

Multiline pump unit

Product series FF

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

Design 1M, dual-stage



Design 2M, single-stage



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.

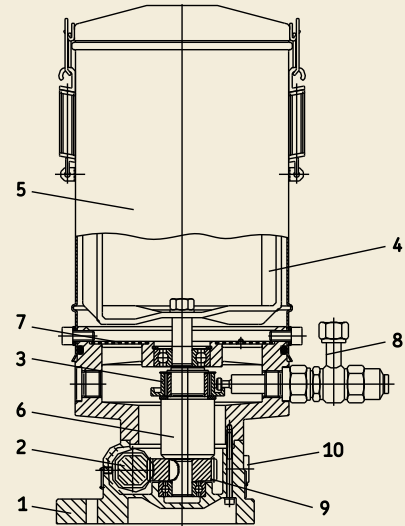
The eccentric drive shaft (6) has a needle-bearing guide ring (3) to receive the delivery piston heads of the pump elements (8). The eccentric movement of the guide ring (3) forcibly moves the suspended delivery pistons into the guide ring.

Sectional view of FF pump

Fig. 1

Components

- 1 Housing with mounting flange
- 2 Drive shaft with worm
- 3 Guide ring
- 4 Agitator
- 5 Grease reservoir
- 6 Eccentric drive shaft
- 7 Strainer
- 8 Pump element
- 9 Worm gear
- 10 Filler socket (G 3/8")



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.

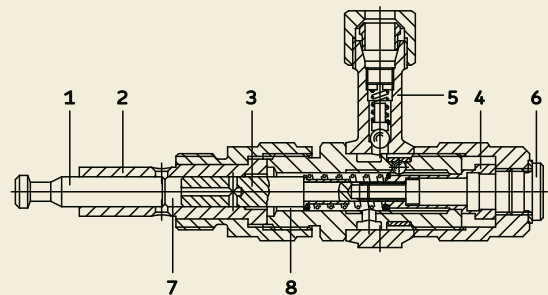
Moving the delivery piston (1) also brings the control piston (3) back to its normal position using spring tension. The suction stroke movement of the delivery piston (1) generates negative pressure in chamber A. When the suction hole opens, the existing negative pressure draws the lubricant into chamber A. The pump element is now prepared for the next lubrication process.

Sectional view of pump elements

Fig. 2

Components

- 1 Delivery piston
- 2 Cylinder
- 3 Spring-loaded control piston
- 4 Adjustment cap
- 5 Ring piece with check valve
- 6 Screw plug
- 7 Chamber A
- 8 Chamber B



FF multiline pump unit

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.

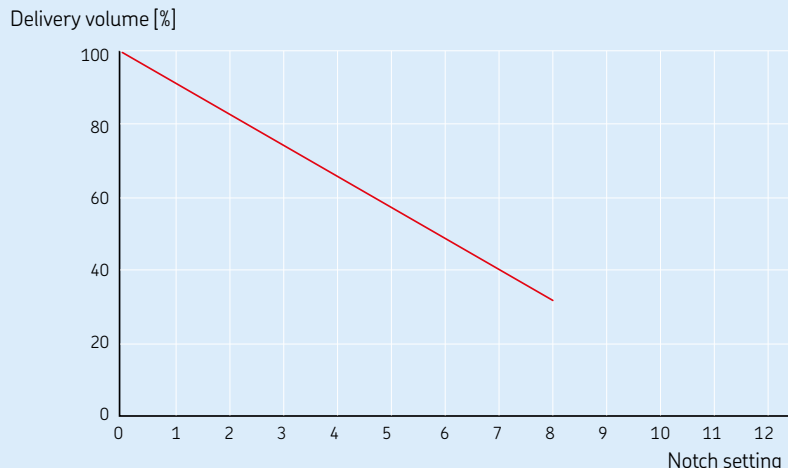
Note!

Unless otherwise requested, pump is configured for full stroke on delivery.

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.

Fig. 3

Delivery volume as a function of notch setting on pump element for piston diameters of 6 mm, 8 mm and 10 mm



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.

