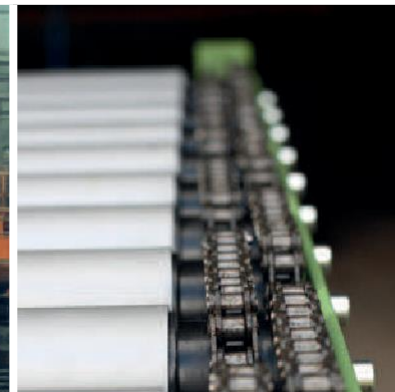
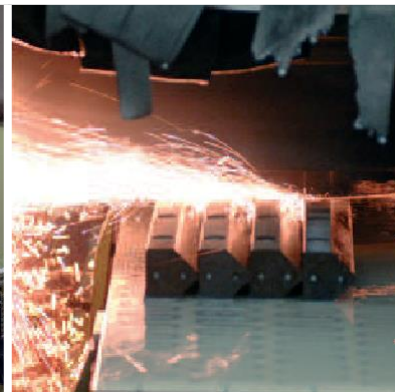
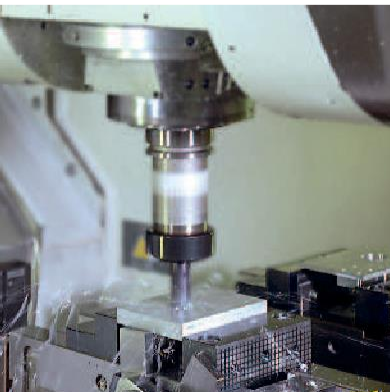
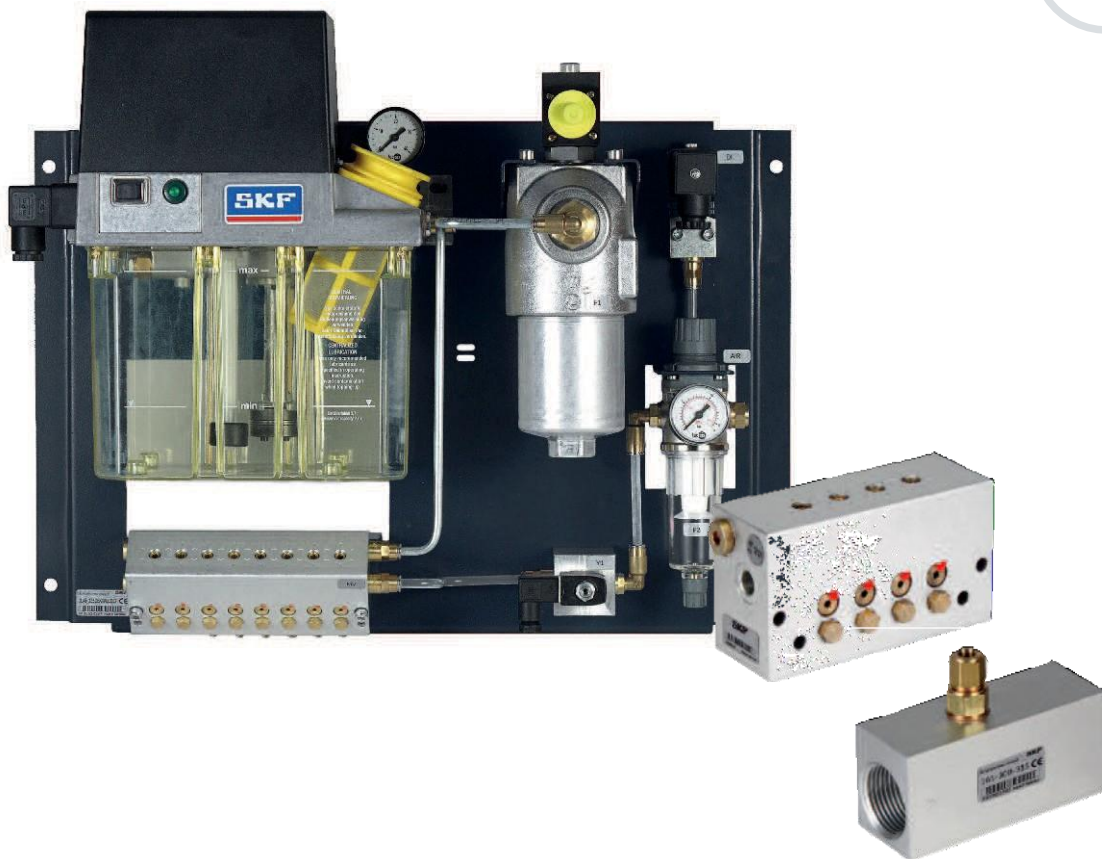


SKF Oil+Air Lubrication Units and Mixing Valves

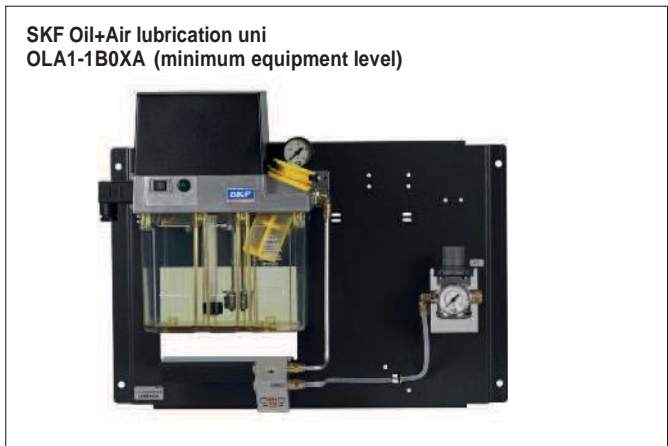
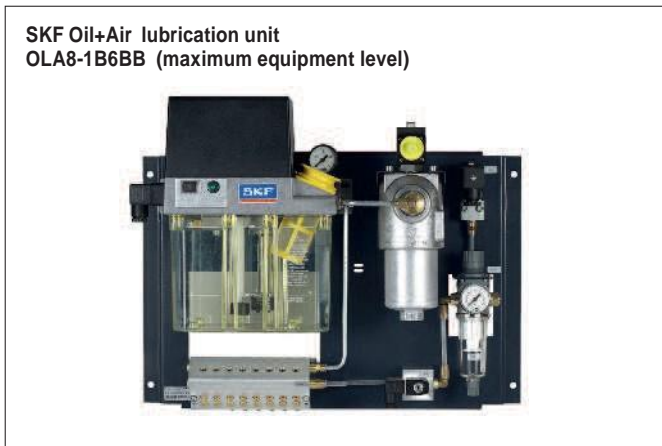
# Product Series OLA, MV and 161

For use in SKF Oil+Air Centralized Lubrication Systems



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# SKF Oil+Air Lubrication Units and Mixing Valves

SKF Oil+Air lubrication units are employed for a wide range of applications in the field of centralized lubrication technology. The main field of application is mechanical engineering due to the high demands made on a defined lubrication system that provides high availability with low wear and a long service life. SKF Oil+Air lubrication units are employed for bearing lubrication, especially the lubrication of spindle bearings. Additional fields of application include the lubrication of chains, gear trains, and process oiling. SKF Oil+Air lubrication units can be individually configured for each application.

## Advantages

- Better machining performance in spindle bearing lubrication due to higher speed factors (on spindle bearings, up to approx.  $2,5 \times 10^6$  mm × rpm)
- Higher dependability due to continuous supply of defined quantities of lubricant; sealing air provided by the system protects the bearings against outside contamination
- Less lubricant – as much as needed, as little as possible – for greater safety and environmental protection; demand-based metering for each lubrication point, with approximately 90% lower lubricant consumption compared to oil lubrication; no oil mist, no repack period compared to grease lubrication

## Fields of application

- Bearing lubrication, especially of spindle bearings
- Chain lubrication
- Gear train lubrication
- Slideway lubrication
- Assembly and process oiling

Product selection table

Product series	Material Seal	Material Housing	Actuating pressure [bar]		Number of outlets	Metered quantities [cm <sup>3</sup> /cycle]						Page
			Air	Oil		0,01	0,02	0,03	0,06	0,10	0,16	
OLA1-1	NBR	–	3-10	30	1	•	•	•	•	•	•	8-12
OLA2-1	NBR	–	3-10	30	2	•	•	•	•	•	•	8-12
OLA3-1	NBR	–	3-10	30	3	•	•	•	•	•	•	8-12
OLA4-1	NBR	–	3-10	30	4	•	•	•	•	•	•	8-12
OLA5-1	NBR	–	3-10	30	5	•	•	•	•	•	•	8-12
OLA6-1	NBR	–	3-10	30	6	•	•	•	•	•	•	8-12
OLA7-1	NBR	–	3-10	30	7	•	•	•	•	•	•	8-12
OLA8-1	NBR	–	3-10	30	8	•	•	•	•	•	•	8-12
<b>Mixing valves with metering</b>												
MV2(3)01-1	NBR / FPM	Aluminium	3-10	17-40	1	•	•	•	•	•	•	13-14
MV2(3)02-1	NBR / FPM	Aluminium	3-10	17-40	2	•	•	•	•	•	•	13-14
MV2(3)03-1	NBR / FPM	Aluminium	3-10	17-40	3	•	•	•	•	•	•	13-14
MV2(3)04-1	NBR / FPM	Aluminium	3-10	17-40	4	•	•	•	•	•	•	13-14
MV2(3)05-1	NBR / FPM	Aluminium	3-10	17-40	5	•	•	•	•	•	•	13-14
MV2(3)06-1	NBR / FPM	Aluminium	3-10	17-40	6	•	•	•	•	•	•	13-14
MV2(3)07-1	NBR / FPM	Aluminium	3-10	17-40	7	•	•	•	•	•	•	13-14
MV2(3)08-1	NBR / FPM	Aluminium	3-10	17-40	8	•	•	•	•	•	•	13-14
161-300-338	NBR	Aluminium	3-10	12-45	1	–	–	•	•	•	–	15
161-300-339	NBR	Aluminium	3-10	12-45	1	–	–	•	•	•	–	15
<b>Mixing valves without metering</b>												
161-300-313	NBR	Aluminium	3-10	3-40	1	–	–	–	–	–	–	16
161-300-315	NBR	Aluminium	3-10	3-40	1	–	–	–	–	–	–	16
MV21	NBR	Aluminium	max 10	5	1	–	–	–	–	–	–	17
MV32	NBR	Aluminium	max 10	5	2	–	–	–	–	–	–	17
MV33	NBR	Aluminium	max 10	5	3	–	–	–	–	–	–	17
MV34	NBR	Aluminium	max 10	5	4	–	–	–	–	–	–	17
MV35	NBR	Aluminium	max 10	5	5	–	–	–	–	–	–	17
MV36	NBR	Aluminium	max 10	5	6	–	–	–	–	–	–	17
MV37	NBR	Aluminium	max 10	5	7	–	–	–	–	–	–	17
MV38	NBR	Aluminium	max 10	5	8	–	–	–	–	–	–	17

