aggressive substances at the storage location (e.g., UV rays, ozone)
- Protected against animals
- In the original product packaging
- Protected from nearby sources of heat or cold
- In case of large temperature fluctuations or high humidity, take appropriate measures (e.g., heating) to prevent the formation of condensation water.

5.3.1 Corrosion protection

The corrosion protection (e.g., on the inside of the container) should be checked and (if applicable) renewed every 6 - 12 months depending on the loads at the storage location.

We recommend:

- Henkel Teroson Fluid DS 150 ML VE 12
- OKS 450 Chain and Adhesive Lubricating Oil

5.4 Special storage conditions for motors

- Do not store motors on the fan cowl.
- Be sure to inspect insulation resistance of the motor before putting back into operation after extended storage.
- Note that when the bearing grease is stored > 1 year, its useful life declines by 10% per year.

5.5 Transport

WARNING

The permissible load capacity of the customer-provided lifting equipment (lifting lugs, lifting ropes, (cranes, forklifts, etc.)) may not be below the total weight of the multi-line pump unit, including its packaging.
See the "Technical data" chapter for the permissible total weight of the multi-line pump unit. **Add 20% to determine the load capacity.**

The customer must secure/assemble the lifting equipment in accordance with its respective national laws and regulations.
SKF Lubrication Systems Germany GmbH is not responsible for improperly designed, assembled, or defective lifting equipment.

5.5.1 Transporting the multi-line pump unit by lifting cables and crane

-See Figure 6

Four lifting lugs are attached to the base-plate of FB multi-line pumps for transport purposes. These are color coded. Multi-line pump units with baseplate may only be lifted and transported using these lifting lugs. The lifting equipment provided by the customer, such as belts, pulleys, etc. must be designed for a total weight of 200 kg The customer must secure/

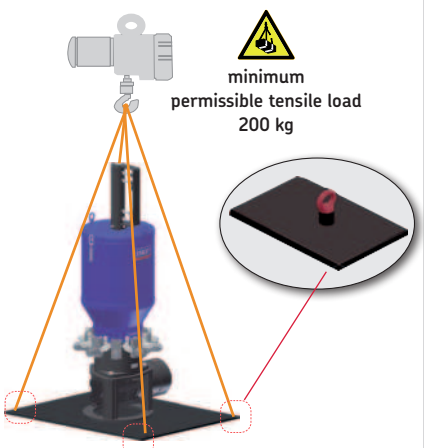
assemble the lifting equipment in accordance with its respective national laws and regulations.
SKF Lubrication Systems Germany GmbH is not responsible for improperly designed, assembled, or defective lifting equipment.

- See the "Technical data" chapter or the shipping documents for the total weight of the multi-line pump unit.
- In case the multi-line pump is filled, calculate the total weight
- Add a 20% safety margin to this weight. Select the lifting cables and lifting crane according to this weight.
- Correctly connect the lifting lugs to the customer-provided lifting crane using lifting cables provided by the customer.

If using lifting ropes
Do not exceed a 45-degree angle of lifting ropes as viewed vertically from the lifting equipment!

- Lift the multi-line pump

Fig. 6 Transport using lifting cables



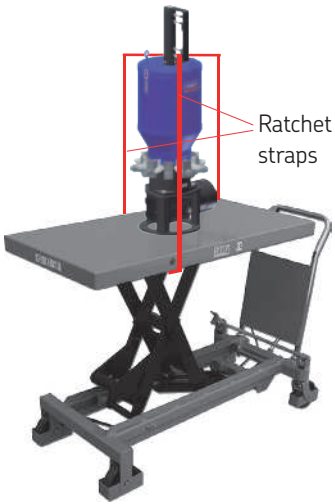
Corner of baseplate with mounting position of lifting lugs (4x)

5.5.2 Transport by pallet truck or forklift

-See Figure 7 and Fig. 8

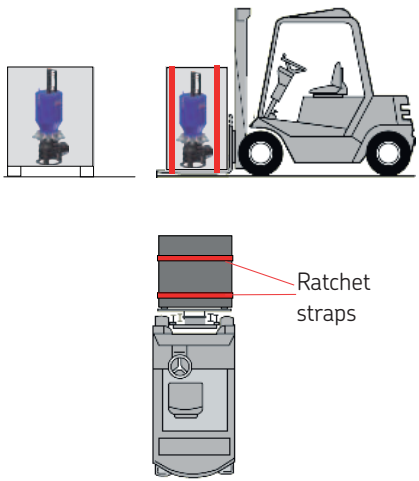
SKF recommends that the customer use a height-adjustable pallet truck or a forklift for transport to the installation location and for installation of the multi-line pump unit.
The multi-line pump unit must be secured against tipping using two ratchet straps.
The lifting equipment provided by the customer, such as forklift, pallet truck, ratchet straps, etc. must be designed for the total weight of the multi-line lubrication pump + a 20% safety margin.
The customer must secure/assemble the lifting equipment in accordance with its respective national laws and regulations.
SKF Lubrication Systems Germany GmbH is not responsible for improperly designed, assembled, or defective lifting equipment.

Fig. 7 Pallet truck



- Secure the multi-line pump against tipping on the pallet truck using at least two ratchet straps.

Fig. 8 Forklift



- Secure the multi-line pump against tipping on the forklift using at least two ratchet straps.

6. Assembly

6.1 General information

Only qualified technical personnel may install the products specified in the instructions.

During assembly, pay attention to the following:

- The product must not be installed within range of moving parts.
- Other units must not be damaged by assembly work.
- The product must be installed at a sufficiently large distance from sources of heat or cold.
- The product must not be installed within range of moving parts.
- Observe the IP protection class of the product
- Maintain safety clearances and comply with statutory regulations for assembly and accident prevention.
- Any visual monitoring equipment present, such as pressure gauges, min./max. markings, oil level gauges, piston detectors, etc. must be clearly visible.
- Follow the mounting position requirements in “Technical data” (Chapter 4).
- The FB-XL multi-line pump unit is mounted using four bolts. This can be done using a provided pump baseplate or directly by the customer. The optional pump baseplate / the pump housing must not be under stress.
- When the reservoir is empty and its cover is removed, the agitator of the multi-line pumps should be visible, so that the functioning and direction of rotation of the pumps can be checked by switching the pumps on briefly (pump model 767-744-5360).
- The installed pump elements are set for full stroke, with the ring pieces (small series) and the outlet ports (large series) with their respective check valves pointing upwards. If you want to point the ring piece (small series) in a different direction, loosen the cap nut on the pump unit and tighten it again with the specified tightening torque (see operating instructions, Chapter 10.4). However, a turn of the outlet port is sufficient when aligning the pump elements of the large series. In pump elements of the large series, the 3-mm-thick sealing ring must not be removed or replaced by a thinner ring during assembly, as this would change the delivery characteristics. The number of pump elements can also be changed later. The pump must be shut down while this is done - see Chapter 8.

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

- Internal threads for installing pump elements have to be sealed off with plug screws M 20 x 1.5 (see Accessories) if not in use.

- The multi-line pump units are installed using 3 bolts with associated 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:

For direct mounting:
- Hexagon head bolt (3x) acc. to DIN EN ISO 4017- M10x25-8.8
- Washers (3x) acc. to DIN125-B10.5-St

For mounting on baseplate:
- Hexagon head bolt (3x) acc. to DIN EN ISO 4017-M18x25-8.8
- Washers (3x) acc. to DIN 125-B21-St

- Drill assembly holes (M18) acc. to the assembly drawing and the conditions on the surface.

- Clean surface to remove drilling chips.

- Place the pump unit (with mounting plate) on the surface and roughly align it.

- Pass hexagon head bolts acc. to DIN933-M18-8.8 with associated washers 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.

- Gentle tighten hexagon head bolts.