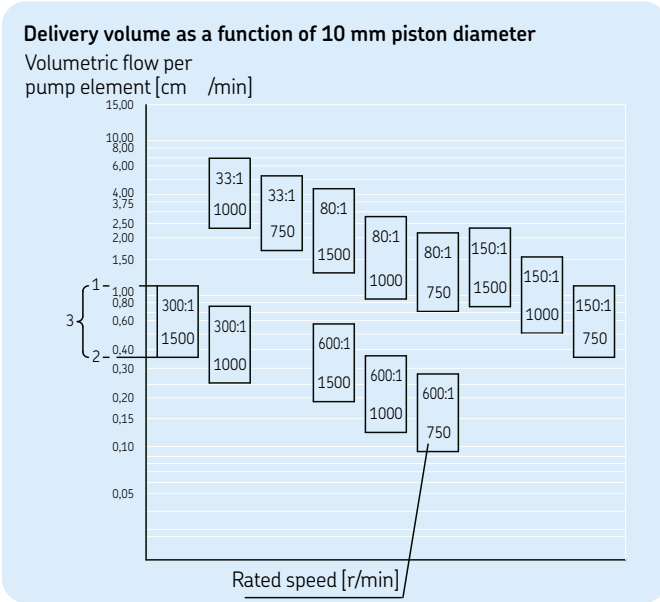
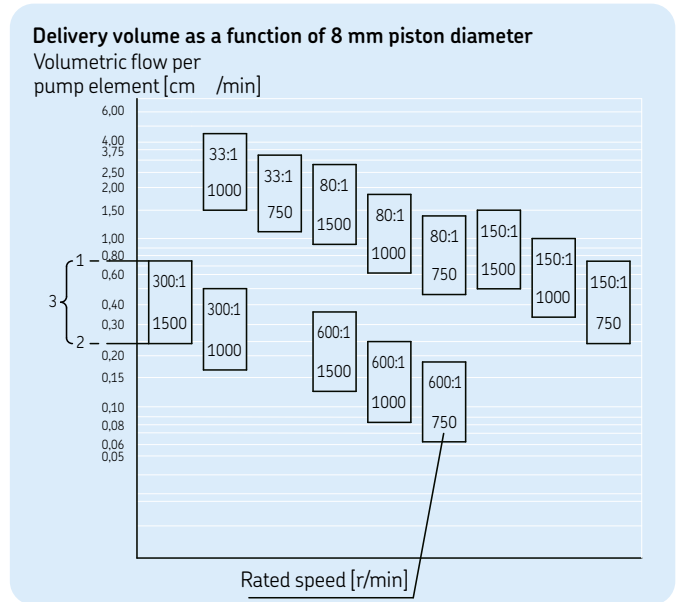
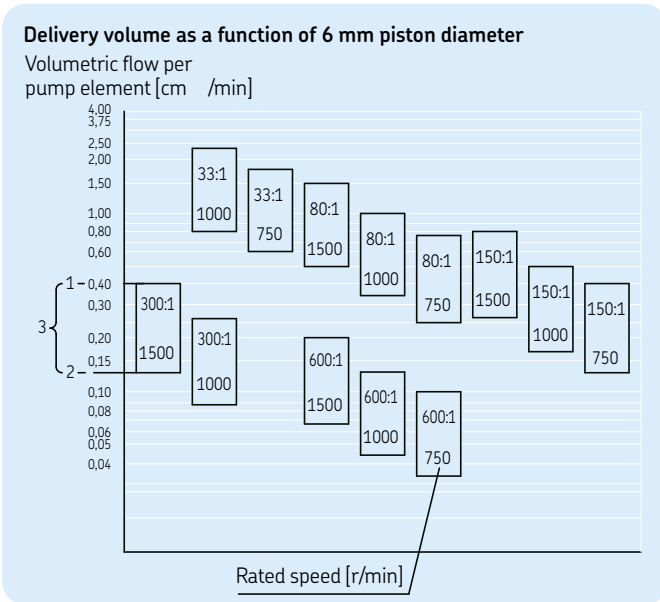
When the FF pump is used as an oil lubrication pump, the reservoir can be equipped with a fill level monitor (fill level switch "W"). Additionally, a special filling device with optical fill level display (fill level control "S") can be installed.

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



Legend

- 1 = maximum delivery volume at constant speed (100%)
- 2 = minimum delivery volume at constant speed (33%)
- 3 = adjustable delivery volume range

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

Design 1M, dual-stage



Motor data design 1M

Rated speed [min ⁻¹]	Frequency [Hz]	Rated power [kW]	Rated voltage [V]	Rated current [A]	Order code
1 000	50	0,09	230/400	0,80/0,46	AG
			290/500	0,64/0,37	AL
			400/690	0,46/0,26	AP
1 500	50	0,18	230/400	1,13/0,65	AF
			290/500	0,90/0,52	AK
			400/690	0,65/1,07	AO



Note!

