

Flow limiter SP/SMB13

for line installation in circulating-oil lubrication systems.



Flow limiters are used in circulating-oil lubrication systems. The task of a flow limiter is to divide up the volumetric flow of the main line into parallel individual volumetric flow quantities and to "limit" these according to requirements, or to keep them constant.

The volumetric flow produced does not depend on the system pressure and is nearly independent of viscosity.

Using interchangeable plug-in nozzles, the volumetric flow of the flow limiter SP/SMB13 can be set stepwise **from 6 to 38 l/min**. That makes it possible to adjust the volumetric flow rates at a later date.

The SP/SMB 13 group comes with a visual/electric gear wheel-type flow indicator that has a proportional factor of 39 ml per revolution.

Advantages

- **reliable**
 - Parallel distribution of individual flow quantities
 - Self-regulating metering, thus even volumetric flows for different back pressures.
 - Wide viscosity spectrum, practically independent of temperature and viscosity, thus stable system conditions.
- **easy system planning**
 - The required volumetric flow (the required flow limiter nozzle) has to be determined already during the project planning phase.
- **simple start-up**
 - Preset volumetric flows allow short start-up times.
- **effective volumetric flow control by means of gear wheel-type flow indicator with Hall-Sensor**
- **broad range of applications**
- **optional ATEX version**
- **stable and reproducible measuring procedure, no corrective factor required**

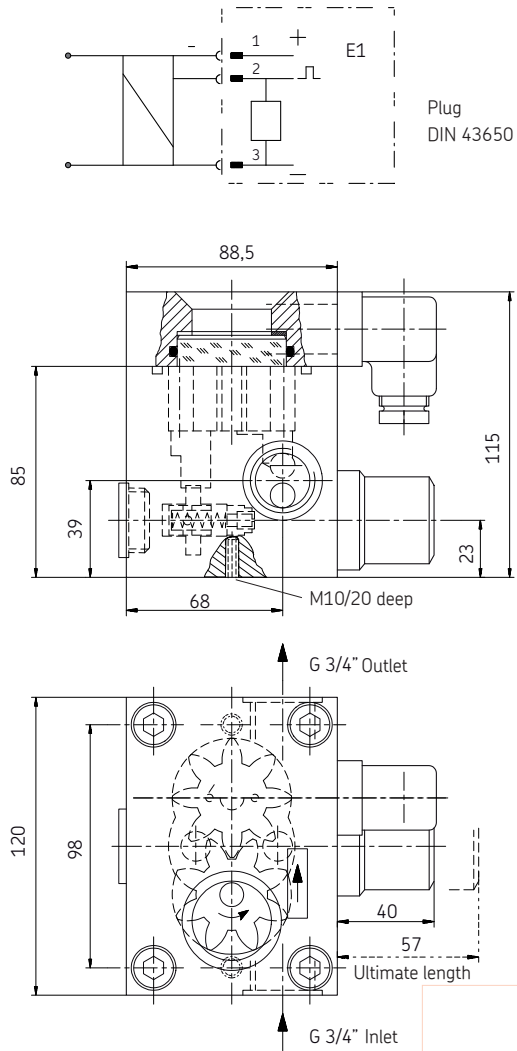
Design

The SP/SMB 13 flow limiter consists of the following:

- Flow limiter housing (with sensor) flow limiter regulating assembly (with control piston, plug-in nozzle and pressure spring)
- Gear pair
- Flow limiter cover (with sight glass, seals, plugs and fastening screws)

The housing, gears and cover consist of an anodized aluminum alloy to ensure corrosion-resistance and low weight. A round glass disk conforming to DIN 8902 (temperature stable pressed hard glass) is used for the sight-glass pane. The pane floats in the cover to avoid distortion and premature failure. The cover also accommodates a sensor that is actuated by two pin magnets embedded in the gear below. The plug-in nozzle in the flow limiter regulating assembly is simply interchangeable, as soon as the screw plug lying under the plug is unscrewed from the housing.

