

System integration only in close cooperation
with SKF Portfolio management

Microdosage system MDS

Product series MDx

For oil

For continuous monitored lubrication with minimum quantities from 0,5 to 5 mm³/min



Microdosage makes an important
contribution to greater sustainability.

The system is:

- Energy-efficient
- Quiet
- Resource-conserving.

The MDS is an intelligent microdosage system for especially demanding applications.

Only the combination of perfectly matched components, a high-precision valve, micro flow sensor, and a highly sophisticated control unit make it possible to precisely meter and monitor extremely small quantities of lubricant.

In contrast with conventional lubrication systems, the MDS does not use any compressed air to transport the lubricant. This makes it especially energy-efficient and offers considerable potential cost savings over conventional systems.

Advantages

- Precise:
 - Continuous lubrication without consuming air
 - Precise metering of minimal quantities of oil
- Reliable:
 - Continuous monitoring and adjustment of the metered quantity
 - Self-calibrating
 - Lubricant feeding directly to the lubrication points
- Environmentally compatible:
 - No compressed air consumption
 - Reduced noise emissions
 - Minimal lubricant quantities

Applications

- High-speed spindles >2 million n x dm
- High-speed bearings



Microdosage system

System design

The microdosage system is a lubricant metering system that allows individual supply of up to four lubrication points with minimal quantities of oil from a common reservoir.

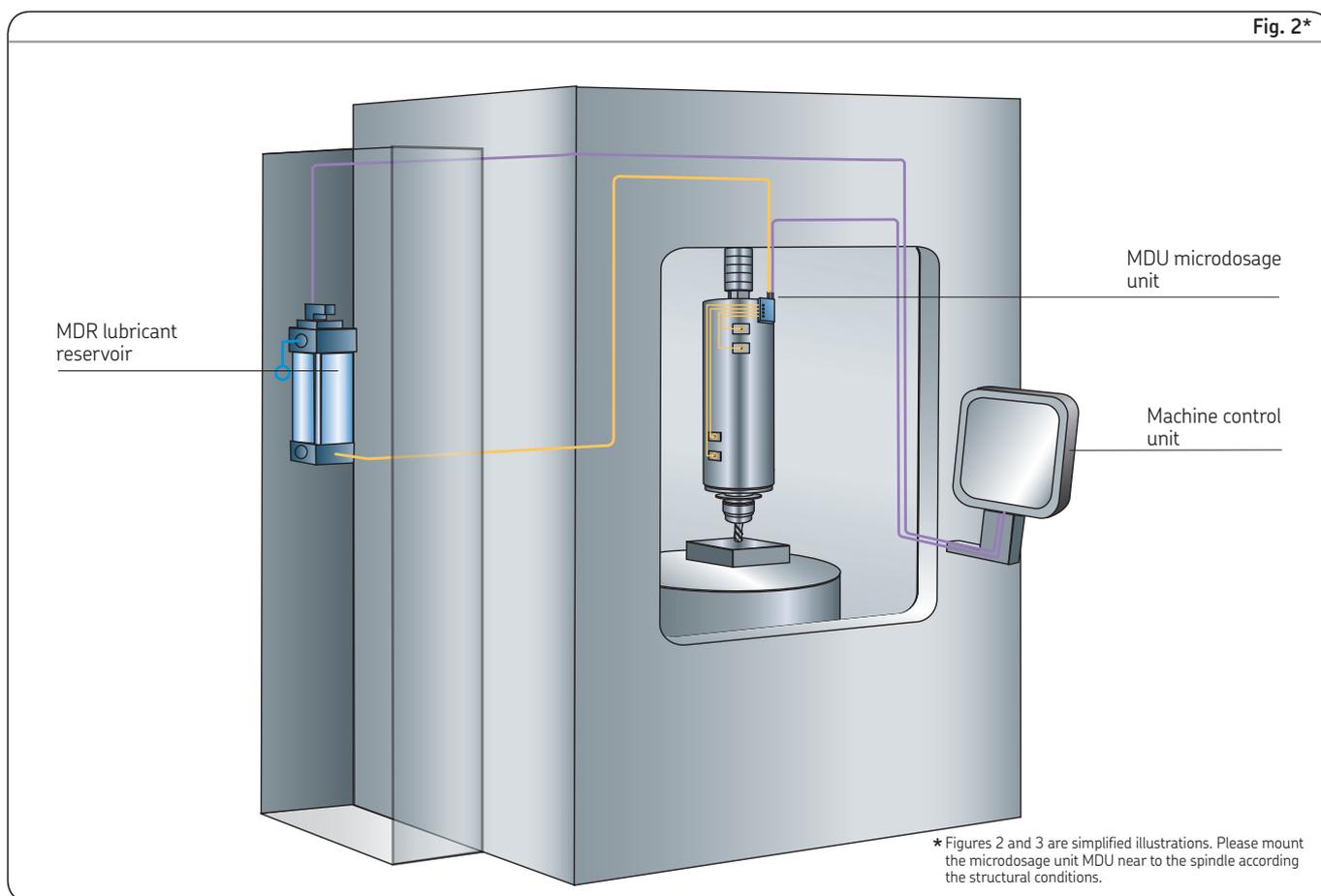
The oil is transported directly to the lubrication points through capillary lines (→ Fig. 3).