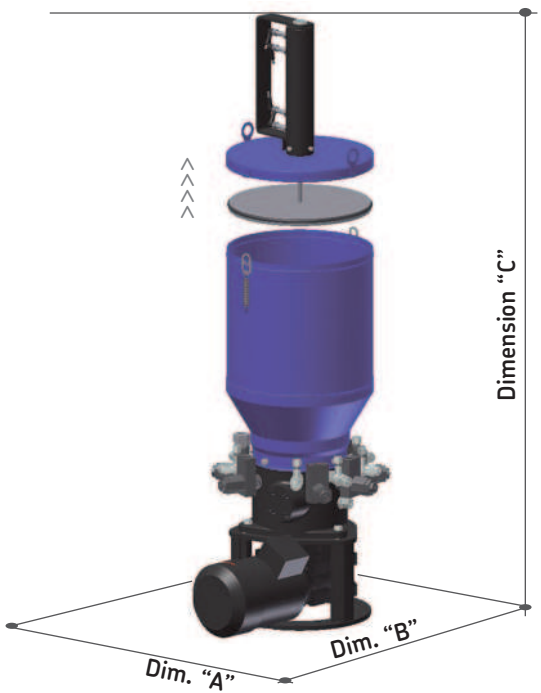
- Align the multi-line pump/mounting plate, tighten hexagon head bolts with the following torque:

DIN EN ISO 4017- M10x25-8.8
Tightening torque 50 Nm

DIN EN ISO 4017-M18x25-8.8
Tightening torque 300 Nm

6.2 Minimum mounting dimensions

Fig. 9 Minimum mounting dimensions

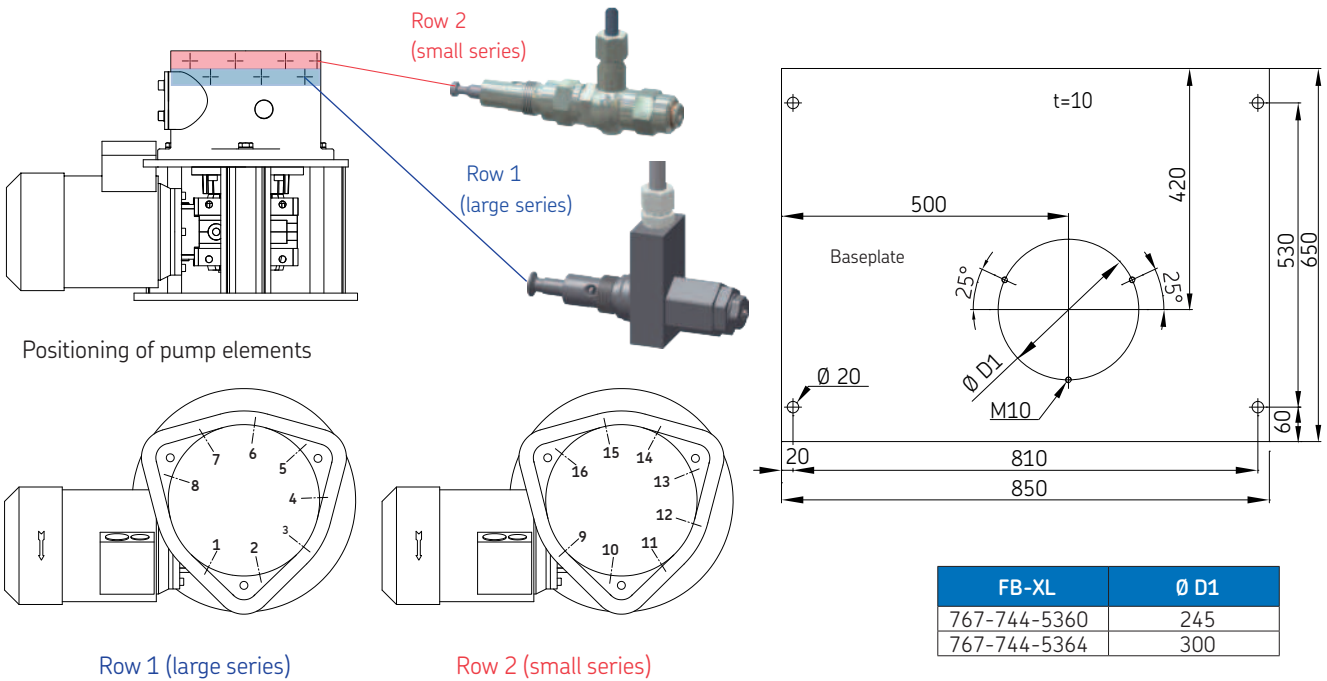


To ensure enough space for maintenance work and possible disassembly of the product, ensure that the minimum mounting dimensions are maintained.

Minimum mounting dimensions		
	[mm]	[mm]
Dimension	Minimum mounting dimensions	with base plate
A	600	950
B	700	750
C	1400	1400

6.3 Assembly drawing of FB-XL on base plate

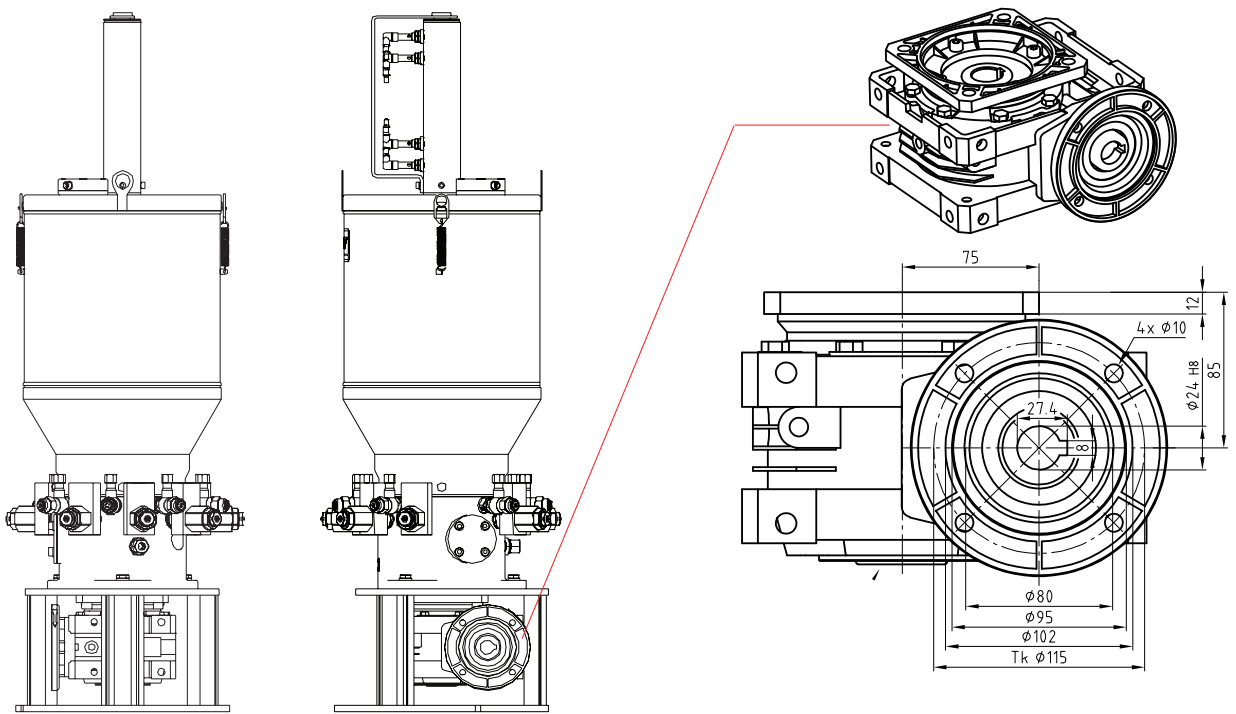
Fig. 10 Assembly drawing



FB-XL	Ø D1
767-744-5360	245
767-744-5364	300

6.4 Assembly drawing of FB-XL 767-744-5364 with geared motor

Fig. 11 Assembly drawing



6.5 Electrical connection for motor

☞ See Figure 12

CAUTION

Electric shock
Disconnect the product electrically from the mains before performing any work on electrical components.

DANGER

Electric shock
Electrical connections for the product may only be established by qualified and personnel authorized to do so by the operator. The local electrical operating conditions and local regulations (e.g., DIN, VDE) must be observed.

Observe the guidelines in EN 60034-1 (VDE 0530-1) for operation at the limits of the ranges A (combination of ±5% voltage deviation and ±2% frequency deviation) and B (combination of ±10% voltage deviation and +3/-5% frequency deviation). This applies especially with regard to heating and deviations in operating parameters from the ratings on the motor's type plate. The limits must never be exceeded.

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 EC / 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 following motor data table or customer's drawing (if available).

WARNING

Electric shock / damage to pump motor
The available mains voltage (supply voltage) must match the specifications on the type plate of the motor or of the electrical components.
Check the fuse protection of the electrical circuit. Use only fuses with the prescribed amperage.
The protective earth conductor must always be connected. Ensure that the contact is secure and that the connector diameter is adequate and standard-compliant.

WARNING

Damage to pump motor/pump

When establishing the electrical connection of the pump motor, be mindful of the correct direction of rotation. The direction of rotation must match the arrow on the motor.

Connect the power cables in such a way that no forces are transferred to the product (stress-free connection).

Connect the pump motor in accordance with the motor connection data sheet (**1**) from the motor manufacturer. It is located in the motor's terminal box (Fig. 13).

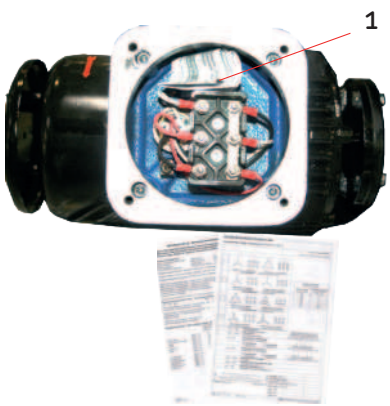
IMPORTANT NOTE

Use only original cover fittings and original cable glands from the motor manufacturer.

Improper work in the terminal box may result in property damage. Follow / comply with the following instructions to avoid this.

- Do not damage components inside the terminal box.
- There must be no foreign bodies, contamination, or humidity in the terminal box.
- Seal the terminal box dust-tight and water-tight with the original seal.
- Comply with the torques for cable glands and other screws.