# SKF Oil+Air lubrication systems

## Fundamentals

Oil+air lubrication systems SKF Oil+Air lubrication systems are employed for bearing lubrication, especially the lubrication of spindle bearings

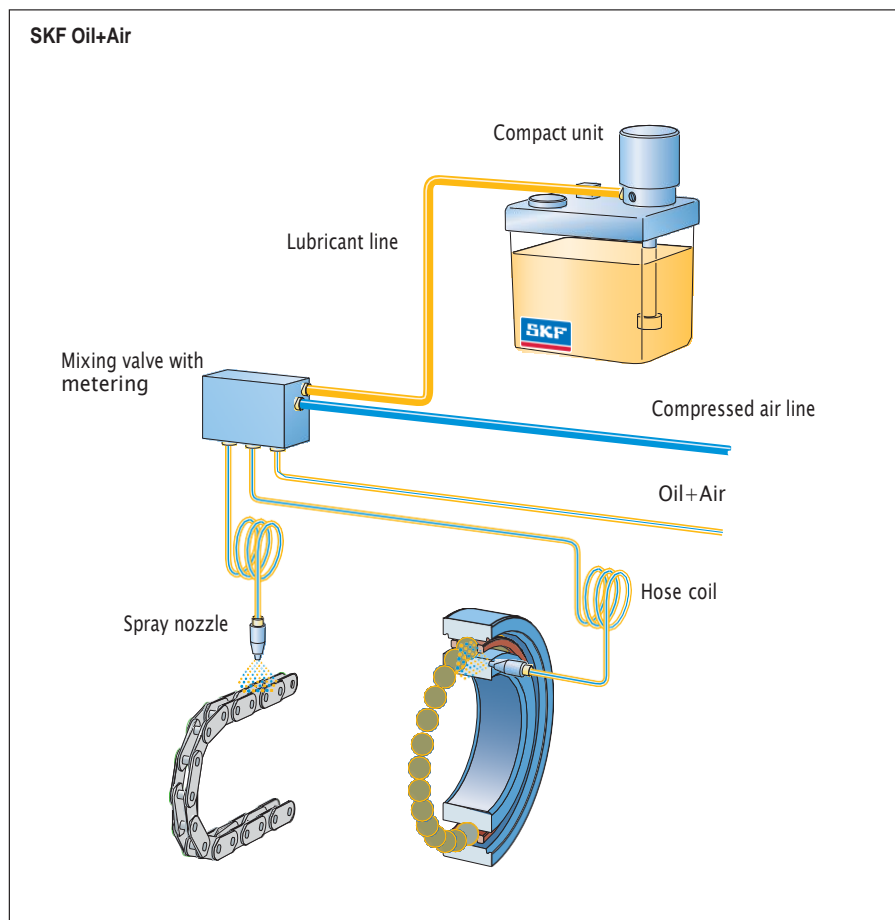
Additional fields of application include the lubrication of chains, gear trains, and process oiling Oil+air lubrication is distinguished by the fact that a metered quantity of oil is drawn into streaks in a lubrication line by a continuous air flow (compressed air) and is transported in the direction of the compressed air flow along the tube wall and to the lubrication point A lubrication unit, a progressive distributor, or a single-line distributor pumps a defined quantity of lubricant to a mixing valve There, an air flow feeds the lubricant through the secondary line and to the lubrication point in the form of oil streaks The bearing or chain is thus continuously supplied with a flow of lubricant and air The air flow introduced creates overpressure in the bearing assembly and prevents the ingress of contaminants This form of lubrication typically does not form an oil mist

Oil-streak sensors can be employed for monitoring in SKF Oil+Air lubrication systems Oil-streak sensors continuously monitor the oil flow in the secondary line Oil+air lubrication units can be configured individually for each application

## Components of oil+air lubrication systems

- Gear pump unit with oil pressure switch and fill level switch in design with a control unit (IG54-20-S4-I) and without
- Oil+air mixing valves with metering
- Mixing valves and lubricant distributors for external lubricant metering
- Air control valve with and without air filter
- Pressure switch for monitoring compressed air
- Oil filter with and without contamination monitoring
- 3/2 directional control valve for switching compressed air on and off
- Oil-streak sensor GS4011 (➔ brochure 1-1704-EN)

SKF Oil+Air lubrication systems can be ordered either as a complete oil+air lubrication unit (gear pump unit, oil+air mixing valve, and optional accessories installed on mounting plate) or as individual components (gear pump unit, oil+air mixing valve, lubricant distributor, and accessories individually)



# SKF Oil+Air lubrication systems

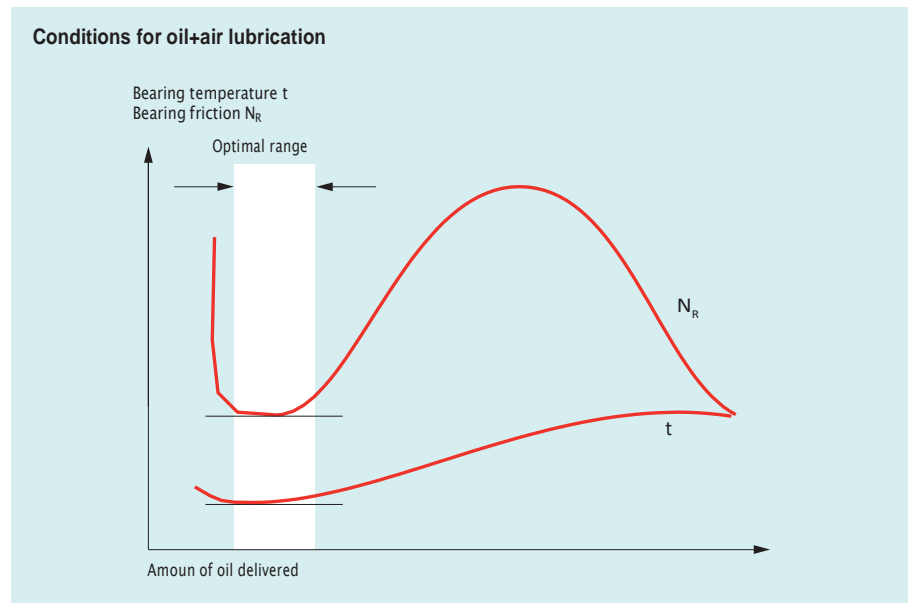
## Fundamentals

### Principles of oil+air lubrication - example: rolling bearings

Many fields of engineering require that the speeds of spindles and shafts on rolling bearings increase beyond the limits cited in rolling bearing catalogs, e.g. in the case of bearings for grinding and milling spindles to increase cutting speeds. Beyond the design and construction of the bearing, another critical aspect of meeting this requirement is the selection of a suitable lubrication system. Conventional lubrication systems (e.g. oil bath lubrication or circulating-oil lubrication), for which the values in rolling bearing catalogs were prepared, fail in such cases because friction-related losses, and thus the temperature, rise beyond permissible limits due to hydrodynamic losses in the lubricant. In a circulating-oil lubrication system with simultaneous cooling of the lubricant, it may be possible to reduce the temperatures, but higher power losses and greater machine-/seal-related complexity would have to be endured. The diagram on this page shows that the best values in respect to bearing friction ( $N_R$ ) and bearing temperature ( $t$ ) are achieved with a minimal supply of oil.

The required low lubricant quantities can be best fed to the bearings using the principle of oil+air lubrication, as this lubrication system allows for precise metering of lubricant quantities. In the case of oil-mist lubrication, however, it is hardly possible to supply individual bearings on a reliable and constant basis with the small quantities required because oil-mist lubrication is too imprecise in lubricant metering and feeding. Permanent grease lubrication is well suited and often employed. However, the limit on speed factors achievable using permanent grease lubrication is significantly lower than with oil+air lubrication.

The limit for permanent grease lubrication can generally be assumed as a speed factor  $n \times d_m$  of  $< 1$  to  $1,5 \times 10^6 \text{ mm} \times \text{rpm}$ , depending on the bearing type and the grease used. Further, the grease change intervals must be adhered to when using permanent grease lubrication; these are eliminated in oil+air lubrication. For higher speed characteristics, oil+air lubrication is therefore an appropriate system that can, of course, also be used when low speed characteristics are involved.



### Lubricant quantities

The amount of lubricant required to lubricate a bearing depends on the type of bearing, number of rows, width, etc. In principle, the bearing manufacturer should be contacted when determining the quantity of lubricant for a bearing. The literature contains the following formula to calculate approximate oil requirements:

$$Q = w \times d \times B$$

$Q$  = quantity in  $\text{mm}^3/\text{h}$

$w$  = coefficient =  $0,01 \text{ mm}/\text{h}$

$d$  = internal bearing diameter in mm

$B$  = bearing width in mm

In practice, however, the values obtained with this formula had to be increased 4- to 20-fold. That shows quite clearly that the actual amount of lubricant per bearing has to be empirically determined for each specific case. In tests, lubricant quantities of  $120$  to  $180 \text{ mm}^3/\text{h}$  have proven to be favorable, for example, for spindle bearings.

# SKF Oil+Air lubrication systems

## Fundamentals

### Requirements for compressed air

Compressed air must be dry and filtered; filter rating of  $\leq 5 \mu\text{m}$ . A conventional water separator, preferably with semi-automatic emptying, is sufficient for water separation. The quantity of air required for faultless transport of the oil in tubing with an internal diameter of 2.3 mm ranges from roughly 1.000 to 1.500 l/h. This value applies to oil viscosity classes ISO VG 32 to ISO VG 100. Higher values must be assumed in the case of oils with a higher viscosity or different adhesiveness. The air pressure has to be adjusted so that this amount can be put through every line, with due consideration given to pressure losses in the line and storage of the quantity involved. The air pressure available at the unit's inlet port (supply system) should be at least 3 bar or preferably 6 bar.

### Requirements for lubricant

Oils belonging to ISO grades VG 32 to VG 100 have proven to be very suitable. Oils with EP additives are particularly recommended when high loads and low speeds are involved. Oils with a viscosity lower than ISO VG 22 should be avoided, since the load-carrying capacity might no longer suffice in the event of large loads, resulting in shorter bearing life. Oils with a higher viscosity can be used. Oils containing molybdenum disulphide additives should not be used, however, since with these oils there is a risk that molybdenum disulphides will deposit on the nozzle holes and block them. Moreover, the bearing clearance can be critically diminished due to plating with molybdenum disulphide particles.