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

Technical data

General

Mounting positionvertical
 Temperature range.-15 °C to +40 °C ¹⁾
 Reservoir.4 or 10 kg
 Number of pump elements1 to 12
 Filling.via filler socket G 3/8"
 Dry weightFF 04 approx. 15 kg;
 FF 10 approx. 20,5 kg

Gearbox

TypeScrew drive 1M, dual-stage
 Gear ratios80:1; 150:1; 300:1; 600:1

Motor

"motor data" table and rating plate

Pump

TypeMulti-piston pump
 with 1 to 12 outlets

Operating pressure for pump elements

Piston-Ø 6max. 350 bar
 Piston-Ø 8max. 200 bar
 Piston-Ø 10max. 125 bar

Lubricants

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

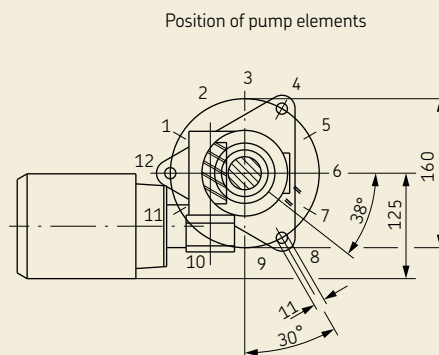
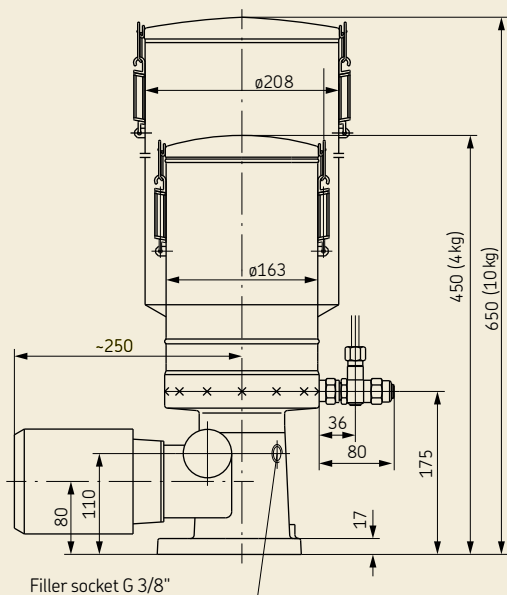
Operating viscosity (Oil)≥ 50 mm²/s
 Worked penetration (Grease)> 220 ¹/₁₀ mm

Delivery volume of pump elements

Piston-Ø 60,027 to 0,080 cm³/stroke
 Piston-Ø 80,050 to 0,150 cm³/stroke
 Piston-Ø 100,077 to 0,230 cm³/stroke

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

Design 1M, dual-stage



FF multiline pump unit

Design 2M, single-stage



Design 2M, single-stage

Motor data design 2M

Rated speed [min ⁻¹]	Frequency [Hz]	Rated power [kW]	Rated voltage [V]	Rated current [A]	Order code
750	50	0,12	230/400	1,27/0,73	AH
			290/500	0,34/0,58	AM
			400/690	0,73/1,26	AQ
1 000	50	0,25	230/400	1,91/1,10	AG
			290/500	0,51/0,88	AL
			400/690	0,10/0,17	AP



Note!

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

Technical data

General

Mounting positionvertical
 Temperature range.-15 °C to +40 °C¹⁾
 Reservoir.4 or 10 kg
 Number of pump elements1 to 12
 Filling.via filler socket G 3/8"
 Dry weightFF 04 approx. 15 kg;
 FF 10 approx. 20,5 kg

Gearbox

TypeScrew drive 2M, single-stage
 Gear ratio.33:1 general

Motor

"motor data" table and rating plate

Pump

TypeMulti-piston pump
 with 1 to 12 outlets

Operating pressure for pump elements

Piston-Ø 6max. 350 bar
 Piston-Ø 8max. 200 bar
 Piston-Ø 10max. 125 bar

Lubricants

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

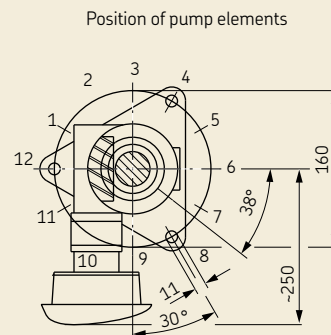
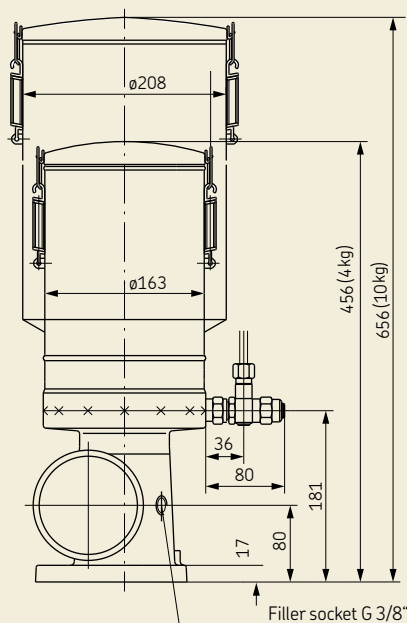
Operating viscosity (Oil)≥ 50 mm²/s
 Worked penetration (Grease)> 220 1/10 mm