Fig. 12 Motor terminal box with data sheet



6.5.1 Establish the motor connection

☞ See Figure 13

IMPORTANT NOTE

When attaching a motor supplied by the customer (for FB-XL series 767-744-5364), consult the operating instructions for the motor. The manufacturer's instructions and assembly descriptions contained therein must be observed in full.

CAUTION

Crushing hazard from agitator when motor running

The reservoir cover must be installed before turning on or commissioning the multi-line pump unit.

- Open the motor terminal box and remove the motor connection data sheet.
- Connect the motor of the pump unit according to the motor characteristics, the specifications in the enclosed terminal diagram (located in the terminal box of the motor), the motor type plate, and the motor's operating instructions.
- Mark the terminal diagram used on the motor data sheet and enclose the motor data sheet with these operating instructions.
- Secure the multi-line pump unit using a motor circuit breaker matched to the motor.

Avoid running the pump dry.
In the action below, run the pump unit only briefly in jogging mode.

- Operate the multi-line pump unit only briefly in jogging mode; while doing so: Check the direction of motor rotation based on the rotation arrow and the direction of motor fan impeller rotation.

Fig. 13 Direction of motor rotation

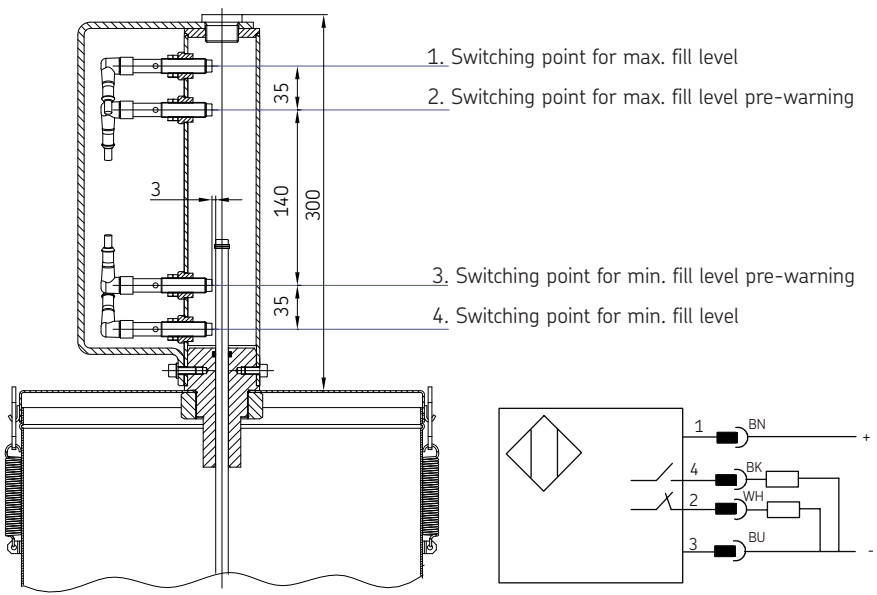
6

6.6 Assembly of electric level switches J

☞ See Figure 14

	Level switch J
Proximity switches (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.	10-30 V DC
Plug connection	
with cable	3 m
Protection class of plug/socket	IP 68

Fig. 14 Level switch J



6.7 Assembly of the analog ultrasonic sensor

☞ See Figure 15

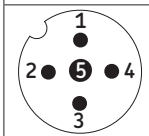
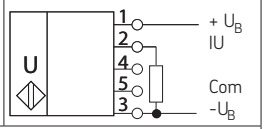
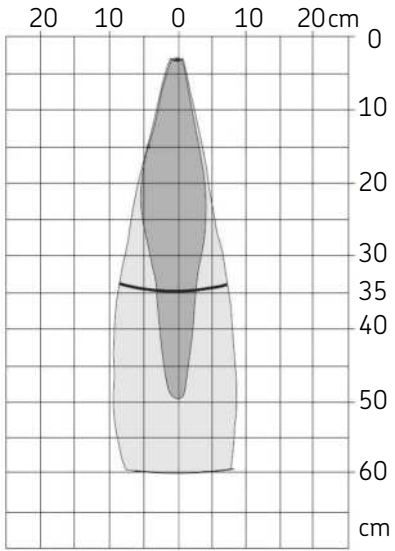
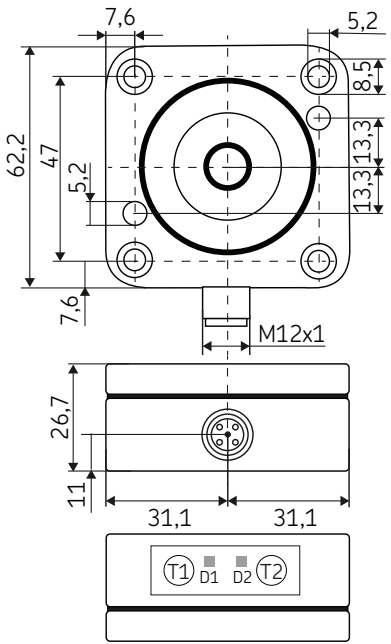
U2 ultrasonic sensor	
1 Analog output 4-20 mA or 0-10 V	
	
PIN assignment with view of sensor plug	
Pin 1	**+U_B**
PIN 3	**-U_B**
Connection	V15 plug connector (M12x1), 5-pin
Sensing range, see Fig. 15	
Sensing range in centimeters The dark gray areas indicate the range in which the normal reflector (conduit) is reliably detected. This is the typical operating range of the sensors. The light gray areas represent the range in which a large reflector, such as a grease follower plate, is still detected, provided it is optimally aligned to the sensor. No evaluation is possible outside the light gray area.	

Fig. 15 U2 ultrasonic sensor





6

6.8 Lubrication line connection

☞ See Figure 16

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

CAUTION

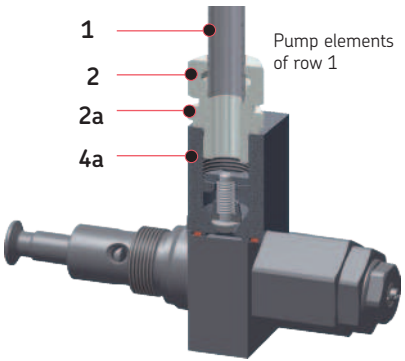
Destruction of fittings by excessive operating pressure

Fittings must be designed 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.

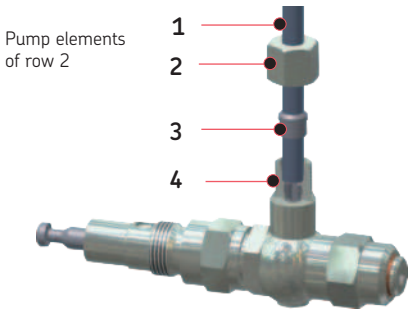
For operating pressures up to 350 bar as can occur especially in progressive centralized lubrication systems, SKF cutting-sleeve screw unions conforming to DIN 2353 can be used.

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

Fig. 16 Lubrication line connection



Delivery volume of pump elements
Piston Ø 7 mm 0.07 to 0.39 cm^3/stroke
Piston Ø 12 mm 0.15 to 1.0 cm^3/stroke



Delivery volume of pump elements
Piston Ø 6 mm 0.027 to 0.08 cm^3/stroke
Piston Ø 8 mm 0.050 to 0.15 cm^3/stroke
Piston Ø 10 mm 0.077 to 0.23 cm^3/stroke

Item	Description
1	Lubrication line to match pipe connection
2	Union nut
2a	Threaded socket

Item	Description
3	Cutting sleeve
4	Ring piece
5	Outlet port

6.8.1 Assembly of the lubrication lines

☞ See Figure 16

Row 1 (large series)

- Deburr the connecting end of the lubrication line (**1**).
- Remove the union nut (**2**) from the threaded socket (**2a**).
- Insert the lubrication line (**1**) into the union nut (**2**).
- Apply the union nut (**2**) with lubrication line (**1**) to the threaded socket (**2a**) and gently tighten the union nut by hand.
- Tighten the union nut (**2**) finger-tight with an open-end wrench.

Row 2 (small series)

- 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**).
- Apply the union nut (**2**) to the thread of the ring piece (**4**) and gently tighten the union nut (**2**) by hand.
- Tighten the union nut (**2**) finger-tight with an open-end wrench.

6.8.2 Lubrication line arrangement

IMPORTANT NOTE

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

To ensure that the entire centralized lubrication system functions smoothly, observe the following instructions when arranging the main lubricant line and lubrication point lines.
The main lubricant line must be dimensioned in accordance with the maximum operating pressure occurring in the lubrication unit used and the delivery volume 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.
Metering devices at the end of the main lubricant line must be installed such that the outlets of the metering devices point upwards. If the system configuration requires that the metering devices 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 and 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. The lubrication line system also 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 in the lubrication line system may protrude inwards in a way that disrupts the flow of the lubricant and could allow contaminants to enter the lubrication line system.

IMPORTANT NOTE

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 may not be impeded by the incorporation 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 must be avoided.