Pressurized air control valve with air filter and water separator



# SKF Oil+Air lubrication systems

## Fundamentals

### Lubricant feeding (criteria, bearing type, etc )

The way the lubricant is fed to the bearing depends on the bearing type and the bearing assembly's design features. The following illustrations provide examples of the lubricant feeding (Fig 1)

In case of single-row rolling bearings, it is possible for the lubricant to be introduced into the rolling bearing from the side. The nozzle should be at the level of the rolling bearing's inner ring. Under no circumstances should the oil+air flow be aligned directly with the cage of the rolling bearing. If using rolling bearings that exert pumping force in one direction (e.g. angular contact bearings), the lubricant must be fed in the direction of pumping force. In case of double-row cylindrical roller bearings, the lubricant should be introduced into the rolling bearing from the side at the level of the outer ring raceway. The lubricant is then distributed almost uniformly to both rows of rolling bearings. On rolling bearings with a diameter from 150 to 280 mm, it is recommended that a second nozzle be installed, with a corresponding increase in case of larger rolling bearing diameters. A single nozzle is sufficient for most applications in which the lubricant is fed through the outer ring of a rolling bearing. The lubricant should be introduced into the bearing assembly via a nozzle whose length depends on the bearing size. Suitable

nozzles can be ordered from SKF Lubrication Systems Germany GmbH

It is also possible to introduce the lubricant directly into the outer ring of the rolling bearing via a bore (Fig 2)

In this case, it must be assured that the lubricant is not introduced into the pressure zone of the rolling bearing between the rolling element and the bearing ring

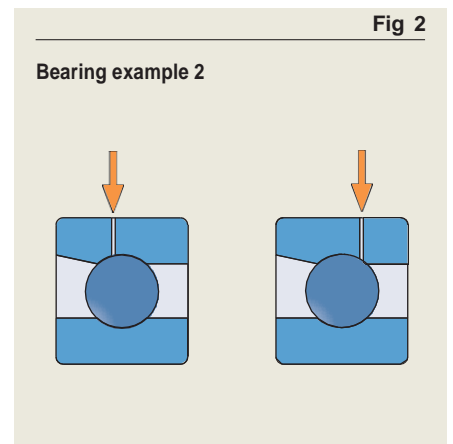
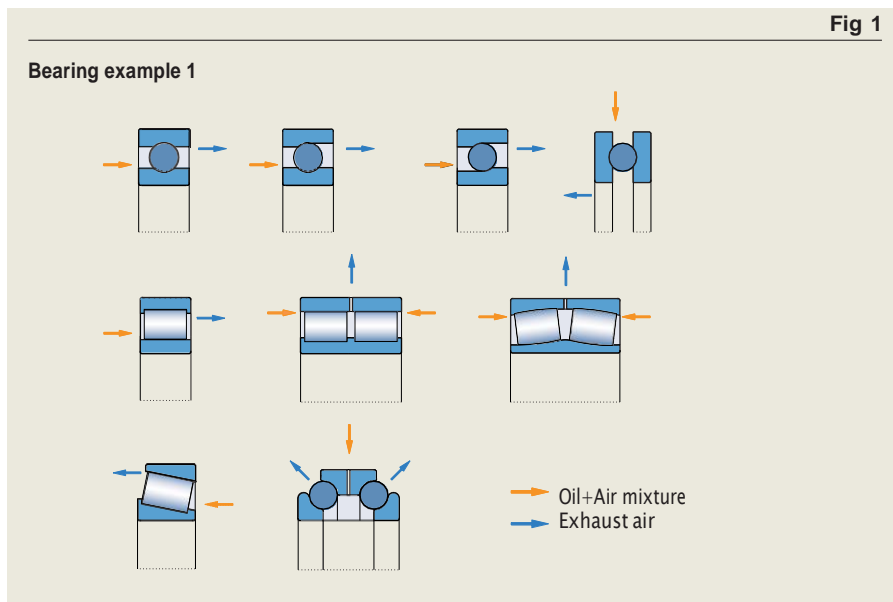
A drain must be provided for the delivered lubricant to keep an oil sump from forming in the lower portion of the bearing. This drain bore must have a diameter of at least 5 mm

The indicated air pressure is generally enough to reliably overcome the air vortex produced by rolling bearings. If in individual cases a higher air pressure is required to reliably feed the lubricant, this does not impair the function of the entire oil+air lubrication unit

Secondary lines made of transparent plastic are recommended so that the lubricant transport in the secondary lines (oil-shear formation) can be assessed visually. Secondary lines made of transparent plastic are available in rigid (unplasticized) and flexible (plasticized) designs. The minimum length of the secondary line is 1 m

The maximum length is 10 m. A hose coil is installed approximately 0,3 m in front of the bearing assembly and serves as a lubricant reservoir. If the distance between the oil+air lubrication unit and the bearing is less than 1 m, the secondary line must be laid as a coil. After the compressed air is turned off, the lubricant distributed in the hose coil collects in the lower coils; this ensures that the bearing is supplied with lubricant again shortly after the compressed air is turned back on. The center axis of the hose coil should always be laid horizontally or up to a maximum inclination of 30°. The secondary lines may be laid at an upward or downward angle. Avoid changes in the cross-section of the secondary 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

SKF oil-streak sensors are recommended for monitoring the continuous lubricant flow in the secondary lines. Oil-streak sensors allow monitoring of the oil-streak transport along the course of the lubrication line between the oil+air metering unit or the mixing valve and the lubrication point



# SKF Oil+Air lubrication unit – OLA

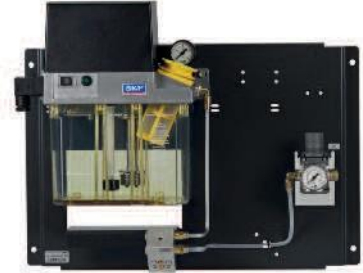
## Designs

**Note**  
 This page shows possible designs of the oil+air lubrication units  
 The configurator on the following page allows the functional specification of a unit with associated order number

Maximum design



Minimal design



Oil filters with monitoring



Oil filters without monitoring



Gear pump unit with control unit



Gear pump unit without control unit



Pressure switch for minimum air pressure



Compressed air control valve with air filter and water separator



Mixing valve with metering



Air control valve without air filter



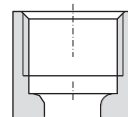
3/2 directional air control valve



SKF plug connectors



Counterbore for solderless tube union for tube diam  $\varnothing$ 4 mm





# SKF Oil+Air Lubrication unit – OLA

## Configurator

<b>Order coder</b>	O	L	A	-	1																
<b>Product series</b>																					
<b>Number of metering points</b>																					
1 = 1 metering point	5 = 5 metering points																				
2 = 2 metering points	6 = 6 metering points																				
3 = 3 metering points	7 = 7 metering points																				
4 = 4 metering points	8 = 8 metering points																				
<b>Design of gear pump unit</b>																					
A = with IG54 control unit, 24 V DC	D = without control unit, 24 V DC																				
B = with IG54 control unit, 230 V AC	E = without control unit, 230 V AC																				
C = with IG54 control unit, 115 V AC	F = without control unit, 115 V AC																				
<b>Design of air filter / valve <sup>1)</sup></b>																					
0 = without air filter, without valve																					
1 = without air filter, with 3 / 2 directional control, 24 V DC																					
2 = without air filter, with 3 / 2 directional control valve, 230 V AC, 50 Hz																					
3 = without air filter, with 3 / 2 directional control valve, 120 V AC, 60 Hz																					
4 = with 5 µm air filter, without valve																					
5 = with 5 µm air filter and 3 / 2 directional control valve, 24 V DC																					
6 = with 5 µm air filter and 3 / 2 directional control valve, 230 V AC, 50 Hz																					
7 = with 5 µm air filter and 3 / 2 directional control valve, 120 V AC, 60 Hz																					
<b>Design of oil filter</b>																					
X = without oil filter	C = with 10 µm oil filter, without monitoring																				
A = with 3 µm oil filter, without monitoring	D = with 10 µm oil filter, with monitoring																				
B = with 3 µm oil filter, with monitoring																					
<b>Design of pressure switch for minimum air pressure</b>																					
A = without pressure switch (compressed air must be monitored by compressed air system)																					
B = pressure switch preset to 3 bar <sup>2)</sup>																					
<b>Metered quantity (only possible complete or completely without SKF plug connector)</b>																					
X = Metering point plugged <sup>3)</sup>																					
0 = No metering point available																					
1 = 0,01 cm <sup>3</sup> /cycle with counterbore for solderless tube union	A = 0,01 cm <sup>3</sup> /cycle with SKF plug connector																				
2 = 0,02 cm <sup>3</sup> /cycle with counterbore for solderless tube union	B = 0,02 cm <sup>3</sup> /cycle with SKF plug connector																				
3 = 0,03 cm <sup>3</sup> /cycle with counterbore for solderless tube union	C = 0,03 cm <sup>3</sup> /cycle with SKF plug connector																				
4 = 0,06 cm <sup>3</sup> /cycle with counterbore for solderless tube union	D = 0,06 cm <sup>3</sup> /cycle with SKF plug connector																				
5 = 0,10 cm <sup>3</sup> /cycle with counterbore for solderless tube union	E = 0,10 cm <sup>3</sup> /cycle with SKF plug connector																				
6 = 0,16 cm <sup>3</sup> /cycle with counterbore for solderless tube union	F = 0,16 cm <sup>3</sup> /cycle with SKF plug connector																				

Metering point 1-8  
(0 = not available)

1) The compressed-air valve must be wired by the customer. It can be wired to the internal control unit (if present) or to the machine's PLC. If wiring to the internal control unit, ensure that the operating voltage of the control unit matches the switching voltage of the compressed-air valve. The compressed-air valve may otherwise be damaged.

2) The pressure switch is wired at the factory to the internal control unit (if present). Wiring must be performed by the customer if no control unit is present or the pressure switch is to be connected to the machine's PLC.