Delivery volume of pump elements

Piston-Ø 60,027 to 0,080 cm³/stroke
 Piston-Ø 80,050 to 0,150 cm³/stroke
 Piston-Ø 100,077 to 0,230 cm³/stroke

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

Design 2M, single-stage



Fill level control, optical

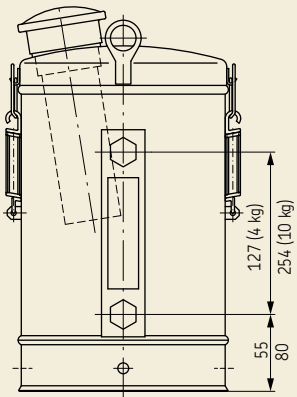
Fill level control S (Oil)

Technical data

General

Lubricant Oil
 Design For oil lubrication pumps;
 with sight glass and
 filler socket with strainer

Fill level control S



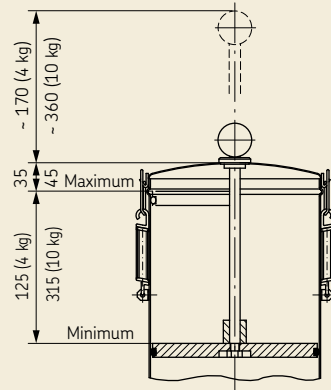
Fill level control G (Grease)

Technical data

General

Lubricant Grease
 Design Optical fill level control
 (dip stick)

Fill level control G



Fill level switches for oil

Fill level switch W

Technical data

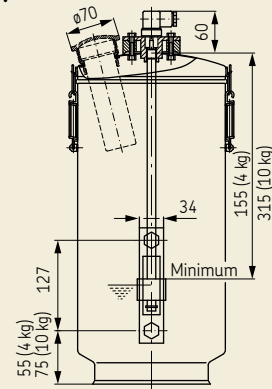
General

Design Reed contact for
 monitoring minimum level

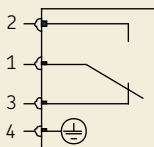
Form of contact Changeover
 Switching capacity 15 W/VA
 Switching voltage, max. 240 V AC/ 120 V DC
 Switched current, max. 1 A
 Connection diagram Plug EN 175301-803
 (DIN 43650)

Protection class IP 65

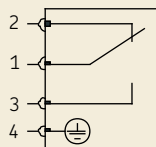
Fill level switch W



Connector pin assignment fill level switch W



Switch position
 at minimum



Switch position
 above minimum

Connector pin assignment

PIN	Description
1	+ Supply voltage
2	Signal output "above minimum"
3	Signal output "minimum"
4	PE Protective earth

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

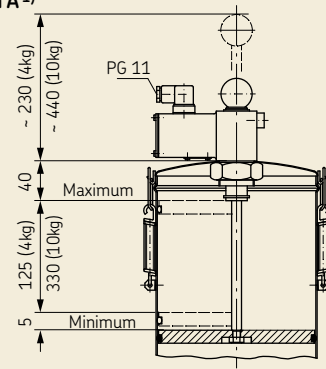
Switched current, max. 15 AAC / 10 ADC

Connection diagram Plug EN 175301-803 (DIN 43650)

Protection class IP 65

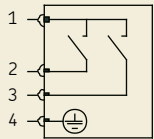
Lubricants Grease of NLGI Grade 2

Fill level switch A¹⁾

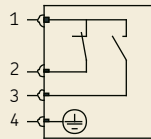


¹⁾ Special design with cable brake protection available on request

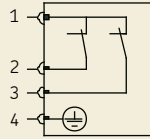
Connector pin assignment fill level switch A



Switch position at maximum



Switch position between minimum and maximum



Switch position at minimum

Connector pin assignment

PIN	Description
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

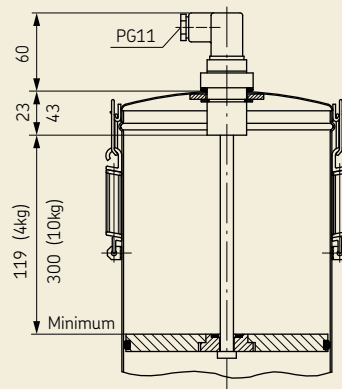
Switched current, max. 1 A

Connection diagram Plug EN 175301-803 (DIN 43650)