Dimension drawing



Mode of operation

The flow limiter SP/SMB 13 has two restrictors connected in series (D_1 , D_2). Restrictor D_1 involves an interchangeable plug-in nozzle, which as a nonadjustable restrictor defines the nominal volumetric flow. The nonadjustable restrictor D_1 is available in different nozzle sizes (refer to table on page 4). On the contrary, restrictor D_2 is an adjustable restrictor, which has a different restrictor cross-section based on the position of the control piston RK. The flow resistance of restrictor D_2 is automatically changed in such a manner by shifting the control piston (RK) against the spring force (F), that the differential pressure on the nonadjustable restrictor D_1 remains constant, and thus also the volumetric flow.

$$p_1 \cdot A = p_2 \cdot A + F \quad \text{resp.} \quad p_1/2 = p_1 - p_2 = F/A = \text{constant}$$

It follows that:

The difference in pressure in front of and behind the plug-in nozzle is held constant by the control piston (RK).

For this function, the system pressure p_1 must always be greater than the sum of the pressure drops in and downstream of each flow limiter.

$$p_1 > p_{1/2} + p_3$$

For this reason, the pump's volumetric flow should exceed all the individual flow quantities by approx. 15 %, i.e.,

$$Q = 1,15 \cdot (\sum Q_i).$$

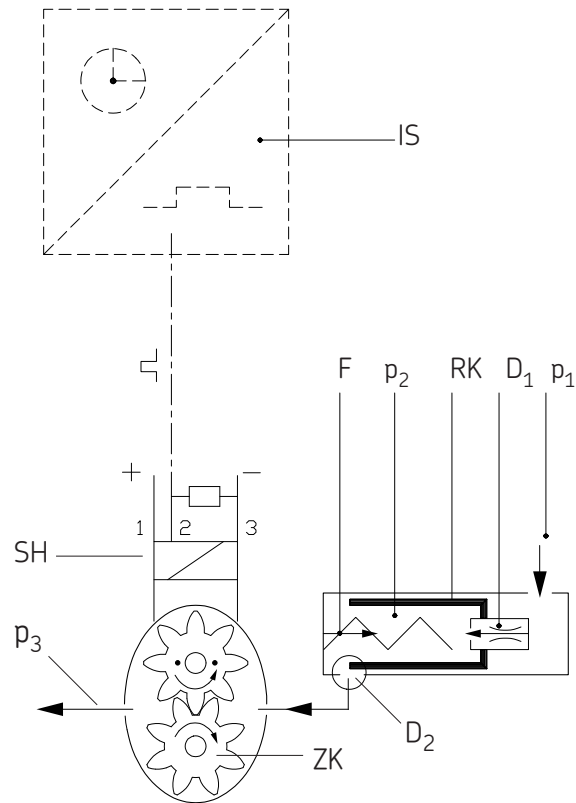
The downstream gear wheel-type flow indicator uses a dynamic pulse generator (24 V DC) to emit a continuous sequence of pulses proportional to the volumetric flow.

The proportionality factor K_1 is derived from the swallowing capacity of one revolution of the gear pair ($K_1 = 39 \text{ ml/pulse}$).

The sequence of pulses can be displayed and monitored by pulse-monitoring equipment, group monitoring units or a central evaluation station.

Due to the very short throttle length of the plug-in nozzle D_1 the control performance in the indicated viscosity range is almost independent of temperature and viscosity.

System structure flow limiter



- | | |
|---|--|
| p_1 Pressure upstream of the plug-in nozzle D_1 | RK Control piston |
| p_2 Pressure downstream of the plug-in nozzle D_1 | ZK Gear wheel-type flow indicator |
| p_3 Pressure downstream of ZK (outlet pressure) | SH Pulse generator |
| D_1 Plug-in nozzle | IS Pulse control and display |
| D_2 Adjustable restrictor | F Spring force |

See important product usage information on the back cover.

Technical Data

Flow limiter

General information

| | |
|---------------------------|---|
| Type | 2-way flow limiter valve with volumetric flow check |
| Application | for line installation |
| Mounting position | discretionary |
| Ambient temperature range | 0 to + 70 °C |
| Material | AlCuPb F38, neutrally anodized |
| Weight | 2.4 kg |

Hydraulic

| | |
|-------------------------|--|
| Nominal volumetric flow | stepwise from 6 to 38 l/min (see table on page 4) |
| Working pressure p_1 | 6 to 50 bars |

| | |
|---|---|
| Required differential pressure between inlet p_1 and outlet p_3 | ≥ 6 bars |
| Lubricant | mineral oils, synthetic oils and ecofriendly oils |
| Lubricant temperature range | 0 to + 90 °C ¹⁾ |
| Operating viscosity | 20 to 600 mm ² /s |