3) without metering point (with a screwed blanking plug)

### Order example

**OLA1-1E0XA30000000**

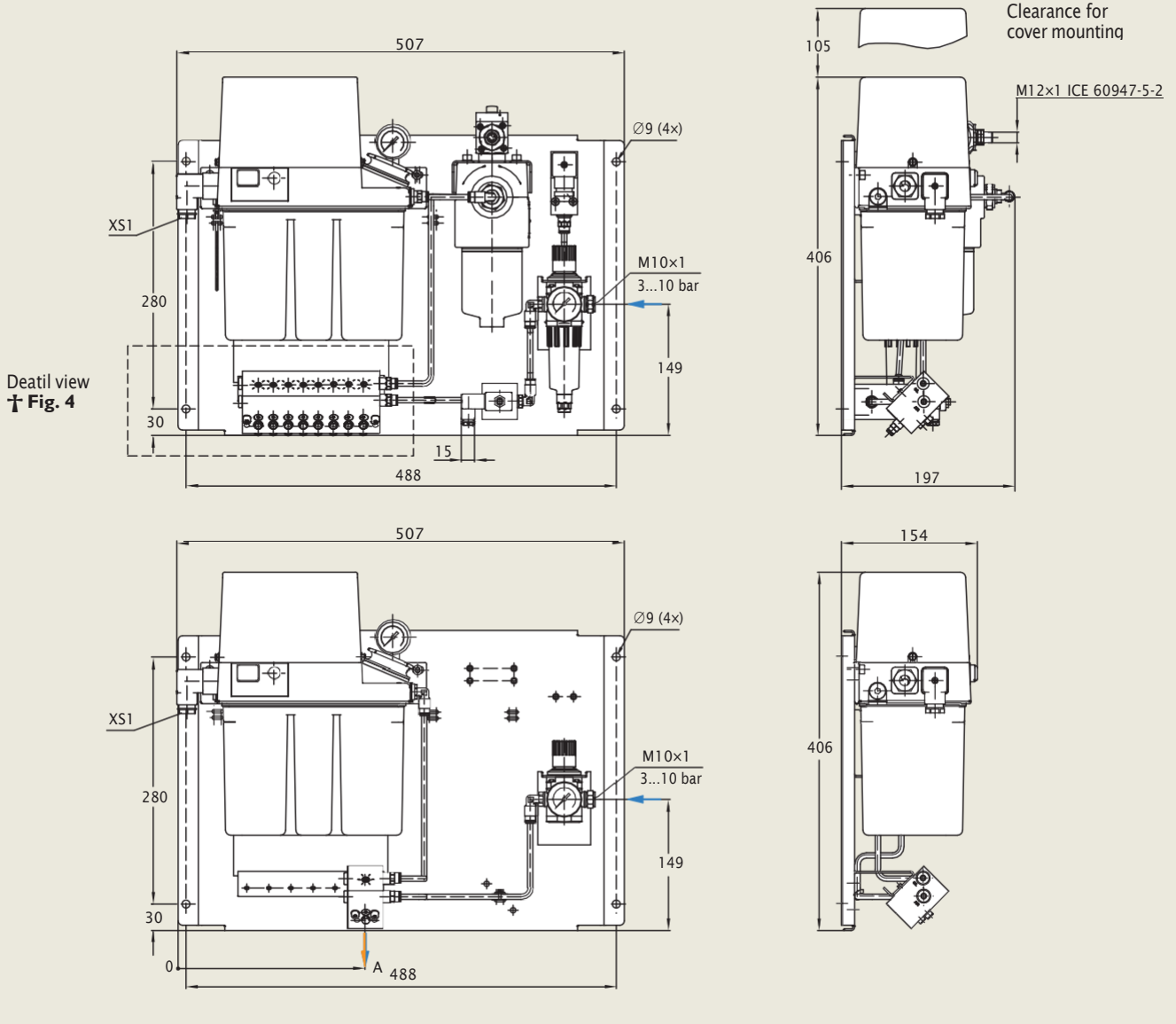
- Product series OLA
- One metering point
- Without control unit, 230 V AC
- Without air filter, without valve
- Without oil filter
- Without pressure switch for minimum air pressure
- Metered quantity 0,03 cm<sup>3</sup>/cycle

# SKF Oil+Air lubrication unit – OLA

## Dimensions

Fig 3

Maximum and minimum equipment levels



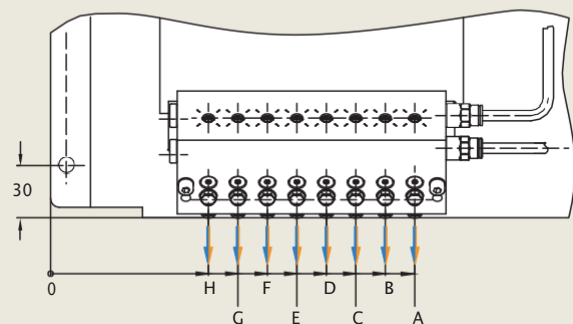
Detail view  
† Fig. 4

Fig 4

Dimensions of oil-air mixing valve with metering

	A	B	C	D	E	F	G	H
OLA1	212	-	-	-	-	-	-	-
OLA2	209	192	-	-	-	-	-	-
OLA3	205	188	171	-	-	-	-	-
OLA4	201	184	167	150	-	-	-	-
OLA5	197	180	163	146	129	-	-	-
OLA6	206	189	172	155	138	121	-	-
OLA7	202	185	168	151	134	117	100	-
OLA8	210	193	176	159	142	125	108	91

Detail view of oil-air mixing valve with metering



# SKF Oil+Air lubrication unit – OLA

## Technical data

### Gear pump unit <sup>1)</sup>

Delivery rate of unit <sup>2)</sup>	0,2 l / min
Number of metering points	1 to 8 (>8 on request)
Max operating pressure	30 bar
Ambient temperature	+10 to +40 °C
Pumped medium	Mineral or synthetic oil, compatible with NBR elastomers
Operating viscosity	20 to 1 500 mm <sup>2</sup> / s
Rated capacity of lubricant reservoir	3 l (others on request)
Lubricant reservoir material	Polyamide (PA6)
Protection class	IP54
Pressure relief valve	Included
Thermal circuit breaker	Included
Duty type (per VDE 0530)	Standard design: S3, ON-time 20% (1 25 to 25 min)
Mounting position	Vertical

<sup>1)</sup> techn. Daten des Öl+Luft-Mischventils MV20x †Seite 13

<sup>2)</sup> bezogen auf eine Ölviskosität von 140 mm<sup>2</sup>/s bei einem Gegendruck von 5 bar

### Oil pressure switch (included in gear pump unit)

Function	NO-contact
Switching voltage range	10 to 25 V AC; 10 to 36 V DC
Switched current (resistive load)	≤ 1 A
Switching capacity (resistive load)	≤ 10 W
Nominal pressure	20 bar

### Pressure switch for minimum air pressure

Function <sup>1)</sup>	NC-contact NO-contact
Switching pressure	0,5 to 5 bar (preset to 3 bar)
Max switching voltage	250 V
Max switched current	5 A
Reset differential	Approx 15%

<sup>1)</sup> Depending on wiring

### Motor (gear pump unit)

Rated frequency [Hz]	50	60	
Rated voltage	115 / 230 V AC	115 / 230 V AC	24 V DC
Rated current [A]	1,06 / 0,53	1,36 / 0,68	1,6
Starting current [A]	–	–	4
Power [W]	60	75	39

### 3/2-directional air control valve

Switching voltage	120 V AC, 60 Hz; 230 V AC, 50 Hz; 24 V DC
Switching capacity	4 W
Plug connector	DIN EN 175301-803-C
Pressure range	0 to 10 bar

### Oil filter

Filter mesh	3 µm or 10 µm
Contaminant capture	6,3 g at Δp = 5 bar (3µm) 5,2 g at Δp = 5 bar (10µm)

### Oil contamination indicator (optionally installed on oil filter)

Function	NC contact = alarm 100%; NO-contact = pre-warning 75%
Max switching voltage	24 V AC/DC
Max switching capacity	15 W
Breaking capacity (resistive load)	1 A (at 15 V AC/DC)
Opening pressure	Δ5 bar -10%

### Fill level switch (included in gear pump unit)

Function	NC-contact (opens when fill level too low)
Switching voltage range	10 to 25 V AC; 10 to 36 V DC
Switched current (resistive load)	≤ 0,25 A
Switching capacity (resistive load)	≤ 3 W

### Air pressure control valve

Type	Diaphragm regulator
Max primary pressure	0-16 bar
Secondary pressure	0,5-10 bar
Sealing material	NBR

### Air pressure control valve incl filter and water separator

Filter mesh	5 µm
Water separation	semi-automatic

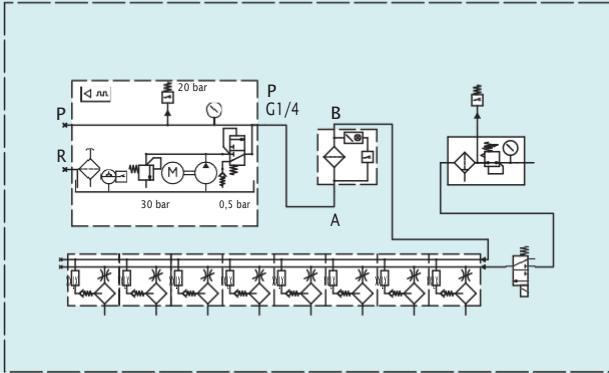
### IG54-20-S4-I control unit (optionally in gear pump unit)

Rated voltage	115 / 230 V AC (50 / 60 Hz) selectable; 24 V DC
Pump runtime limit	60 s (non-adjustable)
Interval time	10 min (adjustable from 1 to 99 min)
Pump dwell time	5 s (adjustable from 0 to 99 seconds)
Pre-lubrication cycles	10 (adjustable from 0 to 99 cycles)