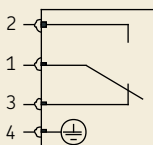
Protection class IP 65

Lubricants Grease of NLGI Grade 2

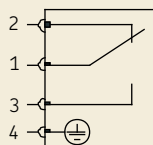
Fill level switch E



Connector pin assignment fill level switch E



Switch position at minimum



Switch position above minimum

Connector pin assignment

PIN	Description
1	+ Supply voltage
2	Signal output "above minimum"
3	Signal output "minimum"
4	PE Protective earth

Fill level switches for grease

Fill level switch F

Technical data

General

Design Reed contact for monitoring minimum and maximum level

Form of contactNO-contact/NC contact

Switching capacity, max.60 W/VA

Switching voltage, max.230 V DC/AC

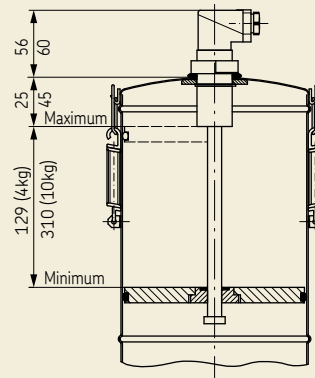
Switched current, max.1 A

Connection diagram Plug EN 175301-803 (DIN 43650)

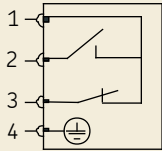
Protection classIP 65

LubricantsGrease of NLGI Grade 2

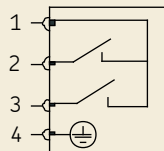
Fill level switch F



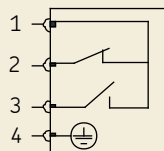
Connector pin assignment fill level switch F



Switch position at minimum



Switch position between minimum and maximum



Switch position at maximum

Connector pin assignment

PIN	Description
1	+ Supply voltage
2	Signal output "maximum"
3	Signal output "minimum"
4	PE Protective earth

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-warningNO-contact

3. Min. fill levelChangeover

Switching capacity, max.60 W/VA

Switching voltage, max.10-30 V DC/AC

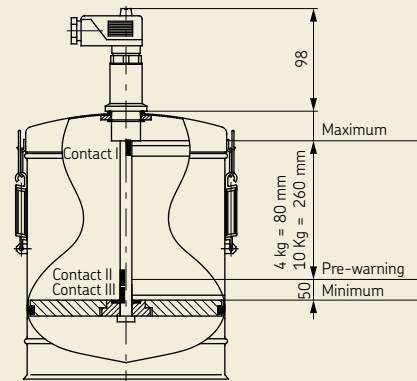
Switched current, max.1 A

Connection diagram Plug EN 175301-803 (DIN 43650)

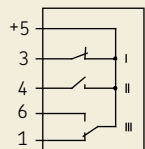
Protection classIP 65

LubricantsGrease of NLGI Grade 2

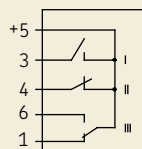
Fill level switch H



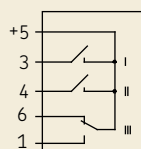
Connector pin assignment fill level switch H



Switch position at maximum



Switch position at pre-warning



Switch position at minimum

Connector pin assignment

PIN	Description
1	Standard output
3	Signal output "maximum"
4	Signal output "pre-warning"
6	Signal output "minimum"
5	+ Supply voltage

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 (A1) and longest (A2) 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 (A2) and maximum (A1) 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 °C to +70 °C

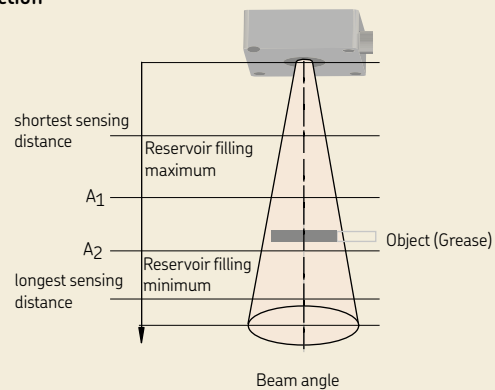
Indicator

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

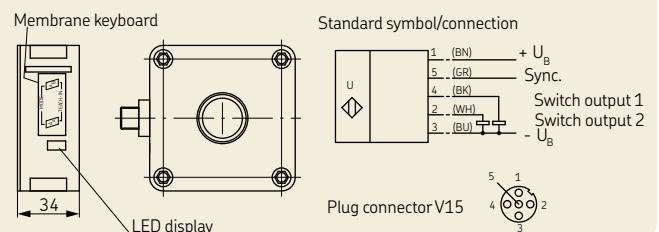
Electrical data

Operating voltage 10 to 30 V DC, ripple 10%
 No-load current I_o ≤ 50 mA
 Protection class IP 65
 Connection connector socket V15 (12Mx1), 5-pin

Function



U2 Ultrasonic sensor



Note!

