Multiline pump unit

Product series FF

for oil, fluid grease and grease, for SKF MultiFlex and SKF ProFlex centralized lubrication systems

The multiline pump unit of the FF series is suitable for small and medium-sized systems due to its flow rate and reservoir capacity. The lubricant can be fed to the lube points directly or via a progressive feeder.

The multiline pump unit of the FF series is a very sturdy and vibration-resistant multiline pump, designed for oils and for very stiff greases, harsh operating conditions and, if necessary, continuous operation.

Designs
- as grease or oil lubrication pumps
- with 4 kg or 10 kg grease reservoir
- with or without fill level control
- high permissible operating pressure, up to 350 bar
- with three-phase motors in 230/400 V, 290/500 V and 400/690 V designs
- with up to 12 individually adjustable pump elements/outlets with various delivery volumes and tube connections
- with up to 7 cm³/min lubricant per outlet
- optional with pressure control valve integrated into the pump element

Applications
- Automotive industry
- Construction materials machinery
- Annealing machines
- Tunnel driving machinery, mining
- Paper and boxing machinery
- Steel and heavy industry
- Conveying systems
- Wind energy systems
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⚠️ CAUTION

The important information on product usage located on the
back cover applies to all systems described in this brochure.
FF multiline pump unit

Pump operation

The pump is operated (Fig. 1) by a worm drive (2) consisting of a worm and related worm gear. The worm gear drives the eccentric drive shaft (6) with the fitted agitator (4). The agitator (4) pushes the lubricant through the strainer into the pump's inlet chamber.

The eccentric drive shaft (6) has a needle-bearing guide ring (3) to receive the delivery piston heads of the pump elements (8). The eccentric movement of the guide ring (3) forcibly moves the suspended delivery pistons into the guide ring.

Pump element operation

The delivery piston is forcibly actuated as described in "Pump operation". In the suction stroke position (Fig. 2), the cross hole of the delivery piston (3) is closed. At the start of the pressure stroke, the delivery piston (1) closes the suction hole. The suctioned lubricant in chamber A is pressed against the spring-loaded control piston (3). The cross hole in the control piston (3) is opened. The lubricant reaches chamber B under pressure through the cross and longitudinal hole of the control piston (3), where it flows through the ring duct and the check valve (5) to the outlet. After 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 suction hole opens, the existing negative pressure draws the lubricant into chamber A. The pump element is now prepared for the next lubrication process.
General notes

The order of pump elements is factory-set for pump designs 1M and 2M. The order begins with the smallest pump elements. The order is shown in the following pump illustrations. The order of the pump elements can be modified at additional charge.

The lubricants to be used must conform with the requirements of the machines being lubricated and be suitable for use in centralized lubrication systems.

Delivery volume adjustment on pump element

The delivery volume of the pump element is determined by the control piston stroke (Fig. 2 and Fig. 3). The screw plug (6) must be removed in order to adjust the delivery volume. The adjustment cap (4) can then be turned.

The following apply to adjustment:

Clockwise rotation – decreased delivery volume.

Counterclockwise rotation – increased delivery volume.

We recommend that the delivery volume not be reduced below \( \frac{1}{3} \) of the maximum to achieve the product’s operating specifications. This corresponds to clockwise rotation of the adjustment cap (Fig. 2, position 4) by eight notches.

Pressure regulating valves for pump elements

Pump elements can be equipped with pressure regulating valves (Accessories). This involves replacing the screw plug (6) with the pressure regulating valve (Fig. 2).

If necessary, grease/oil recirculation can be provided from the pressure regulating valve to the pump housing. This does, however, require a different pressure regulating valve with a G 1/4” outlet and a M20x1.5 threaded socket. The threaded socket needs to be placed into an available mounting space (1 to 12) for pump elements and connected with the pressure regulating valve using tubing. Pressure regulating valves for line installation can also be ordered as accessories.

Design note

The FF multiline pump is equipped standard with a motor protection enclosure of protection class IP 55. The FF multiline pump is available in a-n Ex design (ATEX) on request.

There are also different fill level switches for different applications and lubricants. We recommend the U2 ultrasonic design with two switching points as the standard fill level switch.

When the FF pump is used as an oil lubrication pump, the reservoir can be equipped with a fill level monitor (fill level switch “W”). Additionally, a special filling device with optical fill level display (fill level control “S”) can be installed.