The entire system is monitored by a flow sensor which can be readjusted by the machine control unit (→ Fig. 2).

The system can adjust the amount of lubricant very dynamically when, for example, the spindle speed or basic machining conditions change and cause a change in the oil requirements. The system also responds immediately to viscosity changes in the lubricant (e.g., due to temperature fluctuations).

The system's MDU microdosage unit has a small and compact design and belongs to electrical protection class IP67. It can be installed directly in the spindle compartment of the machine tool and thus close to the lubrication points. The MDR lubricant reservoir can be placed in the fluid cabinet (→ Fig. 2).

It is statically pressurized with compressed air to keep the lubricant pressure in the reservoir constant. This does not, however, consume any compressed air.

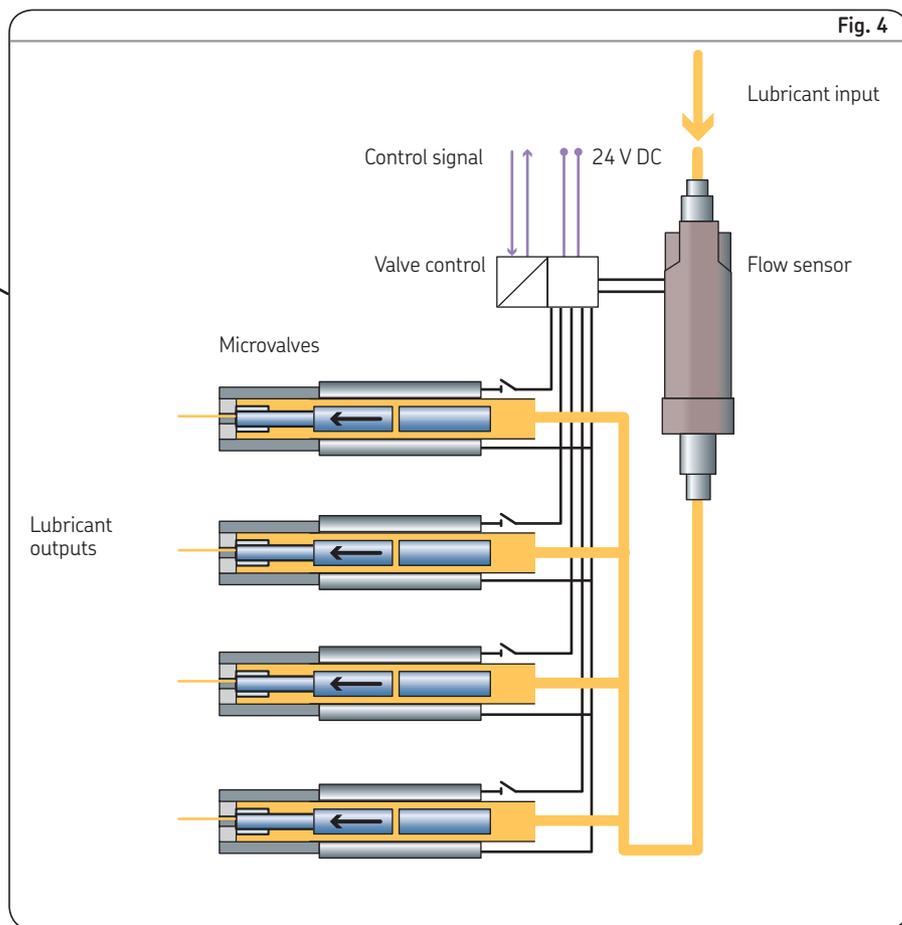
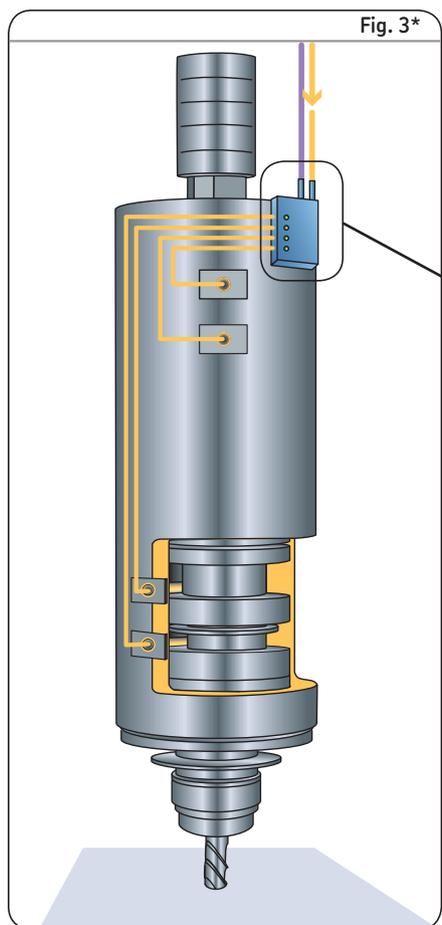