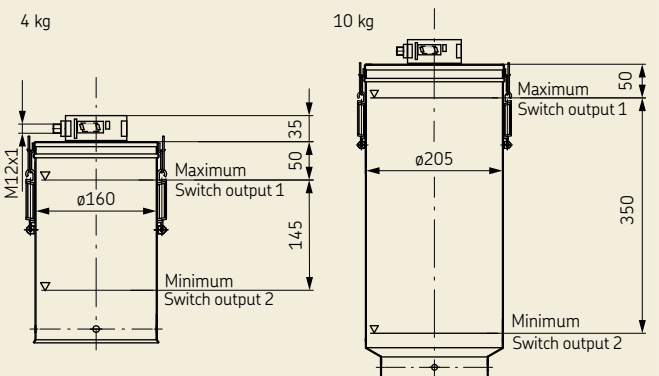
The factory-set values can be changed by the customer at any time (teach-in).

Contact box is not part of the shipment.
 Available for separate order.

Contact box

Description	Order No.
Contact box (not part of the shipment)	24-1882-2076

Reservoir with U2 Ultrasonic sensor



FF multiline pump unit

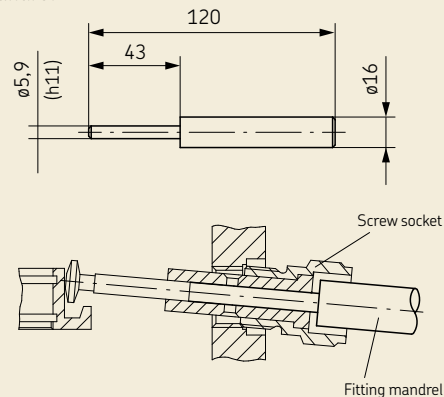
Accessories

Accessory Fitting mandrel

Fitting mandrel
for installing a pump element

Description	Order No.
Fitting mandrel	44-1827-2010

Fitting mandrel

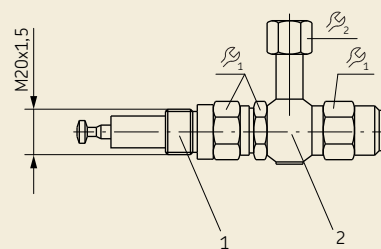


Accessory Pump element

Pump element with ring piece
for installing a pump element

Description	∅ [mm]	Weight [g/each]	⌀ ₁	⌀ ₂	Order No.
Pump element (Pos. 1)	6	260	24	–	24-1557-3680
	8	260	24	–	24-1557-3681
	10	280	24	–	24-1557-3683
Ring piece (Pos.2)	6	100	–	14	24-2255-2003
	8	80	–	17	24-2255-2004
	10	100	–	19	24-2255-2005

Pump element

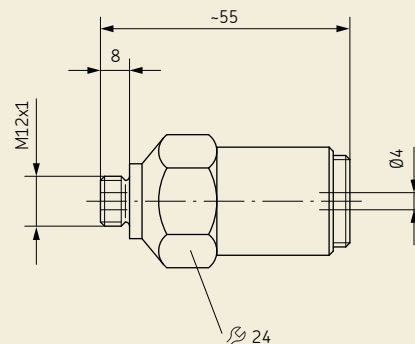


Accessory Pressure regulating valve

Pressure regulating valves for grease
for insertion into pump elements

Set pressure [bar]	Weight [g/each]	Order No.
50	130	24-2103-2273
100	130	24-2103-2344
125	130	24-2103-2345
150	130	24-2103-2342
175	130	24-2103-2272
200	130	24-2103-2346
350	130	24-2103-2271