Gear wheel-type flow indicator

| | |
|------------------------|-------------------|
| Sensor | Hall-Sensor |
| System voltage | 24 V DC \pm 10% |
| Max. switched current | 20 mA |
| Connection | plug, DIN 43 650 |
| Protection class | IP 65 |
| Proportionality factor | 39 ml/pulse |

1) Only when ambient temperature < 60 °C

Plug-in nozzle table

| Nominal volumetric flow ²⁾ | | | | Plug-in nozzle table | | | |
|---------------------------------------|---------------|--------------|---|----------------------|---------------|--------------|---|
| [l/min] | Nozzle [Ø mm] | Nozzle index | Spare part complete plug-in nozzle D ₁ Order no. | [l/min] | Nozzle [Ø mm] | Nozzle index | Spare part complete plug-in nozzle D ₁ Order no. |
| 6,00 | 2,50 | 250 | 24-0455-2370 | 16,75 | 4,40 | 440 | 24-0455-2389 |
| 6,50 | 2,60 | 260 | 24-0455-2371 | 17,50 | 4,50 | 450 | 24-0455-2390 |
| 6,75 | 2,70 | 270 | 24-0455-2372 | 18,00 | 4,60 | 460 | 24-0455-2391 |
| 7,00 | 2,80 | 280 | 24-0455-2373 | 18,75 | 4,70 | 470 | 24-0455-2392 |
| 7,50 | 2,90 | 290 | 24-0455-2374 | 19,50 | 4,80 | 480 | 24-0455-2393 |
| 8,00 | 3,00 | 300 | 24-0455-2375 | 20,25 | 4,90 | 490 | 24-0455-2394 |
| 8,75 | 3,10 | 310 | 24-0455-2376 | 21,00 | 5,00 | 500 | 24-0455-2395 |
| 9,25 | 3,20 | 320 | 24-0455-2377 | 21,75 | 5,10 | 510 | 24-0455-2396 |
| 9,75 | 3,30 | 330 | 24-0455-2378 | 22,50 | 5,20 | 520 | 24-0455-2397 |
| 10,50 | 3,40 | 340 | 24-0455-2379 | 23,25 | 5,30 | 530 | 24-0455-2398 |
| 11,00 | 3,50 | 350 | 24-0455-2380 | 24,00 | 5,40 | 540 | 24-0455-2399 |
| 11,50 | 3,60 | 360 | 24-0455-2381 | 25,00 | 5,50 | 550 | 24-0455-2400 |
| 12,00 | 3,70 | 370 | 24-0455-2382 | 26,00 | 5,60 | 560 | 24-0455-2401 |
| 12,75 | 3,80 | 380 | 24-0455-2383 | 27,00 | 5,70 | 570 | 24-0455-2402 |
| 13,50 | 3,90 | 390 | 24-0455-2384 | 28,00 | 5,80 | 580 | 24-0455-2403 |
| 14,00 | 4,00 | 400 | 24-0455-2385 | 30,00 | 6,00 | 600 | 24-0455-2405 |
| 14,75 | 4,10 | 410 | 24-0455-2386 | 34,00 | 6,50 | 650 | 24-0455-2411 |
| 15,50 | 4,20 | 420 | 24-0455-2387 | 38,00 | 6,90 | 690 | 24-0455-2412 |
| 16,00 | 4,30 | 430 | 24-0455-2388 | | | | |

2) at a service viscosity of 300 mm²/s

Note!

For ordering a flow limiter SP/SMB13, the customer must generate a type designation as well as an order no. This must be adjusted in accordance with the desired flow limiter design.

The key to the order codes on page 5 illustrates the structure of the type designation and the order number.

For the required nozzle index, see the plug-in nozzle table.

Key to order codes

Order example

Flow limiter, type SP/SMB and size 13 (SP/SMB13) outfitted with nozzle (2), with optical/electrical monitoring (gear wheel-type flow indicator) with Hall-Sensor, (E1), with a volumetric flow of 8 l/min and a nozzle diameter of 3 mm (nozzle index 300) results in the

Type designation: **SP/SMB13/2E1/300**

and

Order number: **24-2713-1300**

Note

The following flow limiters, type SP/SMB13, are available in ATEX design:

 Zone 1

 Zone 21

possible design features:

- Housing design with ground terminal rating plate, extended
- can be used only in connection with a circuit breaker device
- can be ordered with ATEX certificate

Restrictions regarding temperature and explosion class must be observed.