Function

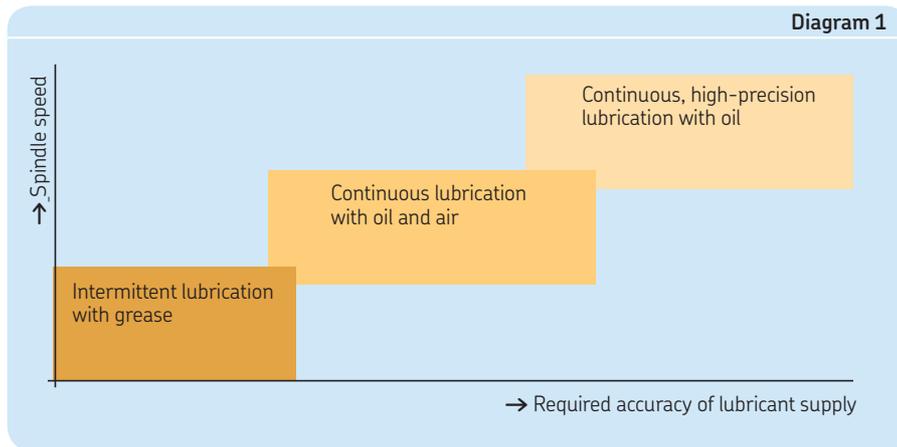
The lubricant is metered by microvalves that generate a homogeneous and nearly continuous volumetric flow when actuated accordingly. The volumetric flow can be individually set to between 0,5 and 5 mm³/min for each lubrication point (→ Fig. 4).

The continuous volumetric flow is monitored by a flow sensor and can be periodically re-adjusted so that it remains constant regardless of external conditions such as pressure, temperature, or viscosity.

Lubricant can also be metered intermittently at longer intervals according to the lubrication task.



Which lubrication system is suitable for which spindle speed?



The performance required of the spindle bearings is only possible in the long-term if combined with a well-designed lubrication solution (→ **Diagram 1**).

Grease-lubricated spindles do not permit maximum speeds as high as spindles with oil lubrication. The lubricant is supplied either once during installation or intermittently by relubrication.

Oil+air lubrication systems that supply an almost continuous oil streak are well suited for high-speed tool spindles.

Lubrication systems that supply minimal quantities of lubricant to bearings nearly continuously and thus eliminate overlubrication and underlubrication are primarily suited for the high-precision lubrication of high-speed spindles with speed factors >2 million n x dm.