Pressure regulating valve

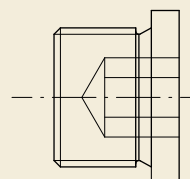


Accessory Screw plug

Screw plug
for closing unused pump outlets

Design	Weight [g/each]	Order No.
M20x1,5	37	95-1520-0908

Screw plug



FF multiline pump unit

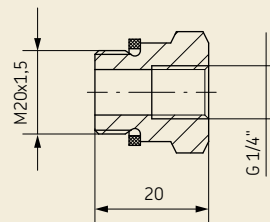
Accessories

Accessory Threaded socket

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

Design	Order No.
Steel, galvanized surface, with copper (Cu) washer	24-1755-2003

Threaded socket

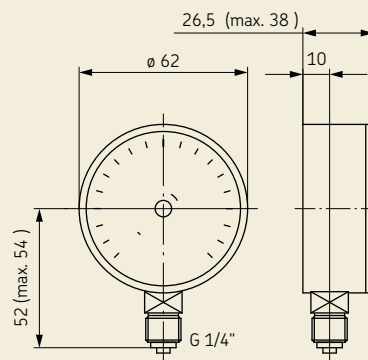


Accessory Pressure gauge

Indicating range	Order No.
0 to 250 bar (0 to 3600 psi)	169-125-000
0 to 400 bar	169-140-001
Washer ¹⁾	248-610.02

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

Pressure gauge



Accessory Pressure gauge screw

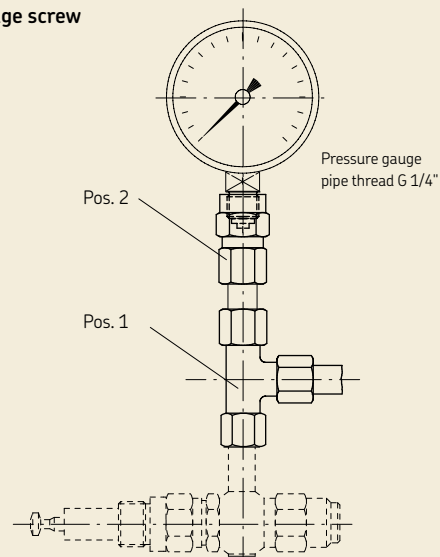
Position 1: elbow fitting, directionally adjustable, according to DIN 2353

Tube external diameter	Thread	Order No.
6 mm	M 12x1,5	443-406-061
8 mm	M 14x1,5	443-408-081
10 mm	M 16x1,5	443-410-101

Position 2: Pressure gauge screw

Tube external diameter	Thread	Order No.
6 mm	M 12x1,5	471-106-163
8 mm	M 14x1,5	96-0308-0060
10 mm	M 16x1,5	471-110-163

Pressure gauge screw



FF multiline pump unit

Accessories

Accessory Topping-up pump

Manual topping-up pump

Description	Order No.
with gear, for 25 kg drum	169-000-042
for 50 kg drum	169-000-054
without running gear for 25 kg drum	169-000-342
corresponding filler socket	995-000-705

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

Topping-up pump ¹⁾



¹⁾ A generic pump is depicted; the actual pumps may differ in appearance.

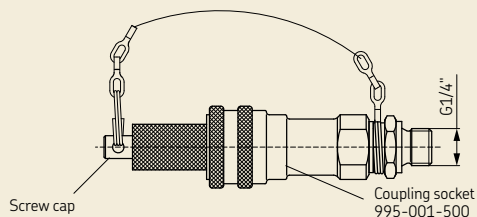
Accessory Coupling socket

Coupling socket with cap

for installation on a topping-up pump

Description	Order No.
Coupling socket with cap	995-001-509

Coupling socket with cap



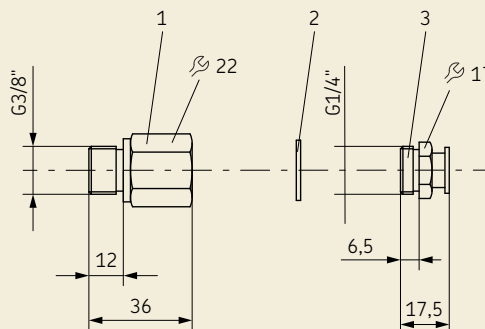
Accessory Lubricant nipple

Reduction fitting with flat-type lubricant nipple

for connecting a manual grease press

Pos.	Description	Order No.
1	Reduction fitting RI 3/8x1/4 VZK EO	96-3120-0058
2	Washer A 17x21 DIN 7603 CU	DIN 7603-A17x21 CU
3	Flat-type lubricant nipple AG 1/4-16 DIN 3404	96-0002-0053