Further details can be obtained from SKFLubrication Systems Germany AG.

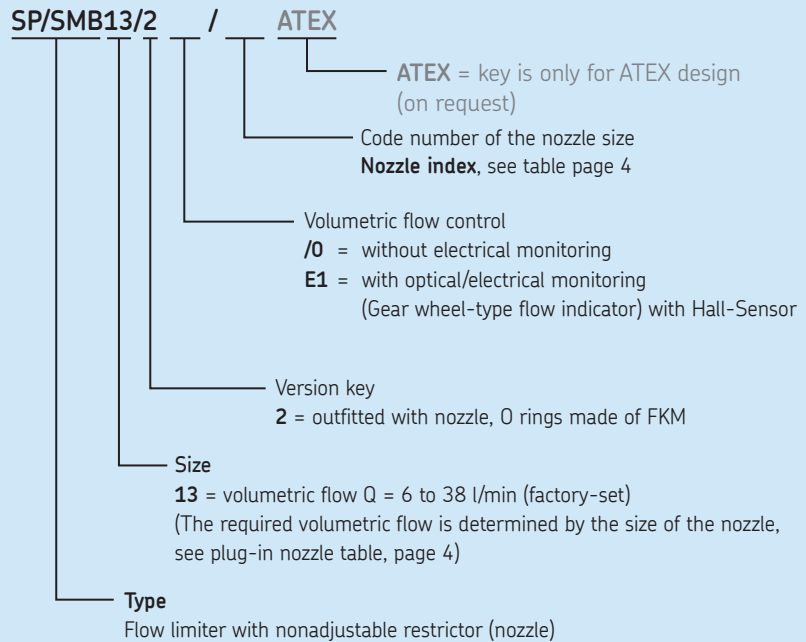
Type designation:

SP/SMB13/2 .. /

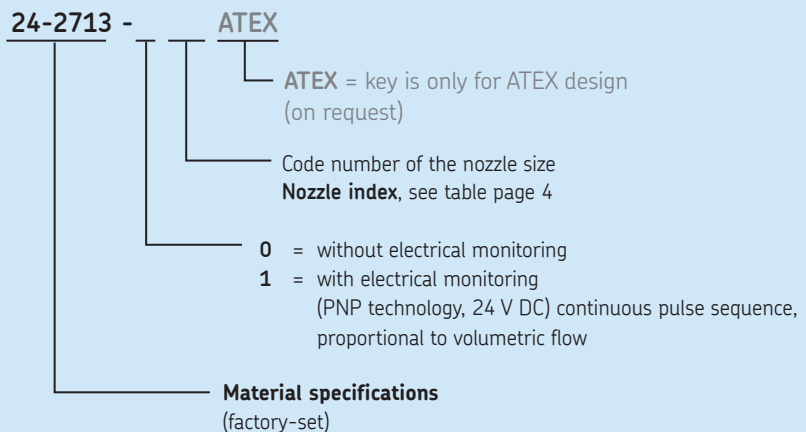
Order number:

24-2713-

Structure of the type designation for flow limiter



Structure of the order number for flow limiter

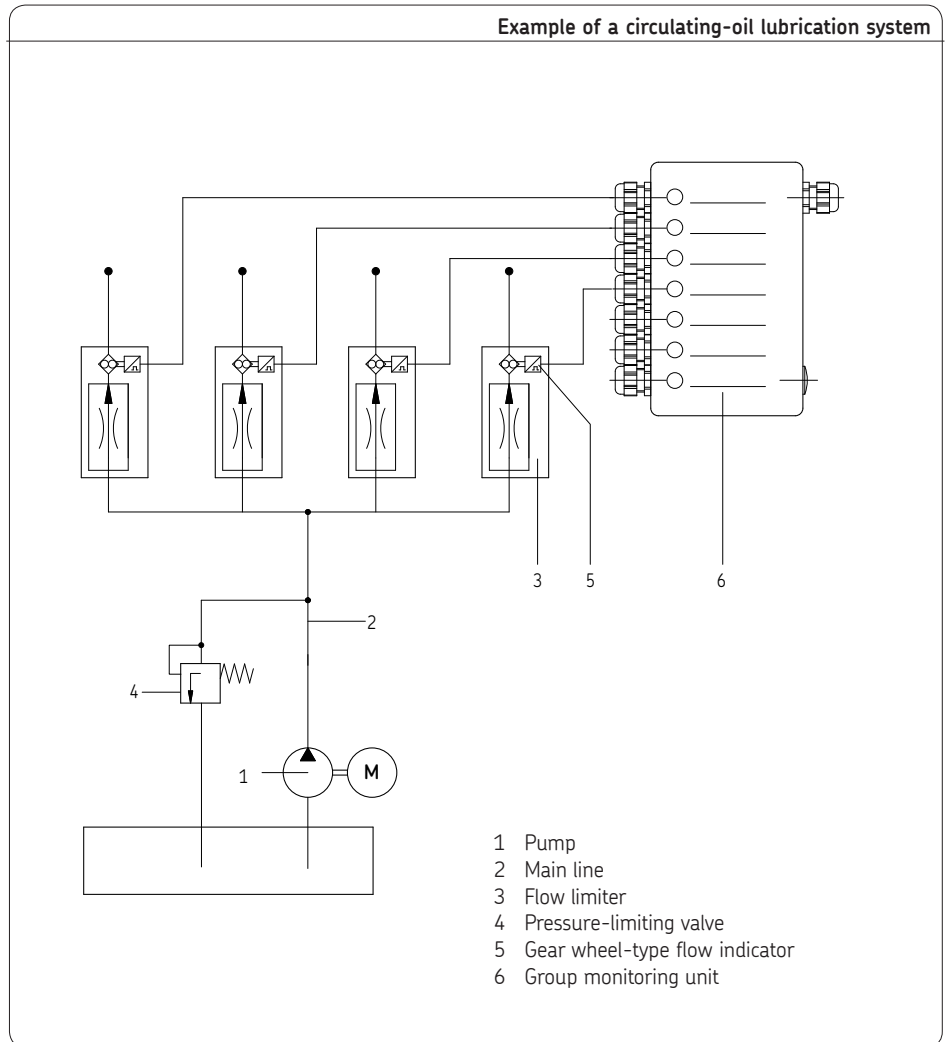


Example of a circulating-oil lubrication system

Pump (1) delivers the lubricant to the main line (2). From the flow limiters arranged in parallel (3), the lubricant reaches the lubrication points directly.

The pump's volumetric flow should be at least 15 % greater than the sum of nominal volumetric flows of all connected flow limiters. The pressure-regulating valve (4) integrated into the main line assumes the system pressure regulation.

The gear wheel-type flow indicator (5) installed in the flow limiters (3) controls the volumetric flow. Display and control of the pulse sequence (flow limiters (3)) is done by a group monitoring unit (6) or a central evaluation station.



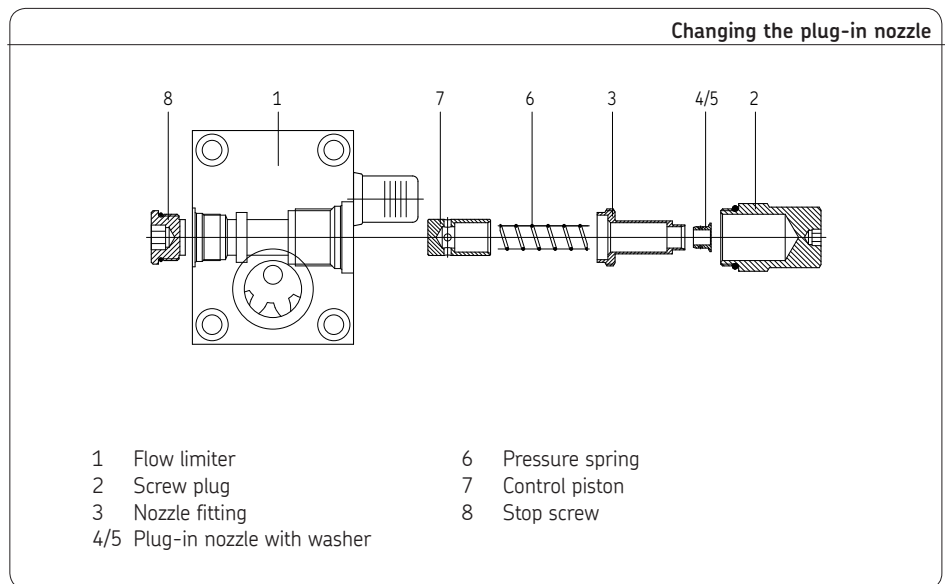
Replacing plug-in nozzles

- Interrupt oil feed to flow limiter using the shutoff valve.
- ☞ **WARNING** SFibControl piston (7) held under spring pressure!
- Slowly screw out stop screw (8) (hexagonal head, WAF 8) together with washer.