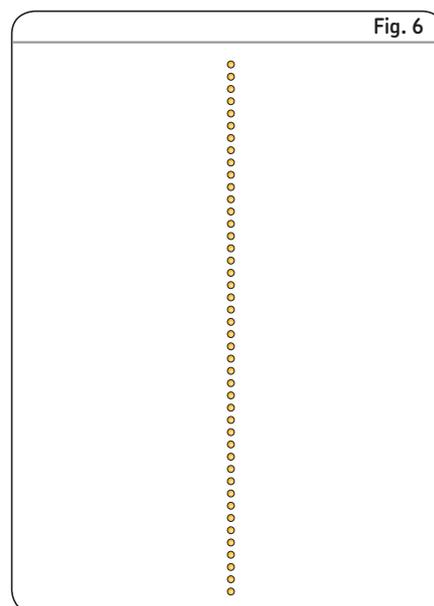
SKF's microdosage system is capable of providing this microdosage. It is characterized both for eliminating air as the carrier medium for the oil and for the very fast response times to changed lubricant re-

quirements. This makes it possible to adjust metering according to load speed at any time during machining processes.

The SKF microdosage system is also well suited for complete machining with a varying range of products.

The integration of MDS into a spindle-machine-system must be planned in closed cooperation with SKF portfolio management.

What is nearly continuous microdosage?



Microdosage, as implemented by SKF in the microdosage method for high-speed bearings, means that the metered quantity of an oil drop (→ **Fig. 5**) is dispersed in a volumetric flow composed of 1 000 microdroplets (→ **Fig. 6**).

The oil microdroplets are thus metered uniformly to provide a nearly continuous volumetric flow and thereby ensure a steady supply of lubricant to the friction points.

Potential savings with the SKF's microdosage system



Table 1

Energy costs for treated compressed air per lubrication point*

Air consumption per lubrication point	[Nm ³ /h]	1	3	6
Costs per hour	[€/h]	0,015	0,045	0,09
Costs per day	[€/d]	0,36	1,08	2,16
Costs per year** (rounded)	[€/a]	130	390	780

* 0,15 €/kWh for 0,1 kW/Nm³

** 8 750 hours per year and lubrication point

In oil+air lubrication, which is widely used for spindle lubrication, a quantity of lubricant metered at a certain frequency is drawn into a streak which then provides a continuous supply of lubricant to a lubrication point. This method is expensive not least due to the costs of supplying compressed air. The operating costs for the required compressed air network are composed of three factors:

- Installation costs
- Maintenance and repair costs
- Energy costs.

The relative importance of the individual factors differs based, among other things, on the number of annual operating hours. Calculations have shown that energy costs are the largest cost factor at 70-90%.

SKF's microdosage system requires compressed air only to statically pressurize the oil in the reservoir, though no air is actually consumed.

Employing lubrication systems that do not consume compressed air may effect significant savings, which make short payback period possible (→ Table 1).

The extremely low quantity of oil used by the system also helps reduce the environmental impact.

The system does not require any expensive special lubricants. Low-viscosity spindle oils such as those typically used in machine tools are suitable for the microdosage system.