Filling device with lubricant nipple



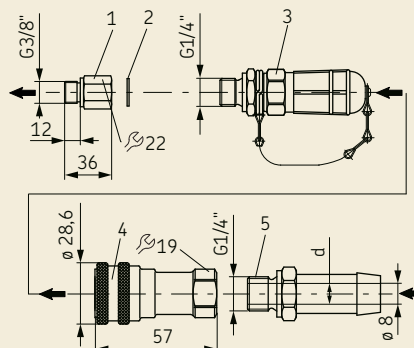
Accessory Quick-action coupling

Quick-action coupling

for connecting an automatic filling device

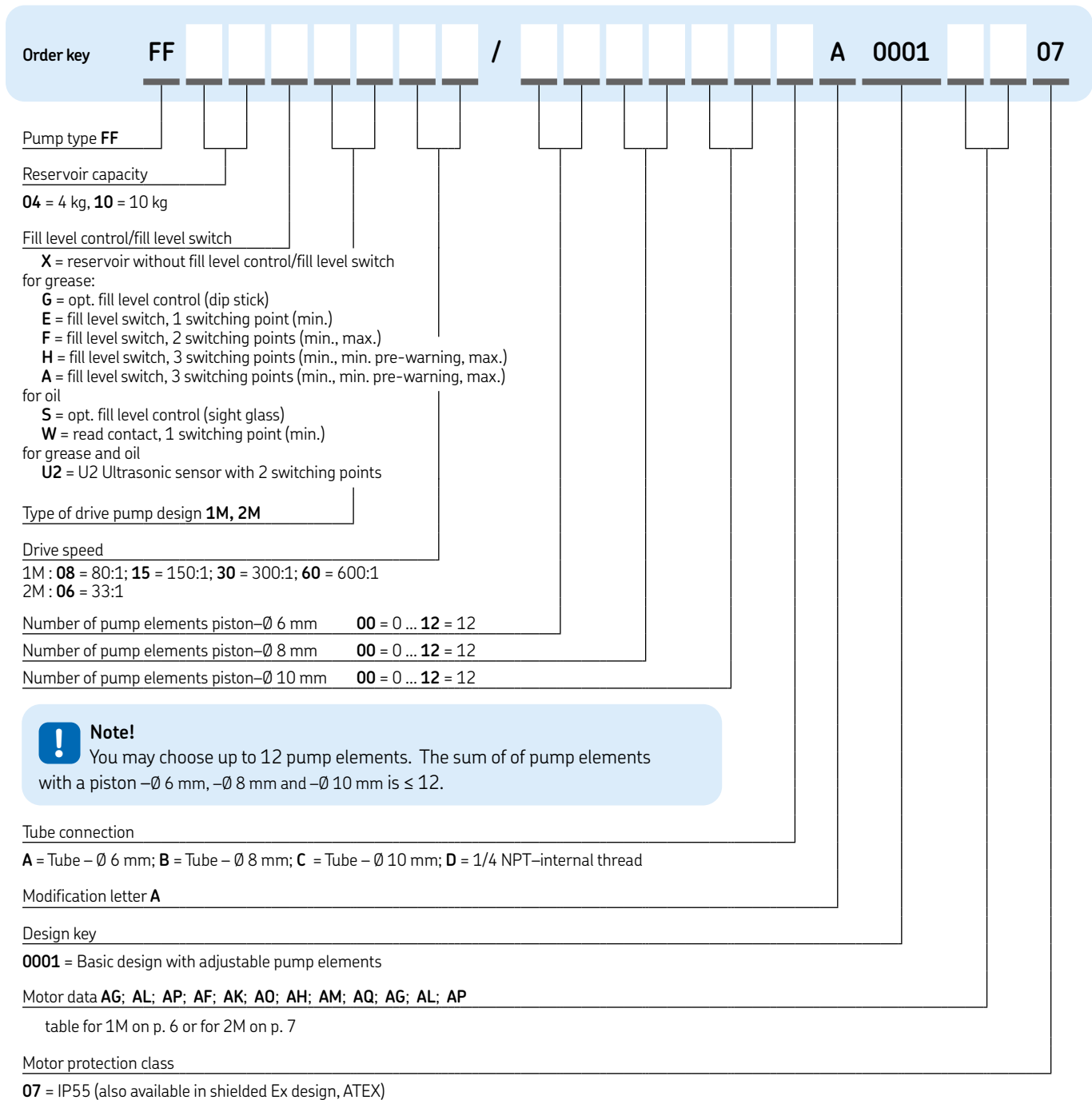
Pos.	Description	Order No.
1	Reduction fitting RI 3/8x1/4 VZK EO	96-3120-0058
2	Washer A 17x21 DIN 7603 CU	DIN 7603-A17x21 CU
3	Filler socket	995-000-705
4	Coupling socket (for refill connection)	995-001-500
5	Hose fitting for connection to coupling socket Diameter (d) 13 mm Diameter (d) 16 mm	857-760-007 857-870-002

Filling device with quick-action coupling



FF multiline pump unit

Order key



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 8mm
- 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

**Important information on product usage**

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:

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

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