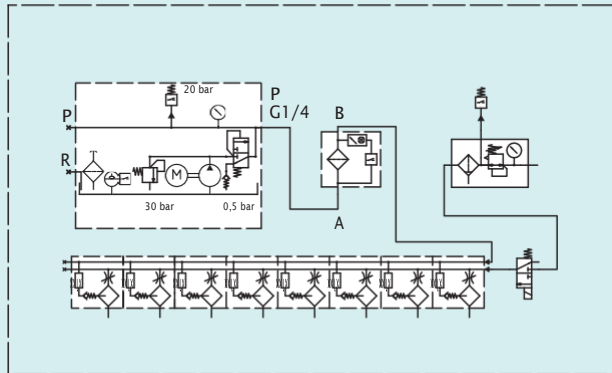
# SKF Oil+Air lubrication unit – OLA

## Hydraulic layouts

Oil+air lubrication unit with control unit



Oil+air lubrication unit without control unit

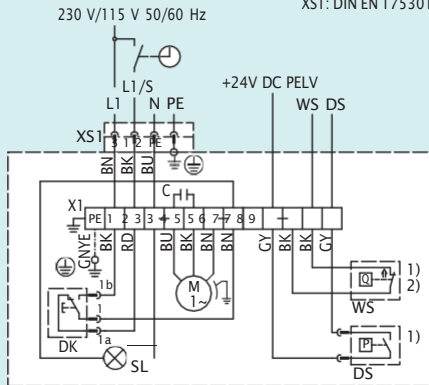


## Wiring diagrams

### Design of gear pump unit

Design E / F  
MKU2-12BC11000+428 /+429

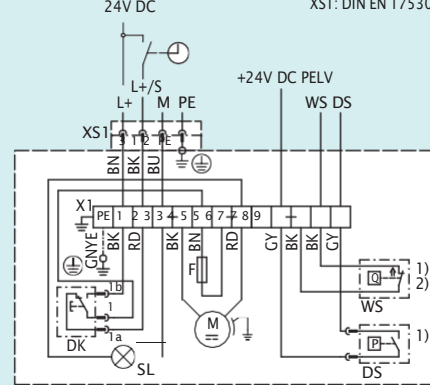
Connector  
XS1: DIN EN 175301-803 A



- 1) optional
- 2) optional: Kontakt schließt bei minimalem Füllstand

Design D  
MKU2-12BC11000+924

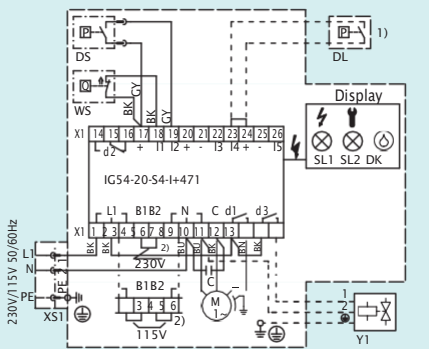
Connector  
XS1: DIN EN 175301-803 A



- 1) optional
- 2) optional: Kontakt schließt bei minimalem Füllstand

Design B / C  
MKL2-12FC11000+428 /+429

Connector  
XS1: DIN EN 175301-803 A

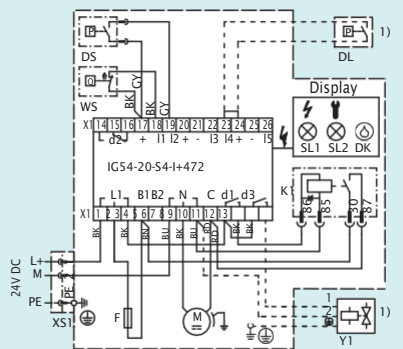


- 1) Connected by customer to internal control unit (if present) or external PLC  
Compressed-air valve minimum air pressure (DL), compressed-air valve Y1
- 2) The control unit can be switched between 230 V and 115 V AC  
The pump motor is not switchable!

X1:16 Malfunction or completion of pre-lubrication cycles  
X1:14 Normal operation

Design A  
MKL2-12FC11000+924

Connector  
XS1: DIN EN 175301-803 A



- 1) Connected by customer to internal control unit (if present) or external PLC  
Compressed-air valve minimum air pressure (DL), compressed-air valve Y1

X1:16 Malfunction or completion of pre-lubrication cycles  
X1:14 Normal operation

# SKF Oil+Air mixing valves with metering – MV...-1..

## Designs

The MV20x-1 and MV30x-1 are oil+air mixing valves with metering They are built in block design and contain up to eight secondary line connections

The lubricant metering is selectable in a range of 0,01-0,16 cm<sup>3</sup> for each lubrication point

Secondary line connections which are not needed can be plugged This involves screwing an appropriate metering screw for zero metering into the mixing valves

The MV20x-1 design contains an air adjustment screw for setting the quantity of compressed air The quantity of compressed air cannot be adjusted on the MV30x-1 design The secondary line connections on both designs are available with SKF plug connectors or fittings for solderless tube unions for tube Ø4 mm Another oil+air mixing valve must be provided if more than eight lubrication points will be supplied In this case, the compressed air must be fed separately to each mixing valve

MV204-1



## Configurator

<b>Order code</b>	M	V				-	1											
<b>Product series</b>									1 2 3 4 5 6 7 8									
<b>Adjustability of air metering</b>																		
20 = Adjustable																		
30 = Not adjustable																		
<b>Number of metering points</b>																		
1 = 1 metering point																		
2 = 2 metering points																		
3 = 3 metering points																		
4 = 4 metering points																		
5 = 5 metering points																		
6 = 6 metering points																		
7 = 7 metering points																		
8 = 8 metering points																		
<b>Seal type</b>																		
00 = NBR																		
S8 = FKM (FPM)																		
<b>Metered quantity (only possible complete or completely without SKF plug connector)</b>																		
X = Metering point plugged <sup>1)</sup>																		
0 = No metering point available																		
1 = 0,01 cm <sup>3</sup> /cycle with counterbore for solderless tube union																		
2 = 0,02 cm <sup>3</sup> /cycle with counterbore for solderless tube union																		
3 = 0,03 cm <sup>3</sup> /cycle with counterbore for solderless tube union																		
4 = 0,06 cm <sup>3</sup> /cycle with counterbore for solderless tube union																		
5 = 0,10 cm <sup>3</sup> /cycle with counterbore for solderless tube union																		
6 = 0,16 cm <sup>3</sup> /cycle with counterbore for solderless tube union																		
A = 0,01 cm <sup>3</sup> /cycle with SKF plug connector																		
B = 0,02 cm <sup>3</sup> /cycle with SKF plug connector																		
C = 0,03 cm <sup>3</sup> /cycle with SKF plug connector																		
D = 0,06 cm <sup>3</sup> /cycle with SKF plug connector																		
E = 0,10 cm <sup>3</sup> /cycle with SKF plug connector																		
F = 0,16 cm <sup>3</sup> /cycle with SKF plug connector																		

Dosterstelle 1-8  
(0 = nicht vorhanden)

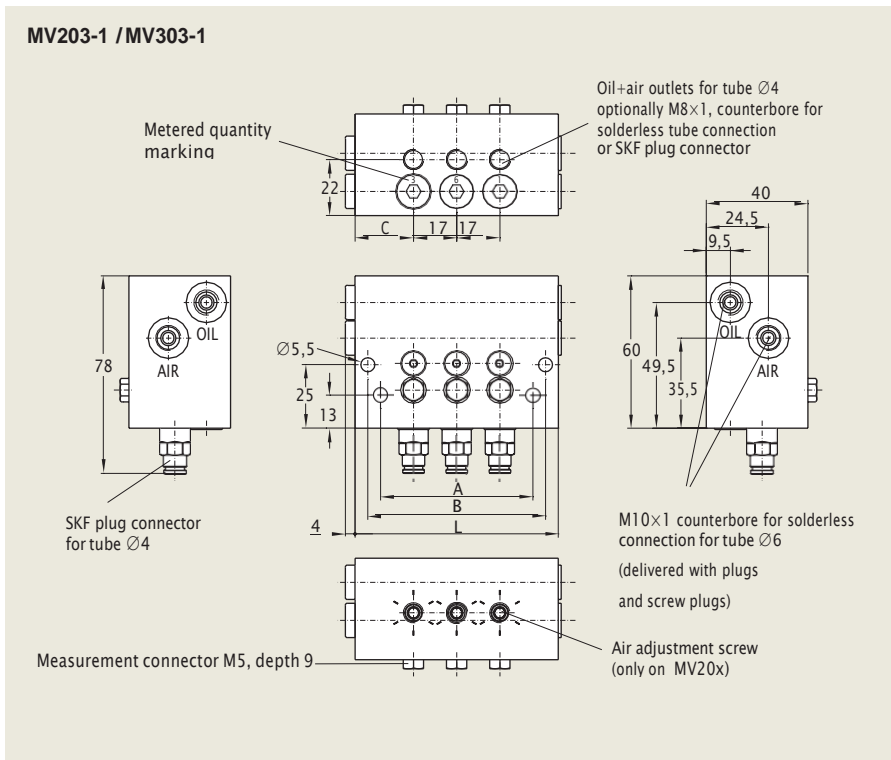
<sup>1)</sup> without metering point (with a screwed blanking plug)

Order example for MV206-100-AACCF00

- Product series MV
- Adjustable air metering
- 6 metering points
- Sealing material NBR
- Metering of metering points 1, 2 = 0,01 cm<sup>3</sup>/cycle with SKF plug connector
- Metering of metering points 3, 4 = 0,03 cm<sup>3</sup>/cycle with SKF plug connector
- Metering of metering points 5, 6 = 0,16 cm<sup>3</sup>/cycle with SKF plug connector

# SKF Oil+Air mixing valves with metering – MV...-1..

## Dimensions



### Dimensions of designs

	A	B	C	D
<b>MV201-1</b>	40	20	22	20
<b>MV202-1</b>	55	43	45	19
<b>MV203-1</b>	80	60	70	23
<b>MV204-1</b>	105	77	95	27
<b>MV205-1</b>	130	94	120	31
<b>MV206-1</b>	130	111	120	22,5
<b>MV207-1</b>	155	128	145	26,5
<b>MV208-1</b>	155	145	145	18
<b>MV301-1</b>	40	20	22	20
<b>MV302-1</b>	55	43	45	19
<b>MV303-1</b>	80	60	70	23
<b>MV304-1</b>	105	77	95	27
<b>MV305-1</b>	130	94	120	31
<b>MV306-1</b>	130	111	120	22,5
<b>MV307-1</b>	155	128	145	26,5
<b>MV308-1</b>	155	145	145	18

### Note

The configurator on page 13 allows the functional specification of oil+air mixing valves with metering with associated order number

## Technical Data

### Metered quantities

Metered quantity [cm <sup>3</sup> /cycle]	Metering rate marking
0,01	1
0,02	2
0,03	3
0,06	6
0,10	10
0,16	16

### MV20x-1 / MV30x-1 mixing valves with metering

Mounting position	preferably as illustrated
Number of metering points	1 to 8
Metered quantity per metering point	0,01 – 0,16 cm <sup>3</sup> /cycle
Actuating pressure, air	3–10 bar
Actuating pressure, oil	17–40 bar
Operating temperature	5–80 °C
Sealing material	NBR / FPM
Air consumption	1 000 to 1 500 NI/h

### Note

To ensure the proper function of SKF Oil+Air mixing valves with metering even after changing the metered quantity, the meterings 0,01 and 0,02cm<sup>3</sup> may only be replaced by authorized SKF Lubrication Systems employees or partners

# SKF Oil+Air mixing valves with metering – 161-300-338/-339

## Designs

161-300-338 / -339 are oil+air mixing valves with metering with a secondary line connection. These mixing valves with metering can be consolidated into groups for multiple lubrication points. In this case, the compressed air must be fed separately to each mixing valve. Metering is performed by an integrated (SKF MonoFlex) single-line distributor and is selectable between 0,03; 0,06 and 0,1 cm<sup>3</sup>/cycle.

The lubricant supply connection has a counterbore for a solderless tube union for lines with  $\varnothing 4$  mm. The connection for compressed air is either G<sup>1</sup>/<sub>2</sub> or G<sup>3</sup>/<sub>4</sub> depending on the design.