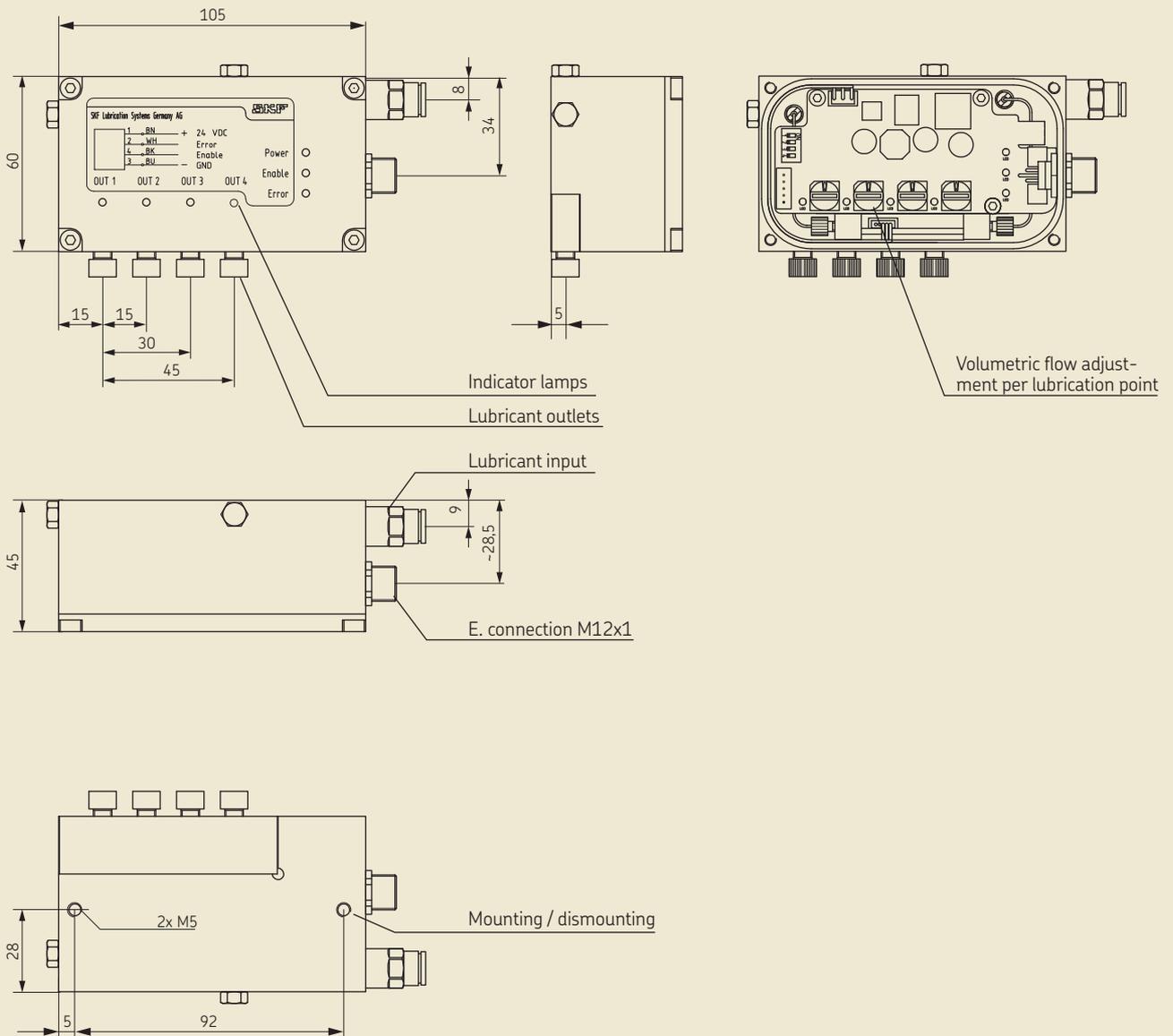
MDU microdosage unit

Technical data

Order number	MDU1-AAAA-000
Dimensions (WxLxD)	105 x 60 x 45 mm
Number of lubricant outlets	4, individually adjustable
Volumetric oil flow per outlet	0,5–5 mm ³ /min
Operating voltage for control unit	24 VDC
Electrical connection	M12x1
Protection class	IP67
Working temperature	10–50 °C
Operating viscosity	20–500 mm ² /s