The FF multiline lubrication pump is available in the following special designs:

- ATEX design
- pre-set delivery volumes
- pre-installed pressure regulating valves
- drive motor with custom voltage, custom frequency and custom protection type – custom varnish
**FF multiline pump unit**

Delivery volume of pump element with 6 mm, 8 mm and 10 mm piston diameter

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**Note!**

The delivery volumes shown are based on the motors’ rated speeds. At reduced speeds (rating plate), the values are lowered accordingly.
FF multiline pump unit

Design 1M, dual-stage

Motor data design 1M

<table>
<thead>
<tr>
<th></th>
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<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1 000</td>
<td>50</td>
<td>0,09</td>
<td>230/400</td>
<td>0,80/0,46</td>
<td>AG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>290/500</td>
<td>0,64/0,37</td>
<td>AL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>400/690</td>
<td>0,46/0,26</td>
<td>AP</td>
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<td></td>
<td></td>
<td></td>
<td>230/400</td>
<td>1,13/0,65</td>
<td>AF</td>
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<td></td>
<td>290/500</td>
<td>0,90/0,52</td>
<td>AK</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>400/690</td>
<td>0,65/1,07</td>
<td>AO</td>
</tr>
<tr>
<td>1 500</td>
<td>50</td>
<td>0,18</td>
<td>230/400</td>
<td>0,80/0,46</td>
<td>AG</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>290/500</td>
<td>0,64/0,37</td>
<td>AL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>400/690</td>
<td>0,46/0,26</td>
<td>AP</td>
</tr>
</tbody>
</table>

Note!
This data refers to three-phase motors from VEM. There may be differences with motors from other manufacturers.

Technical data

General
- Mounting position: vertical
- Temperature range: -15 °C to +40 °C
- Reservoir: 4 or 10 kg
- Number of pump elements: 1 to 12
- Filling: via filler socket G 3/8"
- Dry weight: FF 04 approx. 15 kg; FF 10 approx. 20,5 kg

Gearbox
- Type: Screw drive 1M, dual-stage
- Gear ratios: 80:1; 150:1; 300:1; 600:1

Motor
- "motor data" table and rating plate

Pump
- Type: Multi-piston pump with 1 to 12 outlets
- Operating pressure for pump elements
  - Piston-Ø 6: max. 350 bar
  - Piston-Ø 8: max. 200 bar
  - Piston-Ø 10: max. 125 bar

Lubricants
- Mineral oils or environmentally compatible oils from ISO VG 46 to greases of NLGI Grade 3 (consultation required for synthetic oils)
- Operating viscosity (Oil): ≥ 50 mm²/s
- Worked penetration (Grease): > 220 1/10 mm

Delivery volume of pump elements
- Piston-Ø 6: 0,027 to 0,080 cm³/stroke
- Piston-Ø 8: 0,050 to 0,150 cm³/stroke
- Piston-Ø 10: 0,077 to 0,230 cm³/stroke

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

**Design 2M, single-stage**

### Technical data

**General**
- Mounting position: Vertical
- Temperature range: –15 °C to +40 °C
- Reservoir: 4 or 10 kg
- Number of pump elements: 1 to 12
- Filling: Via filler socket G 3/8"
- Dry weight: FF 04 approx. 15 kg; FF 10 approx. 20.5 kg

**Gearbox**
- Type: Screw drive 2M, single-stage
- Gear ratio: General

**Motor**
- "motor data" table and rating plate

**Pump**
- Type: Multi-piston pump with 1 to 12 outlets

**Operating pressure for pump elements**
- Piston-Ø 6: max. 350 bar
- Piston-Ø 8: max. 200 bar
- Piston-Ø 10: max. 125 bar

**Lubricants**
- Mineral oils or environmentally compatible oils from ISO VG 46 to greases of NLGI Grade 3 (consultation required for synthetic oils)

**Operating viscosity (Oil)**
\[ \geq 50 \text{ mm}^2/\text{s} \]

**Worked penetration (Grease)**
\[ > 220 \text{ mm}^1/10 \text{ mm} \]

**Delivery volume of pump elements**
- Piston-Ø 6: 0.027 to 0.080 cm³/stroke
- Piston-Ø 8: 0.050 to 0.150 cm³/stroke
- Piston-Ø 10: 0.077 to 0.230 cm³/stroke

**Note!**
This data refers to three-phase motors from VEM. There may be differences with motors from other manufacturers.