## Technical Data

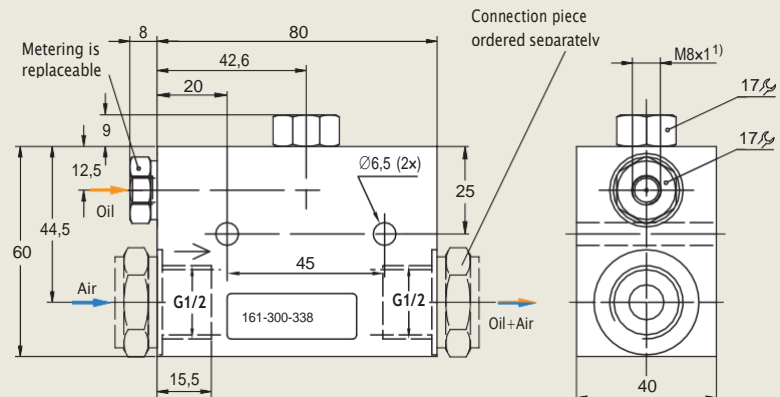
### 161-300-338, 161-300-339

Actuating pressure, air 3-10 bar  
 Actuating pressure, oil 12-45 bar  
 Operating viscosity 20-1 500 mm<sup>2</sup>/s  
 Pumped medium Mineral or synthetic oil, compatible with NBR elastomers

Mounting position as illustrated

## Dimensions

### 161-300-338

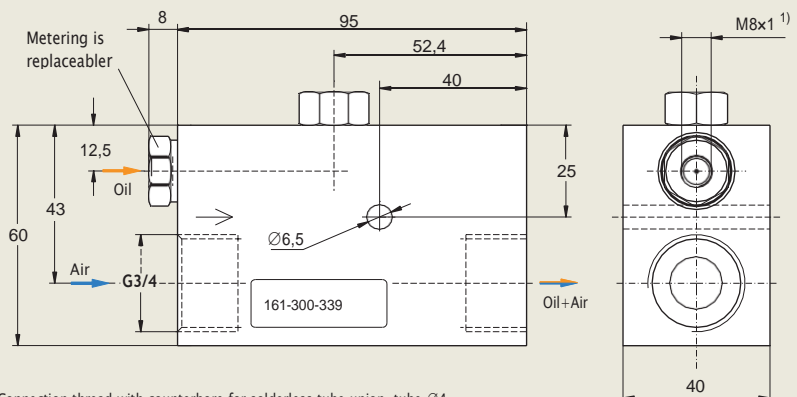


1) Connection thread with counterbore for solderless tube union, tube  $\varnothing 4$

### Dosiereinheit auswechselbar

Order number	Metered quantity [cm <sup>3</sup> /cycle]	Metering rate marking
321-403G4	0,03	3
321-406G4	0,06	6
321-410G4	0,10	10

### 161-300-339



1) Connection thread with counterbore for solderless tube union, tube  $\varnothing 4$

# SKF Oil+Air mixing valves without metering – 161-300-313/-315

## Designs

161-300-313 / 315 are oil+air mixing valves without metering. Each mixing valve has a secondary line connection. The mixing valves can be consolidated into groups for multiple lubrication points.

Oil supply and metering are performed by an (SKF MonoFlex) single-line distributor (➤ brochure 1-5001-EN) connected to the mixing valve and operated on an intermittently operated centralized lubrication system (SKF MonoFlex).

The single-line distributor meters the lubricant, which is fed to the mixing valve through a lubrication line. Within the mixing valve, the supplied compressed air trans-

ports the lubricant into the secondary line and to the lubrication point. The metered quantity depends on the number of lubrication cycles on the intermittently operated centralized lubrication systems and the selected metering on the single-line distributor.

The lubricant supply connection has a counterbore for a solderless tube union for tube  $\varnothing 4$  mm. The connection for compressed air is either  $G^{1/2}$  or  $G1$  depending on the design. An additional mixing valve is required for each additional lubrication point. In this case, the compressed air must be fed separately to each mixing valve.



## Technical Data

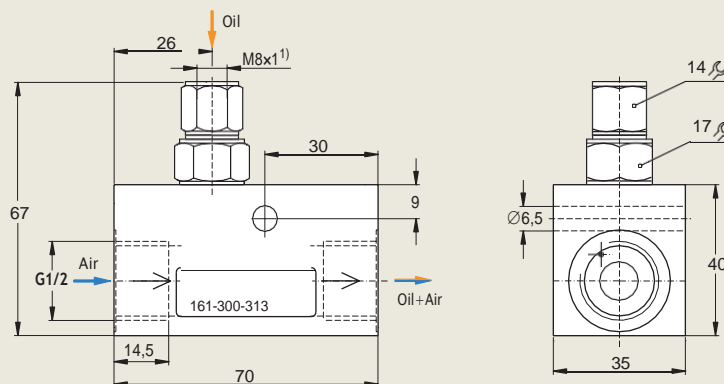
### 161-300-313, 161-300-315

Actuating pressure, air 3 – 10 bar  
 Actuating pressure, oil 3 – 40 bar  
 Operating viscosity 6 – 760 mm<sup>2</sup>/s  
 Pumped media Mineral or synthetic oil, compatible with NBR elastomers

Mounting position as illustrated

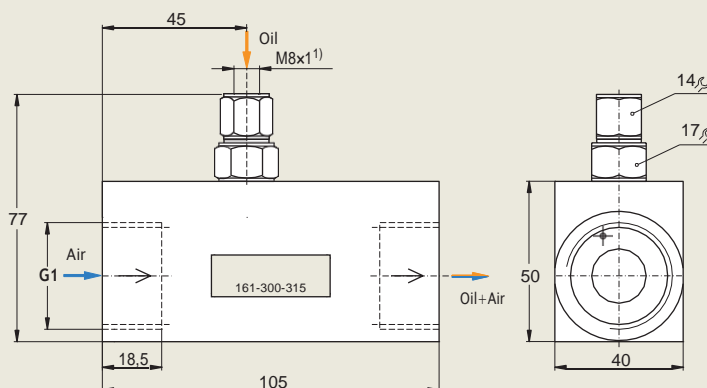
## Dimensions

### 161-300-313



1) Connection thread with counterbore for solderless tube union, tube  $\varnothing 4$

### 161-300-315



1) Connection thread with counterbore for solderless tube union, tube  $\varnothing 4$



# SKF Oil+Air mixing valves without metering – MV21 ... MV38

## Designs

MV21 und MV32 ... MV38 are oil+air mixing valves without metering and have a modular design with up to eight lubrication line connections (for example, MV35 contains 5x MV21) Oil supply and metering are performed by an (SKF MonoFlex) single-line distributor (brochure 1-5001-EN) connected to the mixing valve and operated on an intermittently operated centralized lubrication system (SKF MonoFlex) The single-line distributor meters the lubricant, which is fed to the mixing valve through a lubrication line

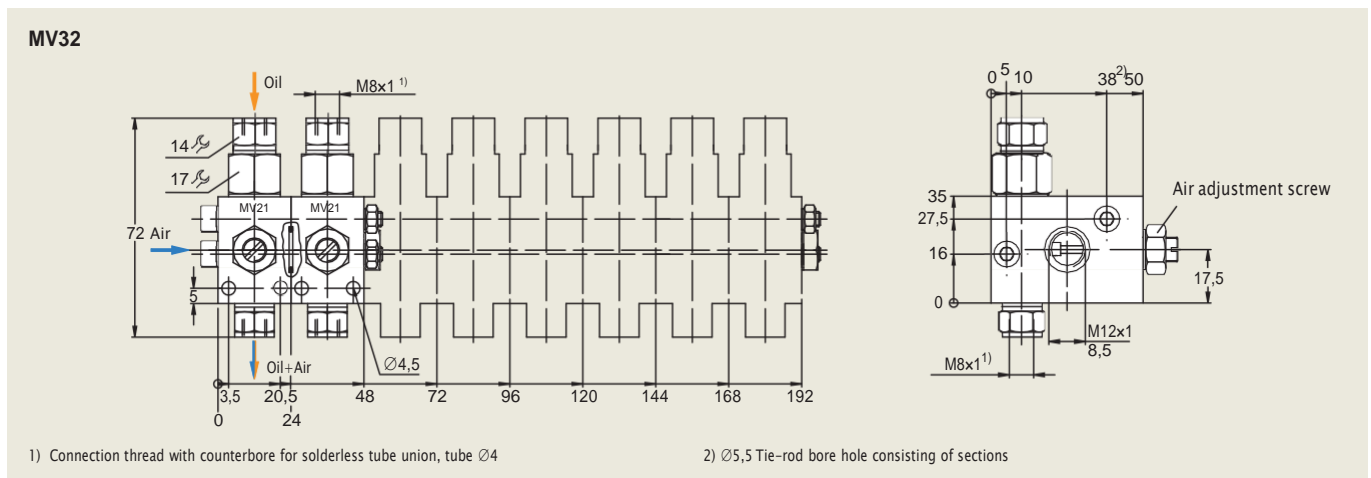
Within the mixing valve, the supplied compressed air transports the lubricant into the secondary line and to the lubrication point The metered quantity depends on the number of lubrication cycles on the intermittently operated centralized lubrication systems and the selected metering on the single-line distributor

Attached externally metering:

- SKF Monolex distributors 0,01-0,2 cm<sup>3</sup>
- Injection oiler 0,003 -0,03 cm<sup>3</sup>
- Micro pumps from 0-0,30 cm<sup>3</sup>



## Dimensions

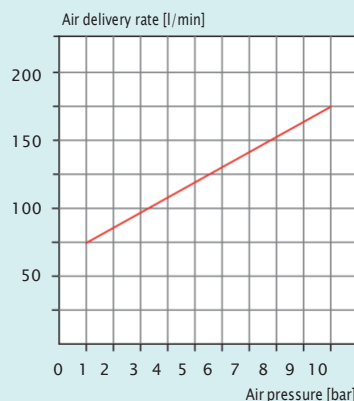


## Technical Data

### Metered quantities

Order number	Number of outlets
--------------	-------------------

MV21	1
MV32	2
MV33	3
MV34	4
MV35	5
MV36	6
MV37	7
MV38	8



### MV21 MV38

Actuating pressure, air max 10 bar  
 Actuating pressure, oil 5 bar  
 Operating viscosity max 3 000 mm<sup>2</sup>/s  
 Pumped media Oil with mineral or synthetic base, compatible with NBR elastomers preferably as illustrated

Metered quantities (external lubricant distributors) 0,003-0,3 cm<sup>3</sup>/cycle

# SKF Oil+Air low divider – 169-000-18x und 169-000-25x

## Designs

SKF Oil+Air low dividers distribute oil+air lows to 2-6 lubrication points To achieve the most uniform distribution of an oil+air low, there may not be any back pressure on the outlets of the oil+air low divider Further, it must be ensured that the lengths of the secondary lines on the outlets of a low divider do not vary by more than 0,5 m A second low divider must be used if the lengths of secondary lines on the outlets of a low divider differ by more than 0,5 m