IMPORTANT NOTE

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

IMPORTANT NOTE

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

7. First start-up

IMPORTANT NOTE

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

IMPORTANT NOTE

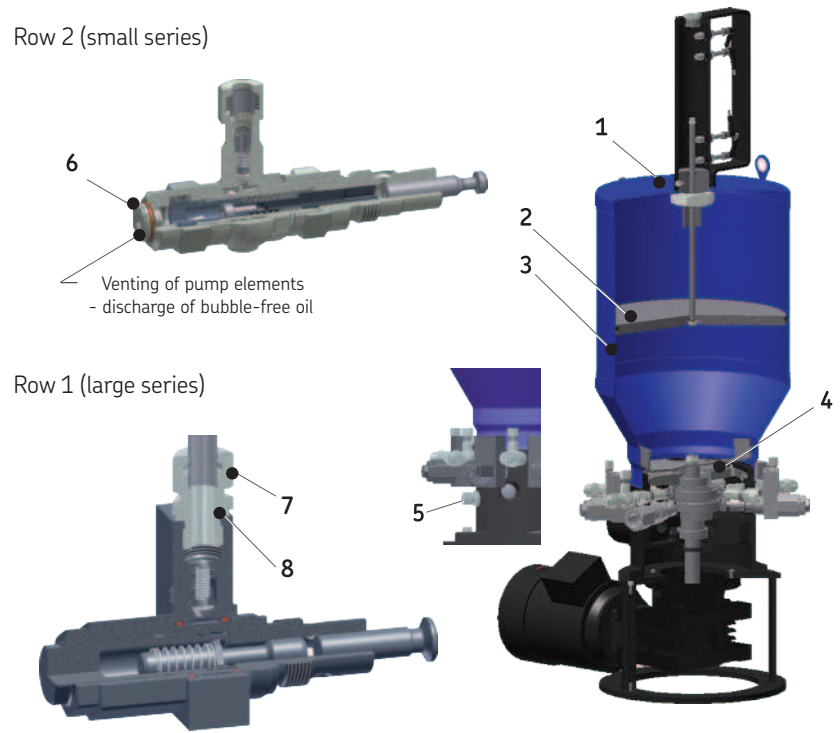
Only fill with clean lubricant and an appropriate device. Contaminated lubricants lead to system malfunctions. The lubricant reservoir must be filled without introducing bubbles.

IMPORTANT NOTE

Property damage due to mixing of different lubricants

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.

Fig. 17 First start-up, venting procedure



7.1 Commissioning and recommissioning

☞ See Figure 17

Before commissioning the feed pump unit, inspect all electrical and hydraulic connections.
The lubricant may only be fed without bubbles. The lubricant reservoir, if present, must be filled with clean lubricant without introducing bubbles.

IMPORTANT NOTE

The following filling with oil is intended only for venting the pump unit.

CAUTION

Crushing hazard
Actual filling of the multi-line pump may be performed only via the fill connection (**5**). Filling via the "reservoir lid" (**1**) is not permitted.

- **Fill the reservoir with oil**
- Remove the reservoir cover (**1**) with grease follower plate (**2**) and place it aside
- Fill the reservoir (3) with oil to the bottom edge of the agitator (**4**) (see Chapter 10 for characteristics)
- Fit the reservoir cover (**1**) with grease follower plate (**2**) back on the reservoir (**3**)
- Switch on the multi-line pump briefly (for about 1 second) and check the direction of motor rotation using the rotation arrow

☞ Filling process- see Chapter 8 Operation

- Fill the reservoir (3) with grease (**see Chapter 10 for characteristics**) via the fill connection (**5**) or upstream ball valve

7.1.1 Venting pump elements of row 1 (large series)

☞ See Figure 17

- Loosen the union nuts (**7**) from all threaded sockets (**8**) of row 1
- Start (switch on) the multi-line pump
- Allow the multi-line pump to run until bubble-free grease instead of oil can be seen discharging from all pump elements
- Tighten the union nuts (**7**) on all threaded sockets (**8**) of row 1.

☞ The venting procedure for row 1 on the multi-line pump is complete once bubble-free grease discharges.

7.1.2 Venting pump elements of row 2 (small series)

☞ See Figure 17

- Loosen and remove the plug screws (**6**) from all pump elements
- Start (switch on) the multi-line pump
- Allow the multi-line pump to run until bubble-free grease instead of oil can be seen discharging from all pump elements
- Attach and tighten the plug screws (**6**) on all pump elements

☞ The venting procedure on the multi-line pump is complete once bubble-free grease discharges.

7.1.3 Venting lubrication lines

The process of venting the centralized lubrication system can be facilitated by:

- ○ Filling long pipe sections (grease filling) before connecting to the lubrication points
- Loosening lubrication lines at the lubrication points
- Allowing the multi-line pump to run until bubble-free grease discharges at all lubrication points
- Tightening lubrication lines at the lubrication points
- Shut down the multi-line pump (switch it off)

7.2 Varying delivery volume

The pump elements are factory-set to maximum pump output. After first start-up, the output can be adjusted to meet output requirements, as described below.

7.2.1 Row 1 (large series)

☞ See Figure 18

- Apply a screw wrench (WAF 22) to the control spindle (**1**)
- Apply a screw wrench (WAF 32) to the locknut (**2**) and remove the locknut from the pump element body (**3**)
- Turn the locknut (**2**) back by several thread marks (on the control spindle)

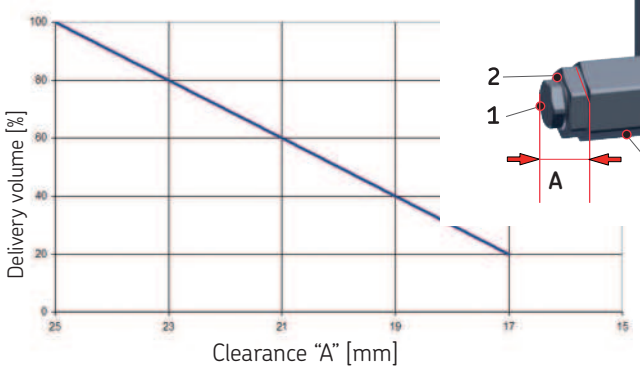
☞ When adjusting the control spindle:
Clockwise rotation results in decreased delivery volume,
counterclockwise rotation results in increased delivery volume.

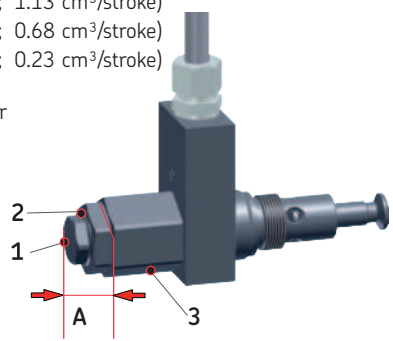
- Set the delivery volume using the control spindle (**1**) and delivery volume table (clearance “A”)
- Apply a screw wrench (WAF 32) to the locknut (**2**) and position the union nut
- towards the pump element body (**3**)

Fig. 18 Delivery volume adjustment, pump element with 7 mm / 12 mm delivery piston

Delivery rate	Clearance " A"	Output per stroke
Piston Ø **7 mm**	Max. L= 25 mm (100%	delivery volume; 0.39 cm³/stroke)
	Medium L= 21 mm (60%	delivery volume; 0.23 cm³/stroke)
	Min. L= 17 mm (20%	delivery volume; 0.07 cm³/stroke)
Piston Ø **12 mm**	Max. L= 25 mm (100%	delivery volume; 1.13 cm³/stroke)
	Medium L= 21 mm (60%	delivery volume; 0.68 cm³/stroke)
	Min. L= 17 mm (20%	delivery volume; 0.23 cm³/stroke)

Max. operating pressure of pump elements 350 bar





7.2.2 Row 2 (small series)

☞ See Figure 19

Remove plug screw

- Loosen and remove the plug screw (1) using a hexagon socket screw key (WAF 8)

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

When adjusting:
Clockwise rotation results in decreased delivery volume,
counterclockwise rotation results in increased delivery volume.

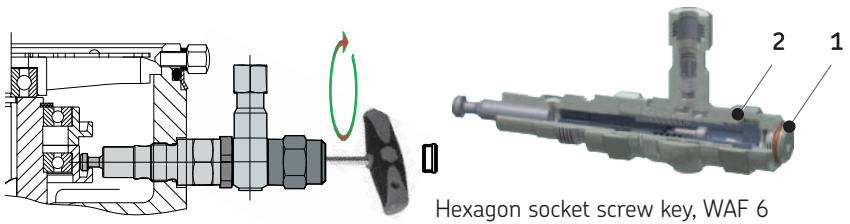
The pump element's delivery volume may be reduced to 1/3 of its maximum delivery volume. This corresponds to clockwise rotation of the setting sleeve (2) by eight notches.
With settings below 1/3 of maximum delivery volume, fluctuations in delivery volume cannot be ruled out.

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

☞ For delivery volume adjustment, 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.