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

Fill level control S (Oil)

Fill level control S

Fill level switches for oil

Fill level switch W

Technical data
General
Lubricant: Oil
Design: For oil lubrication pumps; with sight glass and filler socket with strainer

Form of contact: Changeover
Switching capacity: 15 W/VA
Switching voltage, max.: 240 V AC/120 V DC
Switched current, max.: 1 A
Connection diagram: Plug EN 175301-803 (DIN 43650)
Protection class: IP 65

Connector pin assignment fill level switch W

1 2
---
1 2

Switch position at minimum
Switch position above minimum

Technical data
General
Lubricant: Grease
Design: Optical fill level control (dip stick)

Fill level switch G

Connector pin assignment fill level switch W

<table>
<thead>
<tr>
<th>PIN</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Supply voltage</td>
</tr>
<tr>
<td>2</td>
<td>Signal output “above minimum”</td>
</tr>
<tr>
<td>3</td>
<td>Signal output “minimum”</td>
</tr>
<tr>
<td>4</td>
<td>PE Protective earth</td>
</tr>
</tbody>
</table>
Fill level switches for grease

Fill level switch A

**Technical data**

**General**
- **Design**: Microswitch with three switching points (maximum, minimum prewarning, minimum) and dip stick
- **Switching voltage, max.**: 250 V AC/30 V DC
- **Switched current, max.**: 15 A AC / 10 A DC
- **Connection diagram**: Plug EN 175301-803 (DIN 43650)
- **Protection class**: IP 65
- **Lubricants**: Grease of NLGI Grade 2

**Connector pin assignment fill level switch A**

1. Supply voltage
2. Signal output “above minimum”
3. Signal output “minimum”
4. PE Protective earth

Fill level switch E

**Technical data**

**General**
- **Design**: Reed contact for monitoring minimum level
- **Form of contact**: Changeover
- **Switching capacity, max.**: 60 W/VA
- **Switching voltage, max.**: 230 V DC/AC
- **Switched current, max.**: 1 A
- **Connection diagram**: Plug EN 175301-803 (DIN 43650)
- **Protection class**: IP 65
- **Lubricants**: Grease of NLGI Grade 2

**Connector pin assignment fill level switch E**

1. Supply voltage
2. Signal output “above minimum”
3. Signal output “minimum”
4. PE Protective earth

**Connector pin assignment**

1. Supply voltage
2. Signal output “above minimum”
3. Signal output “minimum”
4. PE Protective earth

1 Special design with cable brake protection available on request.
Fill level switches for grease

Fill level switch F

Technical data

General
Design . . . . . . . . . . . . . . . . . . Reed contact for monitoring minimum and maximum level

Form of contact . . . . . . . . . . . . . . . . . . NO-contact/NC contact
Switching capacity, max. . . . . . . . . . . . 60 W/VA
Switching voltage, max. . . . . . . . . . . . . 230 V DC/AC
Switched current, max. . . . . . . . . . . . . . 1 A
Connection diagram . . . . . . . . . . . . . . . Plug EN 175301-803 (DIN 43650)
Protection class . . . . . . . . . . . . . . . . . . . . IP 65
Lubricants . . . . . . . . . . . . . . . . . . . . . . . Grease of NLGI Grade 2

Connector pin assignment fill level switch F

Switch position at minimum

Switch position between minimum and maximum

Switch position at maximum

Connector pin assignment fill level switch H

Switch position at maximum

Switch position at pre-warning

Switch position at minimum

Connector pin assignment

Fill level switch H

Technical data

General
Design . . . . . . . . . . . . . . . . . . Reed contact with three switching points (maximum, minimum pre-warning, minimum)

Form of contact:
1. Max. fill level . . . . . . . . . . . . . . . . NO-contact
2. Fill level pre-warning . . . . . . . . . . . NO-contact
3. Min. fill level . . . . . . . . . . . . . . . Changeover

Switching capacity, max. . . . . . . . . . . . 60 W/VA
Switching voltage, max. . . . . . . . . . . . . 10-30 V DC/AC
Switched current, max. . . . . . . . . . . . . . 1 A
Connection diagram . . . . . . . . . . . . . . . Plug EN 175301-803 (DIN 43650)
Protection class . . . . . . . . . . . . . . . . . . . . IP 65
Lubricants . . . . . . . . . . . . . . . . . . . . . . . Grease of NLGI Grade 2