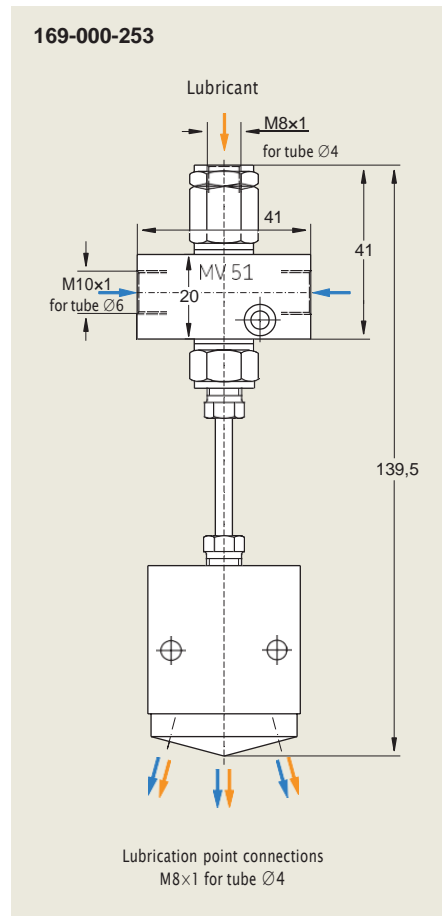
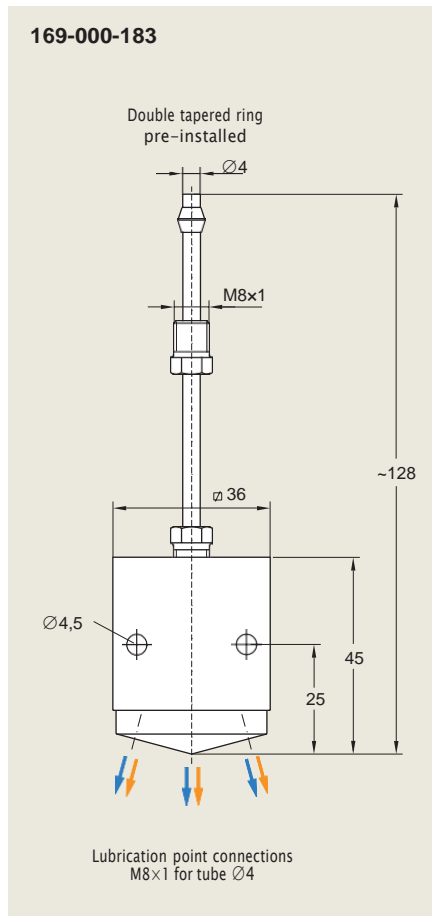
Flow divider 169-000-18x	
Order number	Number of outlets
<b>169-000-182</b>	2
<b>169-000-183</b>	3
<b>169-000-184</b>	4
<b>169-000-185</b>	5
<b>169-000-186</b>	6

Flow divider 169-000-25x	
Order number	Number of outlets
<b>169-000-252</b>	2
<b>169-000-253</b>	3
<b>169-000-254</b>	4
<b>169-000-255</b>	5
<b>169-000-256</b>	6

## Technical Data

169-000-18x, 169-000-25x	
Actuating pressure, air	max 10 bar
Actuating pressure, oil	5 bar
Operating viscosity	max 3 000 mm <sup>2</sup> /s
Pumped media	Oil with mineral or synthetic base, compatible with NBR elastomers preferably as illustrated
Mounting position	
Metered quantities (external lubricant distributors)	0,01 - 0,2 cm <sup>3</sup> /cycle

## Dimensions



# SKF Oil+Air lubrication

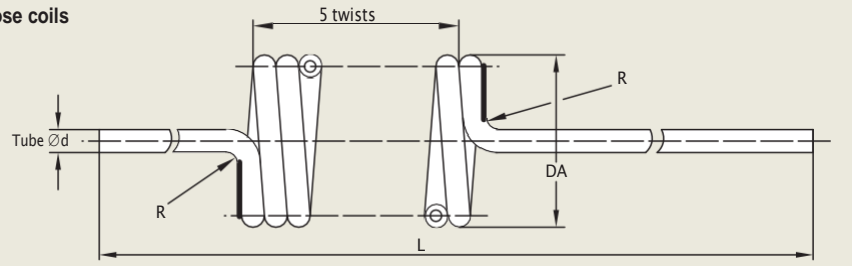
## Accessories

### Hose coils

Order number	tube $\varnothing$ [mm]	DA [mm]	L [mm]	R [mm]
--------------	----------------------------	------------	-----------	-----------

<b>828-090-004</b>	4x0,85	30	2545	14
<b>828-090-020</b>	4x0,85	30	10545	14
<b>828-090-021</b>	4x0,85	30	4045	14

### Hose coils

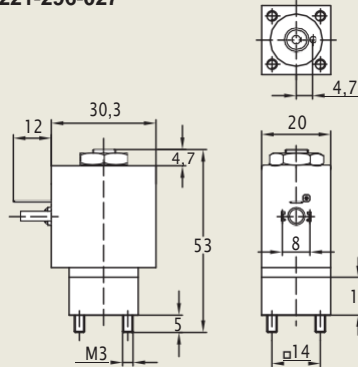


### 3/2 directional control valve

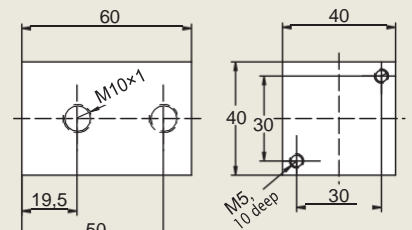
	Order number
230 V AC, 50 Hz	<b>221-296-027+363</b>
120 V AC, 60 Hz	<b>221-296-027+758</b>
24 V DC	<b>221-296-027+924</b>
Valve body	<b>993-000-196</b>

Pressure range	0-10 bar
Mounting position	Any
Sealing material	FKM (FPM)
Ambient temperature	+55 °C
Electrical connection	DIN EN 175301-803
	Form C, connector socket type 2506

### 221-296-027



### 993-000-196 (valve body)



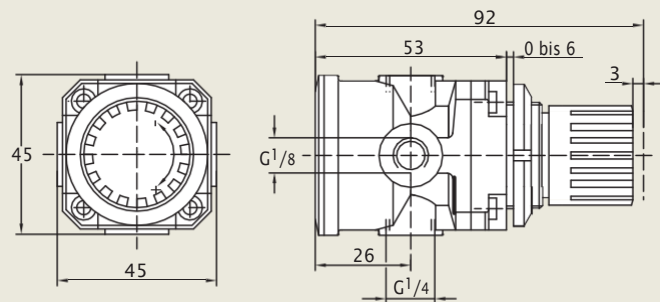
### Air pressure control valve

Order number	<b>231-900-028</b>
Type	Diaphragm regulator
max primary pressure	0-16 bar
Secondary pressure	0,5-10 bar
Operating temperature	0-80 °C
Sealing material	NBR

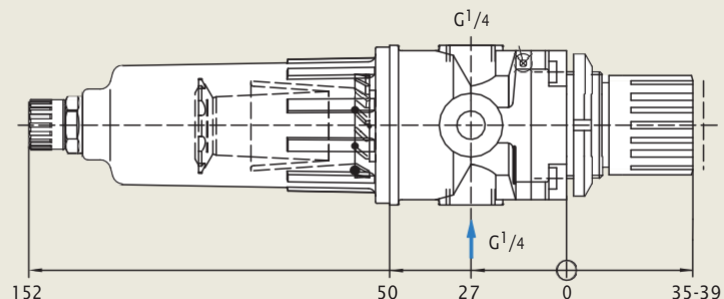
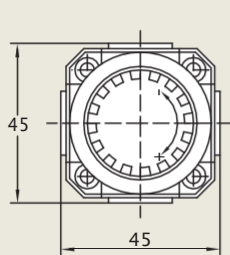
### Air pressure control valve incl filter and water separator

Order number	<b>231-900-028 U1</b>
Filter	5 $\mu$ m

### 231-900-028



### 231-900-028 U1



# SKF Oil+Air Lubrication

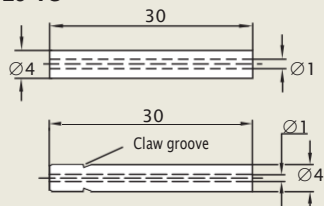
## Accessories

### Nozzles

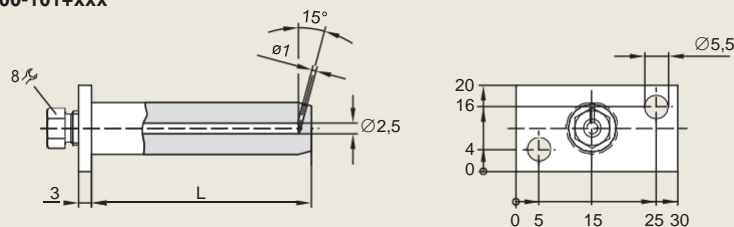
Order number	Description
169-00-101	+xxx 1) Nozzle for tube $\varnothing 4$ mm L=15-120 mm
169-00-102	+xxx 1) Double nozzle for Rohr $\varnothing 4$ mm L=15- 120 mm
P-89 29	Nozzle for tube $\varnothing 4$ mm
P-89 29-S3	Nozzle for tube $\varnothing 4$ mm, stainless steel
P-89 29-VS	Nozzle for tube $\varnothing 4$ mm, with claw groove for SKF plug connectors

1) Specify the desired length L for xxx

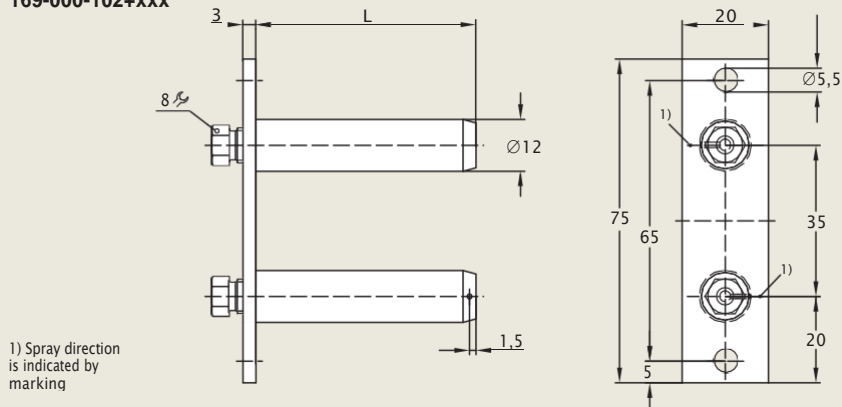
### P-89 29(-S3) P-89 29-VS



### 169-000-101+xxx



### 169-000-102+xxx

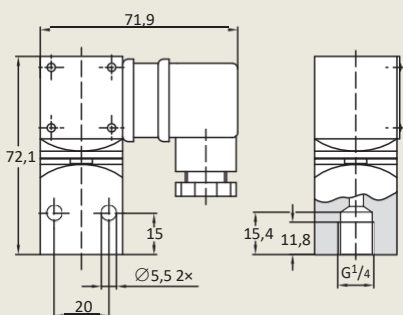


### Pressure switch for minimum air pressure

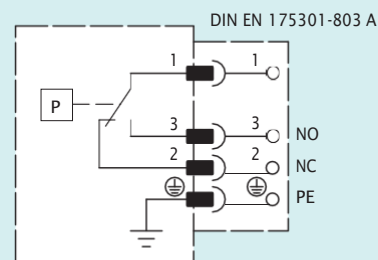
Order number	<b>176-271-001</b>
Contact type	Changeover
Adjustment range	0,5-5 bar (preset to 3 bar)