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

Fig. 19 Delivery volume chart for row 2-small series



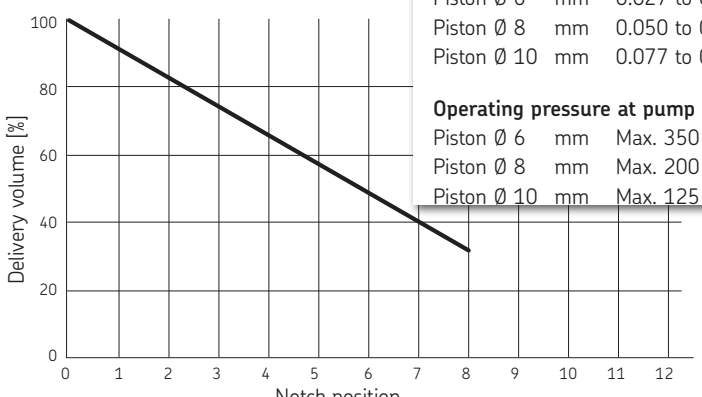
Hexagon socket screw key, WAF 6

Delivery volume of pump elements

Piston Ø 6	mm	0.027 to 0.08 cm³/stroke
Piston Ø 8	mm	0.050 to 0.15 cm³/stroke
Piston Ø 10	mm	0.077 to 0.23 cm³/stroke

Operating pressure at pump elements

Piston Ø 6	mm	Max. 350 bar
Piston Ø 8	mm	Max. 200 bar
Piston Ø 10	mm	Max. 125 bar



To ensure safety and functionality, the person specified by the operator is required to perform the following inspections. Any detected deficiencies must be resolved immediately. The correction of deficiencies must be done exclusively by a specialist competent and authorized to do so.

Fig. 20 Checklist for first start-up

7.3 Inspections before first start-up	YES	NO
Electrical connection established correctly	☐	☐
Mechanical connection established correctly	☐	☐
The performance characteristics for the aforementioned connections match the specifications in “Technical data.”	☐	☐
All components such as lubrication lines and progressive metering device are correctly mounted.	☐	☐
Product is protected by a suitable pressure regulating valve.	☐	☐
No apparent damage, contamination, or corrosion	☐	☐
Any dismantled protective and monitoring equipment is fully reinstalled and functional	☐	☐
Grounding fully present, properly connected, and electrically continuous	☐	☐
No unusual noises, vibrations, moisture accumulation, odors present	☐	☐
No undesired discharge of lubricant at connections (leakage)	☐	☐
Lubricant is fed without bubbles	☐	☐
The bearings and friction points requiring lubrication receive the planned lubricant volume	☐	☐

8. Operation

SKF products operate largely automatically.

The activities required during normal operation are limited primarily to inspection of the fill level, timely refilling of lubricant, and cleaning the exterior of the product if contaminated.

8.1 Refilling lubricant

Only fill using clean lubricant and an appropriate device. Contaminated lubricants can result in severe system malfunction.

The lubricant reservoir must be filled without introducing bubbles.To avoid possible air inclusions when filling, SKF recommends switching on the multi-line pump during the filling process.

Only add lubricant via the fill connection.

- Connect the filling hose on the fill connection of the multi-line pump.
- Let the filling pump run until the maximum mark (lubricant reservoir) of the multi-line pump unit has been reached.
- Turn off the filling pump.
- Remove the filling hose.

Fig. 21 Filling process

9. Cleaning

WARNING

Electric shock

Perform cleaning work only on products that have been de-energized and depressurized. Do not touch cables or electrical components with wet or moist hands. Use steam-jet equipment or high-pressure cleaners only in accordance with the IP protection class of the pump. Otherwise, electrical components may be damaged. Cleaning, required personal protective gear, cleaning agents, and equipment are in accordance with the current operating rules of the operator.

9.1 Cleaning agents

Only cleaning agents compatible with the materials can be used for cleaning (see Section 2.3 for materials).

Always completely remove residue of the cleaning agent on the product and rinse with clear water. This prevents the formation of alkaline deposits.

9.2 Exterior cleaning

- Mark and secure wet areas.
- Unauthorized persons must be kept away.
- Thoroughly clean all external surfaces with a moist cloth.

The reservoir must be kept closed during cleaning.

9.3 Interior cleaning

The interior normally does not need to be cleaned.
The interior of the product must be cleaned if incorrect or contaminated lubricant is accidentally filled.
Please contact SKF Customer Service.

9.4 Cleaning sensors

If the active sensor surface becomes contaminated, it must be cleaned with a cloth.

10. Maintenance

10.1 General

The FB-XL multi-line pump generally operates without maintenance. To prevent air from entering the pump elements, make sure that the oil level or grease level does not fall below the minimum.
If a synthetic oil is used as the pumped fluid, 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.

All connections and fittings must be regularly inspected for proper seating to ensure proper function. 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. Do not allow any cleaning agent to enter the interior of the product during cleaning. It is normally not necessary to clean the interior of the product.

The interior of the product must be cleaned if incorrect or contaminated lubricant is accidentally filled into the product.
Contact the SKF Service department if this occurs.
SKF shall not be held liable for damages resulting from improperly performed assembly, maintenance, or repair work on the product.

WARNING

Electric shock
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.

IMPORTANT NOTE

Dismantling of the product or individual parts thereof within the statutory warranty period is prohibited and voids any claims.

IMPORTANT NOTE

Only original SKF spare parts may be used. Unauthorized alterations to products and the use of non-original spare parts and accessories are prohibited and nullify the statutory warranty.

10.2 Removing a pump element of row 1 (large series)

☞ -See Figure 22 and Fig. 23

- Loosen the union nut (**1**) on the cutting-sleeve screw union (**2**) and remove the cutting-sleeve screw union (**2**)
- Loosen the locknut (**3**) from the pump cylinder (**4**)
- Unscrew and completely remove the control spindle (**5**) from the pump cylinder (**4**) and store it on a clean surface
- Insert the fitting mandrel (**7**) into the pump cylinder (**4**) until the stop position

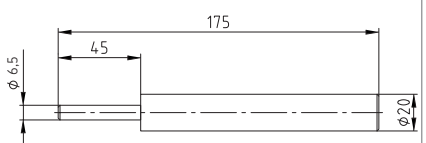
☞ The outlet port (9) is secured on the pump cylinder (4) by a snap ring which does not need to be removed.

- Carefully unscrew and remove the pump cylinder (**4**) from the pump housing
- Tilt the pump cylinder (**4**) about 30° until the delivery piston (**6**) is no longer held back by the guide ring (**8**)

☞ The circular motion prevents the delivery piston from staying stuck in the grease. If, however, the delivery piston does become stuck in the grease, remove it from the pump housing with tweezers or a bar magnet.

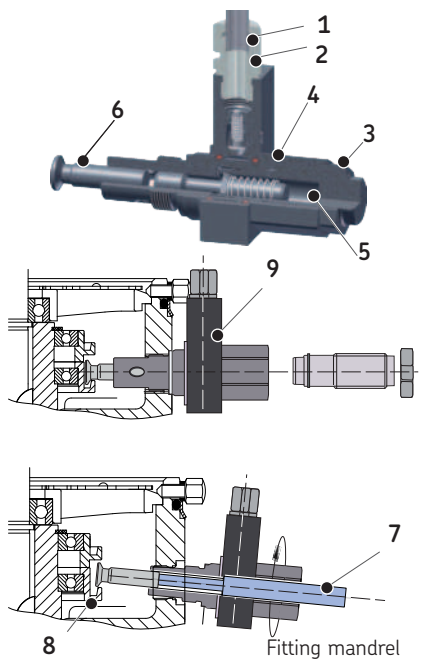
- Remove the pump cylinder (**4**) using a circular motion.

Fig. 22 Fitting mandrel for row 1



	Fitting mandrel for row 1
Order No.	**44-1827-2011**

Fig. 23 Pump elements of row 1



10.3 Removing a pump element of row 2 (small series)

☞ See Figure 24 and Fig. 25

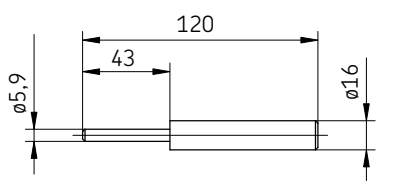
- Release the union nut (**1**) on the ring piece (**2**)
- Remove the lubrication line from the ring piece (**2**)
- Loosen the cap nut (**5**) and pull off the ring piece (**2**)
- Loosen and remove the screw socket (**3**)
- Carefully unscrew and remove the screw-in cylinder (**4**) from the pump 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**)

☞ The circular motion prevents the delivery piston from staying stuck in the grease.

If the delivery piston does become stuck in the grease, remove it from the pump housing with tweezers or a bar magnet.