Connector pin assignment fill level switch H

Connector pin assignment
Fill level monitoring for oil and grease

U2 Ultrasonic sensor with 2 switching points

The ultrasonic sensor works with a piezoceramic element as a sonic transmitter and receiver. A decoupling layer is used to decouple the ultrasound from the acoustically thinner air medium. The ultrasonic transducer is embedded water-tight in foam in the sensor’s housing. The active area of the ultrasonic sensor is designated as the detection area and is limited by the shortest \( A_1 \) and longest \( A_2 \) sensing distance. Its values depend on the size of the transducer. The transducer transmits a sonic pulse packet and converts the echo pulse back into voltage.

The integrated controller uses the echo time and speed of sound to calculate the distance between the minimum \( A_2 \) and maximum \( A_1 \) fill level.

### Technical data

**General**
- **Design**: Ultrasonic sensor with two adjustable switching points (maximum, minimum)
- **Form of contact**: pnp, choice of NO-contact/NC contact
- **Ambient temperature**: \(-25 \, ^\circ C \) to \(+70 \, ^\circ C\)

**Indicator**
- **Yellow LED 1**: constant: state of switching output 1 / flashing: teach-in function
- **Yellow LED 2**: constant: state of switching output 2 / flashing: teach-in function
- **Red LED**: normal operation: “fault” / no lubricant detected

**Electrical data**
- **Operating voltage**: 10 to 30 V DC, ripple 10%
- **No-load current \( I_0 \)**: \( \leq 50 \, mA \)
- **Protection class**: IP 65
- **Connection**: connector socket V15 (12Mx1), 5-pin

### Contact box

**Description**: Contact box (not part of the shipment)

**Order No.**: 24-1882-2076

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Note!
The factory-set values can be changed by the customer at any time (teach-in).

Contact box is not part of the shipment. Available for separate order.
FF multiline pump unit

Accessories

Accessory Fitting mandrel

Fitting mandrel
for installing a pump element

<table>
<thead>
<tr>
<th>Description</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fitting mandrel</td>
<td>44-1827-2010</td>
</tr>
</tbody>
</table>

Accessory Pressure regulating valve

Pressure regulating valves for grease
for insertion into pump elements

<table>
<thead>
<tr>
<th>Set pressure [bar]</th>
<th>Weight [g/each]</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>130</td>
<td>24-2103-2273</td>
</tr>
<tr>
<td>100</td>
<td>130</td>
<td>24-2103-2344</td>
</tr>
<tr>
<td>125</td>
<td>130</td>
<td>24-2103-2345</td>
</tr>
<tr>
<td>150</td>
<td>130</td>
<td>24-2103-2342</td>
</tr>
<tr>
<td>175</td>
<td>130</td>
<td>24-2103-2272</td>
</tr>
<tr>
<td>200</td>
<td>130</td>
<td>24-2103-2346</td>
</tr>
<tr>
<td>350</td>
<td>130</td>
<td>24-2103-2271</td>
</tr>
</tbody>
</table>

Accessory Pump element

Pump element with ring piece
for installing a pump element

<table>
<thead>
<tr>
<th>Description</th>
<th>Ø [mm]</th>
<th>Weight [g/each]</th>
<th>Ø1</th>
<th>Ø2</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump element</td>
<td>6</td>
<td>260</td>
<td>24</td>
<td>24</td>
<td>24-1557-3680</td>
</tr>
<tr>
<td>(Pos. 1)</td>
<td>8</td>
<td>260</td>
<td>24</td>
<td>24</td>
<td>24-1557-3681</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>280</td>
<td>24</td>
<td>24</td>
<td>24-1557-3683</td>
</tr>
<tr>
<td>Ring piece</td>
<td>6</td>
<td>100</td>
<td>14</td>
<td>24</td>
<td>24-2255-2003</td>
</tr>
<tr>
<td>(Pos. 2)</td>
<td>8</td>
<td>80</td>
<td>17</td>
<td>24</td>
<td>24-2255-2004</td>
</tr>
<tr>
<td></td>
<td>10</td>
<td>100</td>
<td>19</td>
<td>24</td>
<td>24-2255-2005</td>
</tr>
</tbody>
</table>