☞ **WARNING** **Burning oil hazard.**

Failure to slowly remove screw could result in burns.

- Remove control piston (7), nozzle holder (3) and pressure spring (6).
- Remove plug-in nozzle (4/5) from the nozzle holder.
- ☞ A roughly \varnothing 6 mm rod (never use a pointed object like, for instance, a scriber) can be used to help press it out.
- Press the new plug-in nozzle (4/5) with the washer forward up until the nozzle holder.
- Insert pressure spring (6) in the borehole.
- Insert nozzle holder (3) with new plug-in nozzle (4/5) in the borehole over the pressure spring without skewing.
- Check to make sure the control piston (7) moves easily by pressing it against the pressure spring (6). Skewing leads to malfunctions.
- Screw in stop screw (8) with washer.
- Open the shutoff valve.



Note

In the case of a change in the nozzle size, the nozzle specifications on the rating plate must be changed accordingly.

Accessories/spare parts

| Accessories | |
|--|--------------|
| Designation | Order no. |
| Pulse meter IPM 12 | 84-8011-0380 |
| Pulse meter with connection socket for PGA 3 | 84-8011-0390 |

| Spare parts | |
|--|--------------|
| Designation | Order no. |
| Flow limiter SP/SMB13 without nozzle, with electrical monitoring | 24-1883-3016 |
| Sight glass D 45x12 | 44-0758-2049 |
| Gasket set for SP/SMB 13 consisting of: Flat gasket D 32/45x05 O-ring 44x3 O-ring 90x3 | 24-0404-2310 |
| Socket | 24-1882-2029 |

Order No. 1-3004-EN

Subject to change without notice! (07/2014)

Important product usage information

All products from SKF may be used only for their intended purpose as described in this brochure and in any instructions. If operating instructions are supplied with the products, they must be read and followed.

Not all lubricants are suitable for use in centralized lubrication systems. SKF does offer an inspection service to test customer supplied lubricant to determine if it can be used in a centralized system. SKF 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 (1013 mbars) by more than 0.5 bar at their maximum permissible temperature.

Hazardous materials of any kind, especially the materials classified as hazardous by European Community Directive EC 67/548/EEC, Article 2, Par. 2, may only be used to fill SKF centralized lubrication systems and components and delivered and/or distributed with the same after consulting with and receiving written approval from SKF.

Additional brochures

| | | | | | |
|-----------|----------------------------------|------|-------|------------|---|
| 1-3027-EN | Overview brochure - Flow limiter | | | | |
| 1-3001-EN | Flow limiter SP/SMB3 | 6 | until | 38 l/min | signal transmitter and proximity switch |
| 1-3001-EN | Flow limiter SP/SMB6 | 25 | until | 132 l/min | signal transmitter and proximity switch |
| 1-3028-EN | Flow limiter SP/SMB8 | 0.09 | to | 8.18 l/min | Sensor and piston detector |
| 1-3002-EN | Flow limiter SP/SMB9 | 0.09 | to | 8.18 l/min | Gear wheel-type flow indicator |
| 1-3003-EN | Flow limiter SP/SMB10 | 0.21 | to | 8.15 l/min | Gear wheel-type flow indicator |
| 1-3005-EN | Flow limiter SP/SMB14 | 25 | to | 132 l/min | Gear wheel-type flow indicator |
| 1-1730-EN | Electrical plug-in connections | | | | |

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

This brochure was presented by:

® SKF is a registered trademark of the SKF Group.

© SKF Group 2014

The contents of this publication are the copyright of the publisher and may not be reproduced (even extracts) unless prior written permission is granted. Every care has been taken to ensure the accuracy of the information contained in this publication but no liability can be accepted for any loss or damage whether direct, indirect or consequential arising out of the use of the information contained herein.