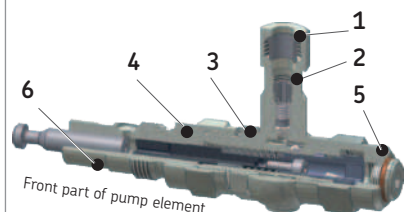
- Remove the front part of the pump element using a circular motion

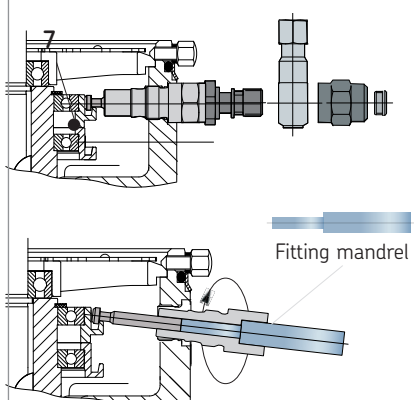
Fig. 24 Fitting mandrel for row 2



	Fitting mandrel for row 2
Order No.	**44-1827-2010**

Fig. 25 Pump elements of row 2





10.4 Installing a pump element of row 1 (large series)

☞ See Figure 22 and Fig. 26

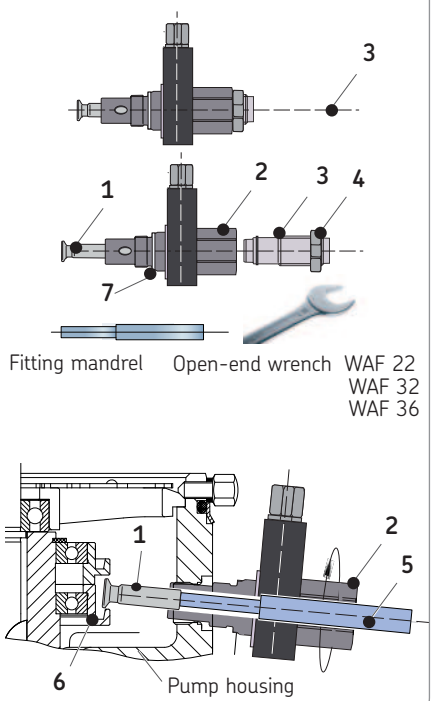
IMPORTANT NOTE

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 plug screws M27 x 1.5 (see Accessories section) if not in use. Only the supplied sealing ring may be used for item 7.

- Turn off pump unit.
- Loosen and remove plug screw.
- On a clean surface, disassemble the pump element that you wish to install into its individual components: delivery piston (**1**), pump cylinder (**2**), control spindle (**3**) with locknut (**4**)
- Fill the pump cylinder (**2**) with clean grease
- Carefully guide the delivery piston (***1***) into the pump cylinder chamber of the screw-in cylinder (**2**) (about 5 to 10 mm).
- Place the sealing ring (**7**) on the pump cylinder (**2**)
- Insert the fitting mandrel (**5**) into the pump cylinder (**2**)
- Guide the pump cylinder (**2**) into the pump element hole of the pump housing and align it, hooking the delivery piston (**1**) into the guide ring (**6**) at the same time
- Remove the fitting mandrel (**5**)

Fig. 26 Dismantling a pump elemen



- Screw the pump cylinder (**2**) into the pump housing and tighten it

  Tightening torque 35 $^{+2}$ Nm

- Place the control spindle (**3**) on the pump cylinder (**2**) and screw it in

- Vent the pump element
  - see Chapter 6.1

- Set the delivery volume
  - see Chapter 6.1

- Secure the control spindle (**3**) using a locknut (**4**).

Tightening torque max. 15 Nm

10.5 Installing a pump element of row 2 (small series)

☞ see Figures 24, Fig. 27 to Fig. 29

IMPORTANT NOTE

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

The number of pump elements can also be changed later.
Seal off unused internal threads for pump elements with screw plugs M 20 x 1.5 (see the "Accessories" Chapter).

- Turn off pump unit.

- Loosen and remove plug screw.

- On a clean surface, disassemble the pump element that 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 plug screw (**6**)

- Fill the cylinder chamber of the screw-in cylinder (**2**) with clean grease

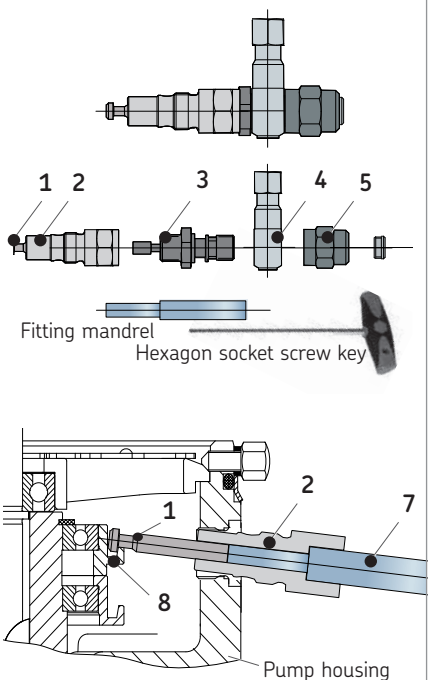
- Carefully guide the delivery piston (**1**) into the cylinder chamber of the screw-in cylinder (**2**) (about 5 to 10 mm).

- 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**)

Fig. 27 Dismantling a pump element



- Screw the screw-in cylinder (2) **into the pump housing and tighten it**

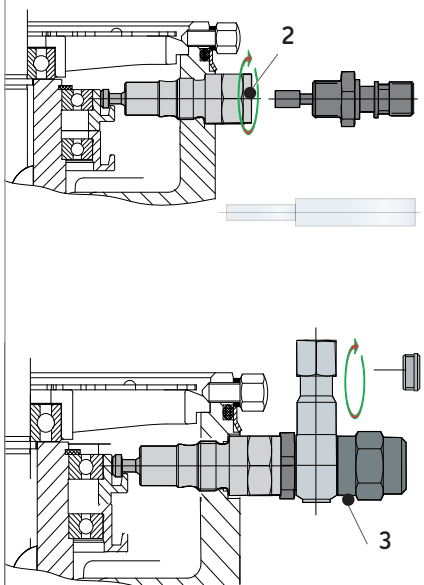
☞ Tightening torque for screw-in cylinder (**2**) - see tightening torque table,

- Screw the screw socket (**3**) into the screw-in cylinder (**2**) and tighten it

☞ Tightening torque for screw socket (**3**) - see tightening torque table

Tightening torque in Nm		
Pump element with piston diameter:		
6 mm	Screw-in cylinder (**2**)	80 Nm
8 mm		60 Nm
10 mm		40 Nm
6 mm	Screw socket (**3**)	70 Nm
8 mm		50 Nm
10 mm		40 Nm

Fig. 28 Installing a screw-in cylinder



10

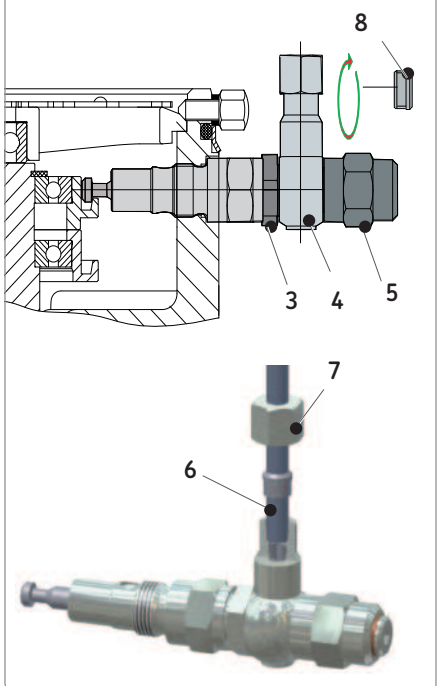
- Fit the ring piece (**4**) and cap nut (**5**) on the screw socket (**3**) and tighten by hand
- Insert the lubrication line (**6**) into the ring piece and tighten the union nut (**7**) by hand
- Tighten the cap nut (**5**)

☞ Tightening torque for cap nut (**5**)
- see tightening torque table

- Tighten the union nut (**7**)
- Vent the pumps completely - see Chapter 6.1 “Commissioning / recommissioning“
- Set the delivery volume
- see Chapter 7.2“Adjusting delivery volume”
- Put the plug screw (**8**) in position and tighten it using a hexagon socket screw key (WAF 8)
- Vent the pump element
- see Chapter 6.1
- Set the delivery volume
- see Chapter 7.2

Tightening torque in Nm		
Pump element with piston diameter:		
6 mm	Cap nut (**5**)	60 Nm
8 mm		40 Nm
10 mm		40 Nm

Fig. 29 Installation of ring piece and cap nut



10.6 Analog ultrasonic sensor

10.6.1 Setting with teach-in

☞ See Figure 30

The ultrasonic sensor has internal temperature compensation. Due to specific heat of the sensor, the temperature compensation reaches its optimum operating point after approximately 30 minutes of running time.
If there is an object (grease follower plate) within the set window limits of the analog output, LED D1 lights up green; if the object is outside of the window limits, LED D1 lights up red.
If no button is pressed for approx. 5 minutes during the teach-in parameterization, the settings made to that point will be accepted and the sensor will return to normal operation.
The sensor can also be returned to its factory settings (see Fig. 31). An LCR-2 LinkControl adapter and the LinkControl adapter software for Windows can optionally be used to make all teach-in settings and other sensor settings.