Accessory Screw plug

Screw plug
for closing unused pump outlets

<table>
<thead>
<tr>
<th>Design</th>
<th>Weight [g/each]</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>M20x1,5</td>
<td>37</td>
<td>95-1520-0908</td>
</tr>
</tbody>
</table>
FF multiline pump unit

Accessories

Accessory Threaded socket

**Threaded socket for grease recirculation**
in place of a pump element to recirculate grease into pump housing

<table>
<thead>
<tr>
<th>Design</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steel, galvanized surface, with copper (Cu) washer</td>
<td>24-1755-2003</td>
</tr>
</tbody>
</table>

Accessory Pressure gauge

**Indicating range**

<table>
<thead>
<tr>
<th>Range</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 to 250 bar (0 to 3600 psi)</td>
<td>169-125-000</td>
</tr>
<tr>
<td>0 to 400 bar</td>
<td>169-140-001</td>
</tr>
<tr>
<td>Washer 1)</td>
<td>248-610.02</td>
</tr>
</tbody>
</table>

1) Washer must be ordered separately for each pressure gauge.

Accessory Pressure gauge screw

**Position 1:** elbow fitting, directionally adjustable, according to DIN 2353

<table>
<thead>
<tr>
<th>Tube external diameter</th>
<th>Thread</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 mm</td>
<td>M 12x1.5</td>
<td>443-406-061</td>
</tr>
<tr>
<td>8 mm</td>
<td>M 14x1.5</td>
<td>443-408-081</td>
</tr>
<tr>
<td>10 mm</td>
<td>M 16x1.5</td>
<td>443-410-101</td>
</tr>
</tbody>
</table>

**Position 2:** Pressure gauge screw

<table>
<thead>
<tr>
<th>Tube external diameter</th>
<th>Thread</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
<td>8 mm</td>
<td>M 14x1.5</td>
<td>443-408-081</td>
</tr>
<tr>
<td>10 mm</td>
<td>M 16x1.5</td>
<td>443-410-101</td>
</tr>
</tbody>
</table>
FF multiline pump unit

Accessories

Accessory Topping-up pump

Manual topping-up pump

<table>
<thead>
<tr>
<th>Description</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>with gear, for 25 kg drum</td>
<td>169-000-042</td>
</tr>
<tr>
<td>for 50 kg drum</td>
<td>169-000-054</td>
</tr>
<tr>
<td>without running gear, for 25 kg drum</td>
<td>169-000-342</td>
</tr>
<tr>
<td>corresponding filler socket</td>
<td>995-000-705</td>
</tr>
</tbody>
</table>

The delivery rate of all designs is ~40 cm³/stroke.

Accessory Coupling socket

Coupling socket with cap for installation on a topping-up pump

<table>
<thead>
<tr>
<th>Description</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coupling socket with cap</td>
<td>995-001-509</td>
</tr>
</tbody>
</table>

Accessory Lubricant nipple

Reduction fitting with flat-type lubricant nipple for connecting a manual grease press

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reduction fitting RI 3/8x1/4 VZK E0</td>
<td>96-3120-0058</td>
</tr>
<tr>
<td>2</td>
<td>Washer A 17x21 DIN 7603 CU</td>
<td>DIN 7603-A17x21 CU</td>
</tr>
<tr>
<td>3</td>
<td>Flat-type lubricant nipple AG 1/4-16 DIN 3404</td>
<td>96-0002-0053</td>
</tr>
</tbody>
</table>

Accessory Quick-action coupling

Quick-action coupling for connecting an automatic filling device

<table>
<thead>
<tr>
<th>Pos.</th>
<th>Description</th>
<th>Order No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reduction fitting RI 3/8x1/4 VZK E0</td>
<td>96-3120-0058</td>
</tr>
<tr>
<td>2</td>
<td>Washer A 17x21 DIN 7603 CU</td>
<td>DIN 7603-A17x21 CU</td>
</tr>
<tr>
<td>3</td>
<td>Filler socket</td>
<td>995-000-705</td>
</tr>
<tr>
<td>4</td>
<td>Coupling socket (for refill connection)</td>
<td>995-001-500</td>
</tr>
<tr>
<td>5</td>
<td>Hose fitting for connection to coupling socket</td>
<td>857-760-007</td>
</tr>
<tr>
<td></td>
<td>Diameter (d) 13 mm</td>
<td>857-760-007</td>
</tr>
<tr>
<td></td>
<td>Diameter (d) 16 mm</td>
<td>857-870-002</td>
</tr>
</tbody>
</table>
FF multiline pump unit