MDU microdosage unit

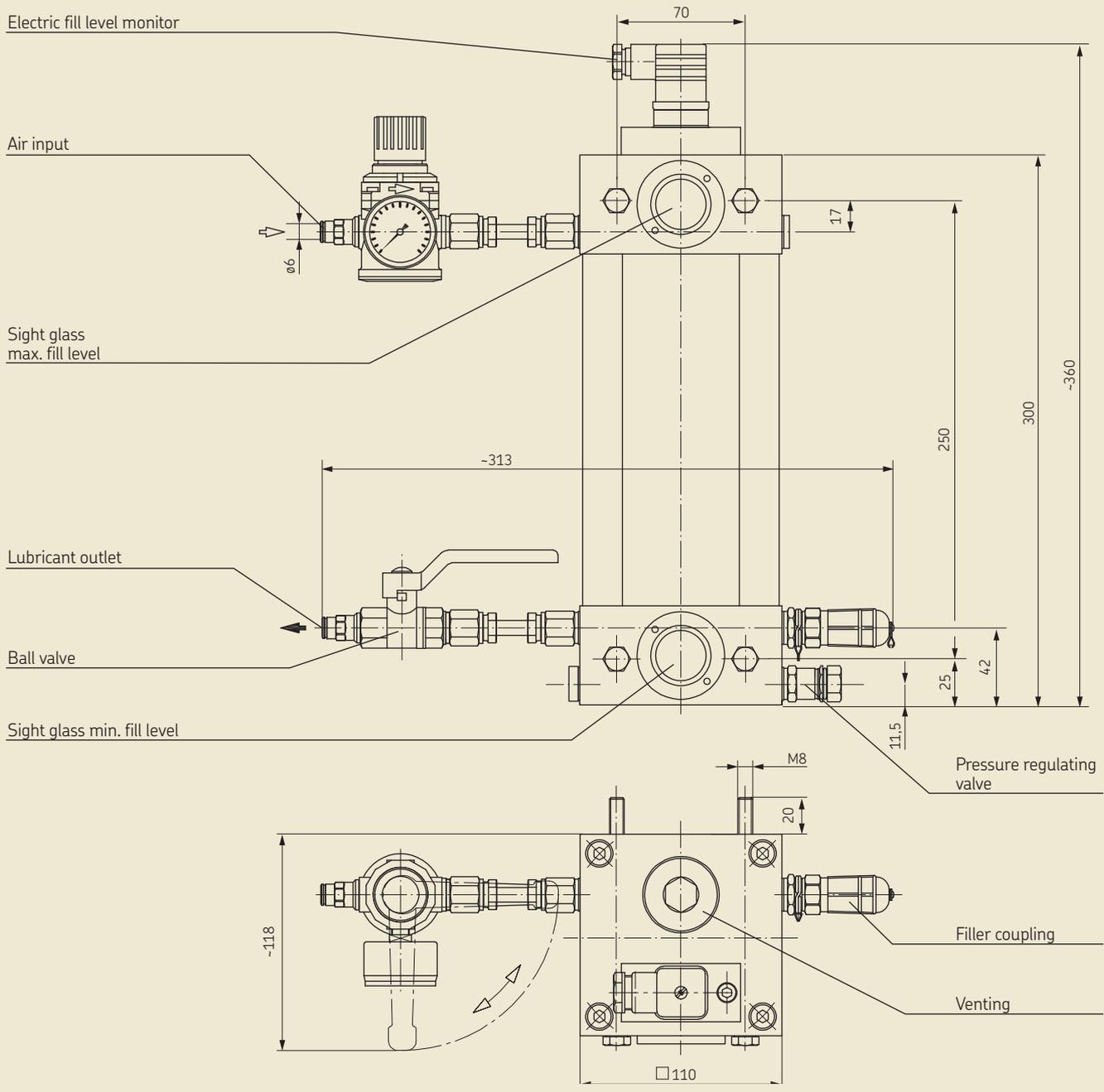


MDR pressurized lubricant reservoir

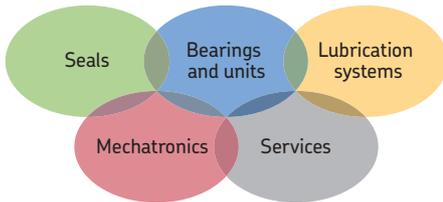


Technical data	
Order number	MDR1-1000-000
Dimensions (WxDxH)	110 x 192 x 393 mm
Capacity	1 Liter
Fill level monitoring in reservoir	24 V DC
Priming pressure generation	4-8 bar (compressed air)
Reservoir pressure	4 bar
Working temperature	10-50 °C
Operating viscosity	20-500 mm ² /s

MDR lubricant reservoir



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The Power of Knowledge Engineering

Drawing on five areas of competence and application-specific expertise amassed over more than 100 years, SKF brings innovative solutions to OEMs and production facilities in every major industry worldwide. These five competence areas include bearings and units, seals, lubrication systems, mechatronics (combining mechanics and electronics into intelligent systems), and a wide range of services, from 3-D computer modelling to advanced condition monitoring and reliability and asset management systems. A global presence provides SKF customers uniform quality standards and worldwide product availability.

! Important information on product usage

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 (1 013 mbar) 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.

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