Fig. 30 Setting window limits

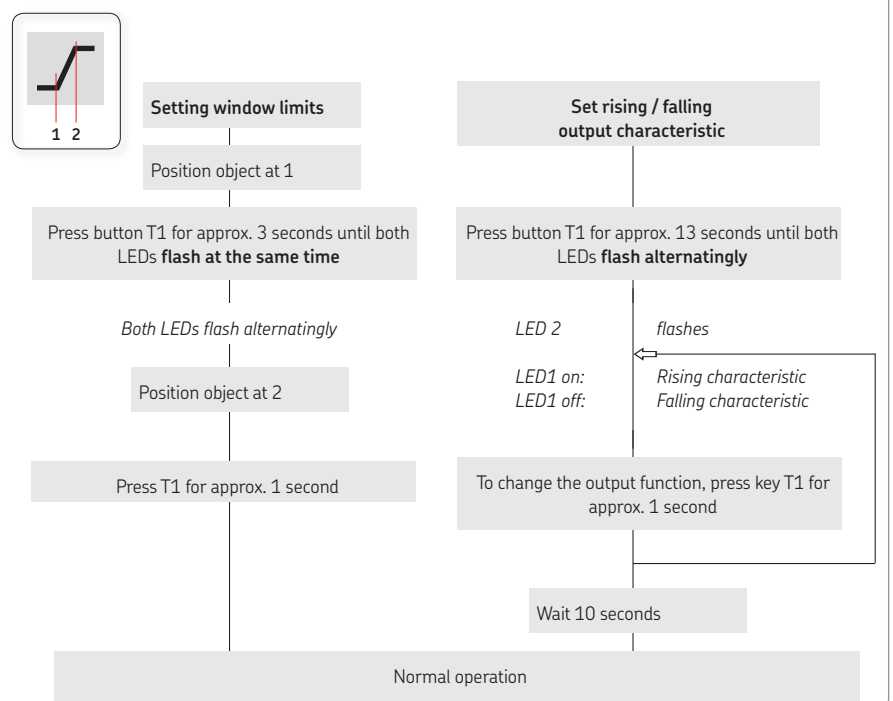
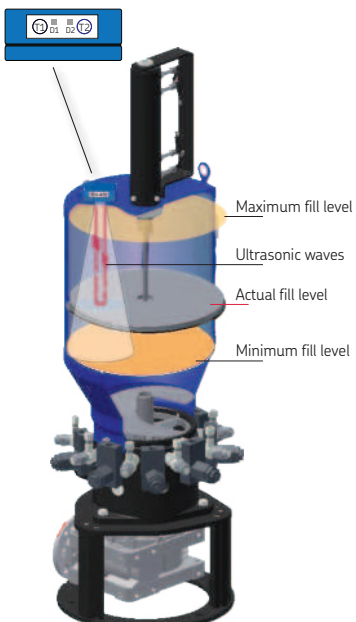
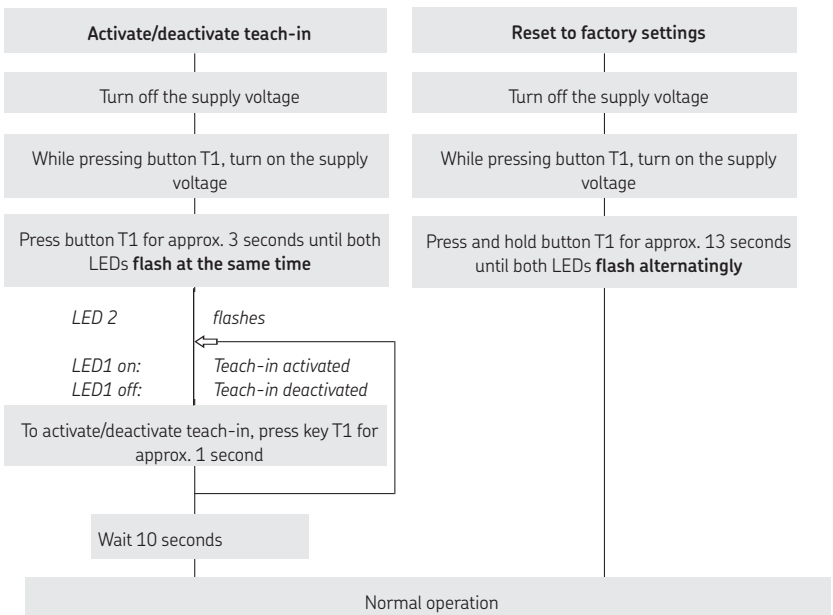


Fig. 31 Activating/deactivating teach-in, resetting to factory settings





10.7 Maintenance checklist for pump units

Fig. 32 Maintenance checklist

Activity to be performed on the unit	YES	NO
Electrical connection established correctly	☐	☐
Cable glands and lines are properly connected (not loose).	☐	☐
Mechanical connection established correctly	☐	☐
The performance characteristics for the aforementioned connections match the specifications in “Technical data.”	☐	☐
All components such as lubrication lines are correctly mounted	☐	☐
No apparent damage, contamination, or corrosion	☐	☐
Any dismantled protective and monitoring equipment is fully reinstalled and functional	☐	☐
All warning labels on the product are present and in proper condition	☐	☐
No unusual noises, vibrations, moisture accumulation, odors present	☐	☐
No undesired discharge of lubricant at connections	☐	☐
Lubricant is fed without bubbles	☐	☐
The bearings and friction points requiring lubrication receive the planned lubricant volume	☐	☐
Varnishing is fully present; no parts of the varnishing are missing	☐	☐

10.8 Electric motor maintenance schedule

Maintenance work by qualified electrician	Maintenance intervals in operating hours [bh]		
	Monthly	First after approx. 500 oh	Every 10,000 oh or once annually
Inspect the cooling air passages and surface of the motor for contamination.	X	X	X
Check air inlets and outlets on the motor fan cowl for cleanliness.	X	X	X
Check the motor fixing bolts for tightness.			X
Check the terminal box fixing bolts for tightness.			X
With motor running:			
Electrical characteristics are met.		X	X
The insulation resistances of the windings are sufficiently large.			X
If present, bearing insulation is implemented in accordance with the labels.			X
Check the motor bearing temperatures for possible exceedance.		X	X
The running smoothness and operating noise of the machine have not changed/worsened.		X	X
Lines and insulating parts are in proper condition and are not discolored.			X
Inspect rolling bearings and shaft seals, replace if necessary.			X
Check the lines and insulating material			X

10.9 Maintaining sensors

The sensors are maintenance-free.
No repairs are possible.

11. Malfunctions, causes, and remedies

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

IMPORTANT NOTE

Dismantling of the product or individual parts thereof within the statutory warranty period is prohibited and voids any claims.

IMPORTANT NOTE

All assembly, maintenance, and repair work beyond this scope must be performed by SKF's service department.

IMPORTANT NOTE

Only original SKF spare parts may be used. Unauthorized alterations to products and the use of non-original spare parts and accessories are prohibited.

WARNING

Electric shock

Performing work on products that have not been de-energized 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

Hot surface

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

System pressure

The product described here is pressurized during operation. Depressurize the product before starting any assembly, maintenance, or repair work.

11.1 Commissioning malfunctions

Commissioning malfunctions

Malfunction	Cause	Remedy
Delivery volume and/or delivery pressure too low without supply lines connected	Air in the pump element	• Vent and fill according to Chapter 7.1, Commissioning
	Driveshaft rotating in wrong direction Driveshaft speed is too low	• Check electrical connections and voltage • Remove foreign substances if pump element or agitator is jammed
		• Replace motor if necessary
	In pump elements of the large series: original sealing ring is not installed	• Install an original sealing ring (item 7) - see Chapter 14.1
No delivery (with pipe connections and supply lines not yet connected)	Air in the pump element	• Vent the pump element
	Pump element set too low	• Set notch position 0 (max. delivery rate)
	Pump element not hooked in properly	• Remove and install the pump element as instructed in Chapter 10.2 to 10.5
	Motor does not start	• Check electrical connections • Clean venting slots on motor • Replace geared motor if necessary
	Grease too stiff	• Use only approved grease

11.2 Operational malfunctions

Operational malfunctions, Table 1 of 2

Malfunction	Cause	Remedy
Delivery volume or delivery pressure too low without lines connected	Air in the pump element	• Vent and fill according to Chapter 7.1
	Pump element is clogged	• See "No delivery" malfunction
	Driveshaft speed is too low	• 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 Woodruff key on the drive shaft is defective Motor stopped	• Empty and clean lubricant reservoir • Remove and clean pump element (including ring piece - row 1) • Vent and fill according to Chapter 6 • Replace the woodruff key, vent the pump elements as instructed in Chapter 7.1 - Commissioning • Check supply voltage, replace motor if necessary

Operational malfunctions, Table 2 of 2

Malfunction	Cause	Remedy
No delivery	Pump element is defective	• Replacing the pump element • Vent and fill according to Chapter 6.1
	Spring pressure, delivery piston breaking loose	• Install the pump element as instructed in Chapter 8.3 to 8.6
	Guide ring for the pump element piston heads is worn or broken	• Replace the guide ring and vent the pump as instructed in Chapter 6.1 - Commissioning
	Grease too stiff	• Use only approved grease

11.3 Malfunctions on fill level control J

Fill level control malfunctions

Malfunction	Cause	Remedy
Lubricant over grease follower plate	Seal on the grease follower plate is leaking	• Replace the seal
Lubricant comes out of the cover when filling the reservoir	No signal Sensor “max” ignored Seal on the grease follower plate is leaking	• Check the cable connection; replace plug or cable if necessary • Remove the excess grease • Replace the seal
No signal from fill level switch “min.”, “min. pre-warning”, “max. pre-warning”, “max.”	Cable connect incorrect or defective Plug is disconnected Grease follower plate is tilted Grease follower plate is jammed	• 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

12. Repairs

WARNING

Risk of injury

At a minimum, the following safety measures must be taken before any repairs:

- Unauthorized persons must be kept away.
- Mark and secure the work area.
- Depressurize the product.
- Unlock the product and prevent it from being restarted
- Check to ensure the absence of voltage
- Ground and short-circuit the product
- Cover any live parts in the surrounding area

13. Shutdown, disposal

13.1 Temporary shutdown

Temporary shutdown is performed by:

- Switching off the main machine
- Disconnecting the product's power supply

13.2 Permanent shutdown, disassembly

Permanent shutdown and disassembly of the product must be planned properly by the operator and conducted in compliance with all applicable requirements.