Order key

<table>
<thead>
<tr>
<th>Order key</th>
<th>FF</th>
<th>/</th>
<th>A</th>
<th>0001</th>
<th>07</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump type FF</td>
<td></td>
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<td></td>
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<tr>
<td>Reservoir capacity</td>
<td></td>
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<tr>
<td>04 = 4 kg, 10 = 10 kg</td>
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<tr>
<td>Fill level control/fill level switch</td>
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<tr>
<td>X = reservoir without fill level control/fill level switch for grease:</td>
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<tr>
<td>G = opt. fill level control (dip stick)</td>
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<tr>
<td>E = fill level switch, 1 switching point (min.)</td>
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<tr>
<td>F = fill level switch, 2 switching points (min., max.)</td>
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<tr>
<td>H = fill level switch, 3 switching points (min., min. pre-warning, max.)</td>
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</tr>
<tr>
<td>A = fill level switch, 3 switching points (min., min. pre-warning, max.) for oil</td>
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<tr>
<td>S = opt. fill level control (sight glass)</td>
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<tr>
<td>W = read contact, 1 switching point (min.) for grease and oil</td>
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<tr>
<td>U2 = U2 Ultrasonic sensor with 2 switching points</td>
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<tr>
<td>Type of drive pump design 1M, 2M</td>
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<tr>
<td>Drive speed</td>
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<tr>
<td>1M: 08 = 80:1; 15 = 150:1; 30 = 300:1; 60 = 600:1</td>
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<tr>
<td>2M: 06 = 33:1</td>
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<tr>
<td>Number of pump elements piston–Ø 6 mm</td>
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<tr>
<td>00 = 0 ... 12 = 12</td>
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<tr>
<td>Number of pump elements piston–Ø 8 mm</td>
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<td>00 = 0 ... 12 = 12</td>
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<tr>
<td>Number of pump elements piston–Ø 10 mm</td>
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<tr>
<td>00 = 0 ... 12 = 12</td>
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</tbody>
</table>

Note! You may choose up to 12 pump elements. The sum of pump elements with a piston –Ø 6 mm, –Ø 8 mm and –Ø 10 mm is ≤ 12.

| Tube connection |
| A = Tube – Ø 6 mm; B = Tube – Ø 8 mm; C = Tube – Ø 10 mm; D = 1/4 NPT–internal thread |

| Modification letter A |
| 0001 = Basic design with adjustable pump elements |

| Design key |
| Motor data AG; AL; AP; AF; AK; AO; AH; AM; AQ; AG; AL; AP |
| → table for 1M on p. 6 or for 2M on p. 7 |

| Motor protection class |
| 07 = IP55 (also available in shielded Ex design, ATEX) |

Order example:
FF04U22M06/080400BA0001AG07
- Pump type FF
- 4 kg-reservoir
- U2 ultrasonic fill level switch
- Drive type 2M
- Drive speed 06 (33:1)
- 8 pump elements with Ø 6 mm
- 4 pump elements with Ø 8 mm
- 0 pump elements with Ø 10 mm
- Tube connection B with Ø 8 mm
- Modification letter A
- Basic design with adjustable pump elements
- Motor values (2M) of 1 000 r/min, 50 Hz, 0,25 kW, 230/400 V AC, 1,91/1,10 A
- Protection class IP55
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These competence areas include bearings and units, seals, lubrication systems, mechatronics, and a wide range of services, from 3-D computer modelling to cloud-based condition monitoring and asset management services.

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SKF and Lincoln lubrication systems or their components are not approved for use with gases, liquefied gases, pressurized gases in solution and fluids with a vapor pressure exceeding normal atmospheric pressure (1,013 mbar) by more than 0.5 bar at their maximum permissible temperature.

Additional brochures for further information:

1-0103-EN  Fittings and accessories
1-0107-6-EN  Accessories for progressive systems
1-3016-EN  Sectional feeder VP
1-3017-EN  Block feeder VPB
1-3026-EN  FB multiline pump unit
1-3030-EN  Piston pump unit KFG
1-9201-EN  Transport of lubricants in centralized lubrication systems

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