13.3 Disposal

Countries within the European Union

Waste should be avoided or minimized to the extent possible. The disposal of products contaminated with lubricant must be performed by a recognized waste disposal company in compliance with environmental protection requirements and waste disposal regulations as well as the requirements of local authorities.

The producer of waste is responsible for its specific classification, as the European Waste Catalog provides for different disposal keys for waste that is the same but of different origin.

Dispose of or recycle electrical components in accordance with WEEE Directive 2012/19/EU.

Plastic or metallic parts can be disposed of as industrial waste.

Countries outside the European Union

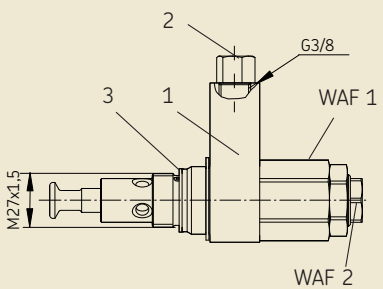
Disposal is carried out according to the applicable laws and regulations of the country.

14. Spare parts

Pump elements of row 1 (large series)

Description	Piston Ø	WAF_1	WAF_2	Weight [kg/each]	Order No.
Pump element (item 1)	7 mm	36	22	1.26	24-1557-3684
with packing ring	12 mm	36	22	1.26	24-1557-3685
G3/8 cutting-sleeve screw union (item 2)					
for pipe diameter:	8 mm			0.61	408-413W
	10 mm			0.65	410-413W
	12 mm			0.72	412-413W
Sealing ring (item 3)	27x32x3 Al				44-0404-2547

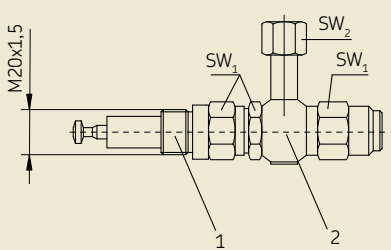
Pump elements of row 1



Pump element with ring piece of row 2 (small series)

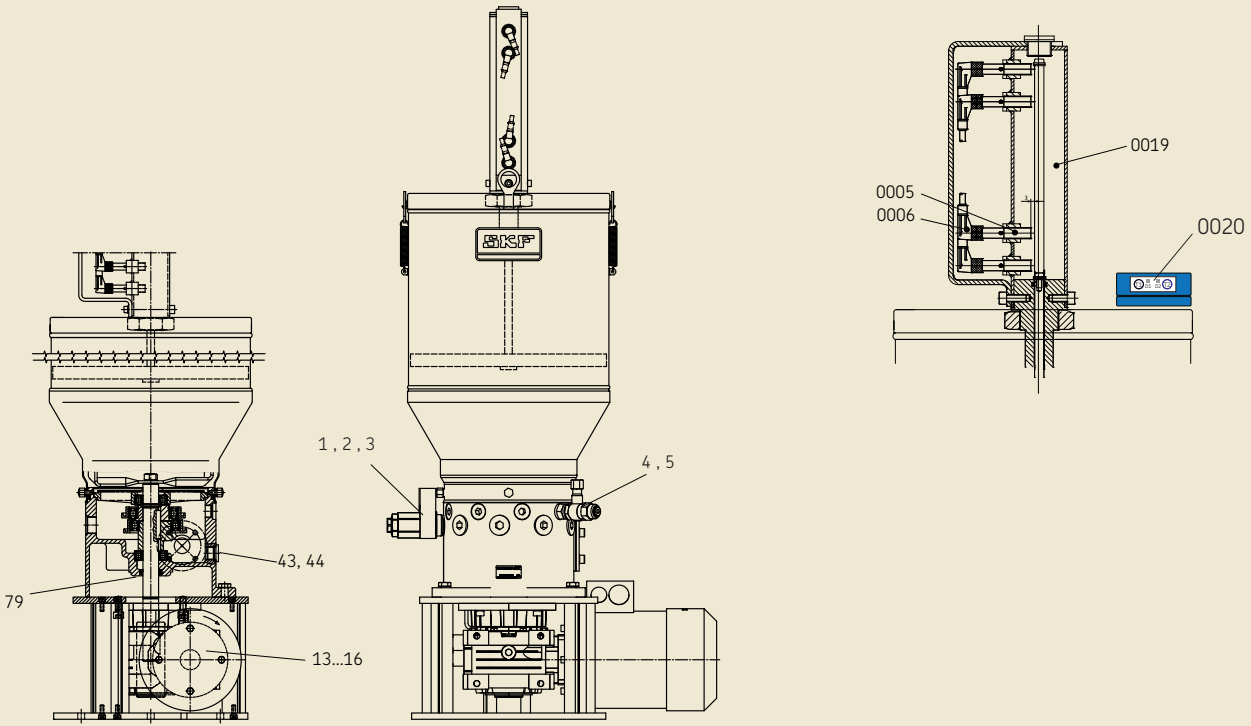
Description	Piston Ø	WAF_1	WAF_2	Weight [kg/each]	Order No.
Pump element (item 1)	6 mm	24	-	0.26	24-1557-3680
	8 mm	24	-	0.26	24-1557-3681
	10 mm	24	-	0.28	24-1557-3683
Ring piece (item 2)	6 mm	-	14	0.10	24-2255-2003
for pipe diameter:	8 mm	-	17	0.08	24-2255-2004
	10 mm	-	19	0.10	24-2255-2005

Pump elements of row 2



14.1 Spare parts list for FB-XL multi-line pump unit

Spare parts for FB-XL multi-line pump unit



Spare parts for FB multi-line pump unit

Item	Quantity	Description	Order number
Row 1 (large series)			
1	1	Pump element	see page 67
2	1	G3/8 cutting-sleeve screw union	
3	1	Sealing ring	
Row 2 (small series)			
4	1	Pump element	see page 67
5	1	Ring piece	
Components			
13	1	Worm drive (FB-XL: 767-744-5360)	24-0701-3518
		Worm drive (FB-XL: 767-744-5364)	24-0701-3564
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	Bolt 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
0020	1	Ultrasonic sensor	237-11204-7

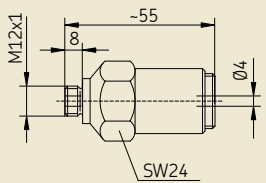
15. Accessories

Pressure regulating valves for grease

for insertion into pump elements of row 2 (small series)

Set pressure [bar]	Weight [kg/each]	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

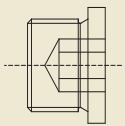


Plug screw

(for closing unused pump outlets)

Design	Weight kg/each	Order No.
Row 1, M27x1.5	0.173	**24-1855-2032**
Row 2, M20x1.5	0.037	**95-1520-0908**

Plug screw

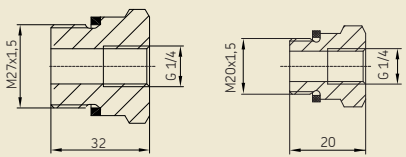


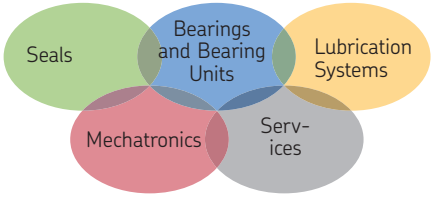
Threaded socket

(for connecting a grease return line)

Design	Weight kg/each	Order No.
Steel, galvanized surface, with copper (Cu) sealing ring		
Row 1, M27x1.5 for G1/4	0.15	**24-1755-2006**
Row 2, M20x1.5 for G1/4	0.037	**24-1755-2003**

Threaded socket





951-170-227-EN
March 2019
Version 04

SKF Lubrication Systems Germany GmbH
Motzener Straße 35/37 · 12277 Berlin · Germany
PO Box 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. Industriestraße 4 · 68766 Hockenheim · Germany

Tel. +49 (0)62 05 27-0
Fax +49 (0)62 05 27-101
www.skf.com/lubrication