Max switching voltage	250 V AC
Max switched current	5 A
Reset differential	15 %

### 176-271-001



### 176-271-001 circuit diagram

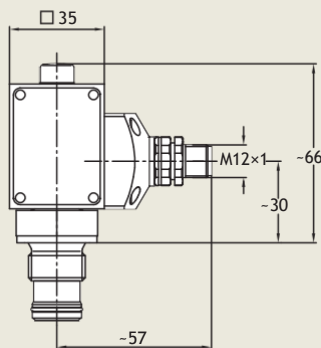


Contact position shown: Switch depressurized

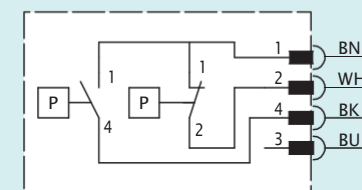
### Differential pressure switch

Order number	<b>176-200-009</b>
Contact type	1 x NC contact, 1 x NO-contact
Max voltage	24 V AC/DC
Max switching capacity	15 VA / W
Opening pressure	$\Delta 5$ bar -10 %
Max operating pressure	420 bar

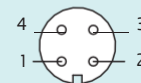
### 176-200-009



### 176-200-009 wiring diagram



BN = +24 V DC  
WH = 100% Alarm  
BK = 75% pre-warnung  
BU = PIN 3 not assigned



# SKF Oil+Air Lubrication

## Accessories

### Square connector

Order number Designation

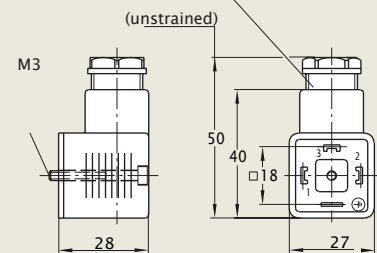
**179-990-033** Cable socket per DIN EN 175301-803-A cable diameter 6 bis 10 mm

**179-990-033**



**179-990-033**

Cable gland M16x1.5 for line diameter 6-10 mm



### Circular connector M12x1

Order number Designation

**179-990-371** Cable socket, straight (A)  
**179-990-600** Cable socket, straight with molded cable (B)  
**179-990-372** Cable socket, angled (C)  
**179-990-601** Cable socket, angled with molded cable (5 m, 4x0,34 mm<sup>2</sup>) (D)

### Circular connector

A

B

C

D



### Tube unions for plastic tubing Ø4 mm

Order number Designation

**404-003-VS** SKF plug connectors  
**404-612** Socket union for solderless tube union  
**404-611** Tapered sleeve for solderless tube union  
**404-603** Reinforcing socket for solderless tube union

### SKF plug connectors



### Solderless tube union

Socket union  
 Tapered sleeve  
 Reinforcing socket  
 Metering nipple on mixing valve



### Plugs for metering points

Order number Designation

**404-011 U1** Screw plug with copper ring for solderless tube union  
**450-204-002** Locking pin for SKF plug connectors

### Locking pin



### Screw plug



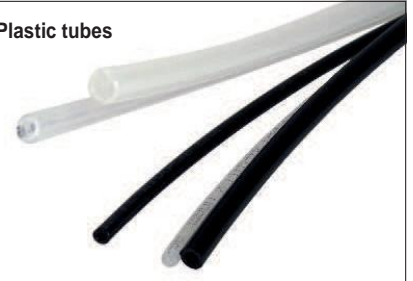
# SKF Oil+Air Lubrication

## Accessories

### Tubing

Order number	Designation	Detailed information in brochure
<b>WVN715-R04x0 85</b>	Plastic tubes Ø 4 mm, semirigid (unplasticized), length 50 m	1-0103-EN
<b>WVN716-R04x0 85</b>	Plastic tubes Ø 4 mm, lexible (plasticized), length 50 m	1-0103-EN

Plastic tubes



### Pressure filter for oil

Order number	Designation
<b>169-460-307</b>	Pressure filter 10 µm, with electric and visual contamination indicator
<b>169-460-308</b>	
<b>169-460-250</b>	
<b>169-460-309</b>	
	Pressure filter 3 µm, with electric and visual contamination indicator
	Pressure filter 10 µm, without electric and visual contamination indicator
	Pressure filter 3 µm, without electric and visual contamination indicator

Oil filters with monitoring



Oil filters without monitoring



### Oil-streak sensors

Order number	Designation	Detailed information in brochure
<b>GS4011-S50</b>	Oil-streak sensor for 60-120 mm <sup>3</sup> /h and line diameter of 4 mm	1-1704-EN
<b>GS4011-S20</b>	Oil-streak sensor for 120-600 mm <sup>3</sup> /h and line diameter of 4 mm	1-1704-EN

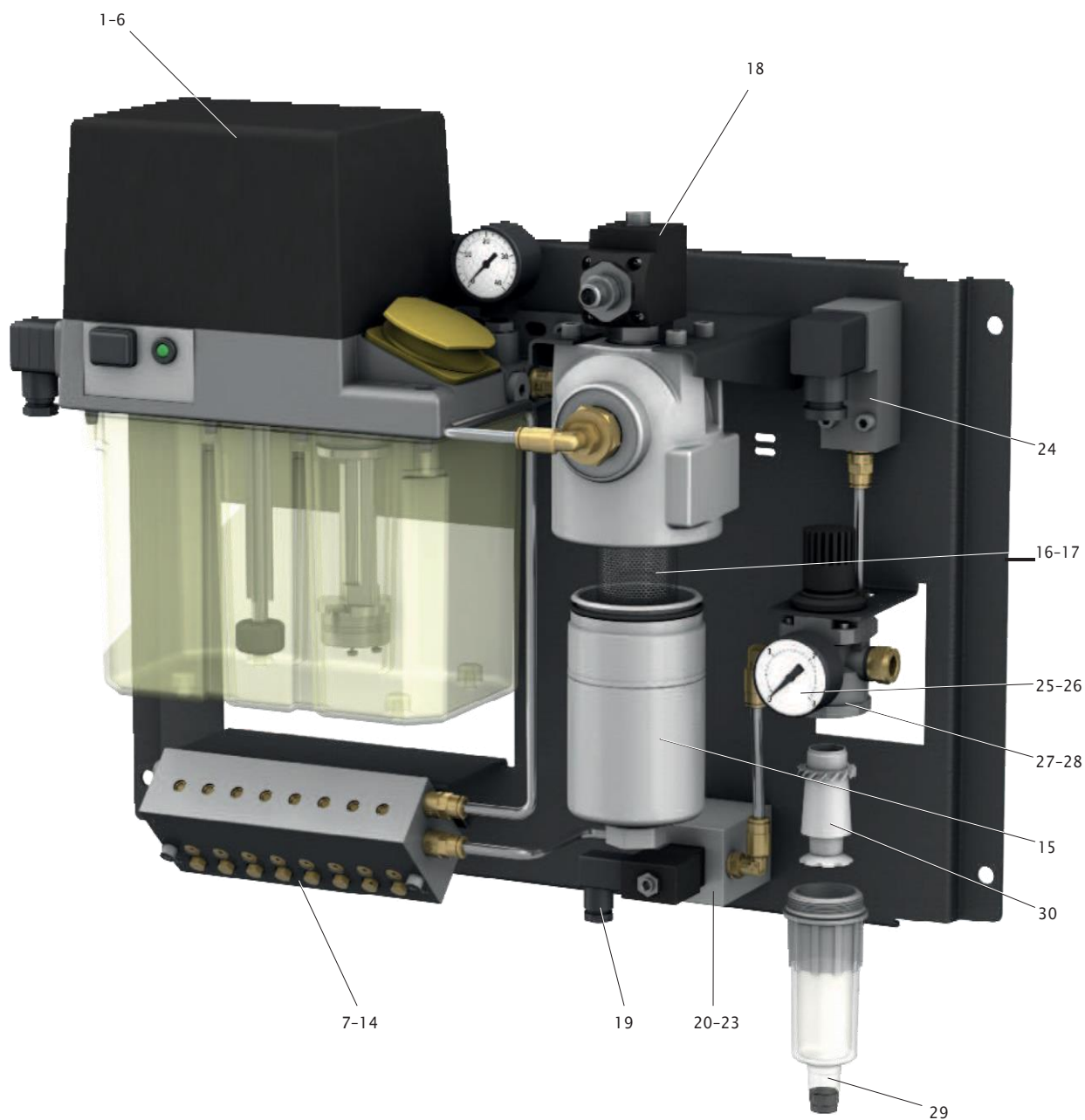
Oil-streak sensors



# SKF Oil+Air lubrication

## Spare parts

OLA 3D exploded view



# SKF Oil+Air lubrication

## Spare parts

### Spare parts list

Item	Order number	Designation
1	<b>MKL2-12FC11000+428</b>	Gear pump unit with IG54-20-S4-I control unit, for 230 V 50 / 60Hz
2	<b>MKL2-12FC11000+429</b>	Gear pump unit with IG54-20-S4-I control unit, for 115 V 50 / 60Hz
3	<b>MKL2-12FC11000+924</b>	Gear pump unit with IG54-20-S4-I control unit, for 24 V DC
4	<b>MKU2-12BC11000+428</b>	Gear pump unit without control unit, for 230 V 50 / 60 Hz
5	<b>MKU2-12BC11000+429</b>	Gear pump unit without control unit, for 115 V 50 / 60 Hz
6	<b>MKU2-12BC11000+924</b>	Gear pump unit without control unit, for 24V DC
7	<b>MV201-1...</b>	Oil+air metering unit, 1-port
8	<b>MV202-1...</b>	Oil+air metering unit, 2-port
9	<b>MV203-1...</b>	Oil+air metering unit, 3-port
10	<b>MV204-1...</b>	Oil+air metering unit, 4-port
11	<b>MV205-1...</b>	Oil+air metering unit, 5-port
12	<b>MV206-1...</b>	Oil+air metering unit, 6-port
13	<b>MV207-1...</b>	Oil+air metering unit, 7-port
14	<b>MV208-1...</b>	Oil+air metering unit, 8-port
15	<b>853-880-011</b>	NG40 housing for oil filters
16	<b>169-400-250</b>	Filter element 10 µm for oil filters
17	<b>169-400-260-V57</b>	Filter element 3 µm for oil filters
18	<b>176-200-009</b>	Differential pressure switch for oil filters
19	<b>179-990-465</b>	Connector socket for 3 / 2 directional control valve
20	<b>221-296-027+263</b>	3/2 directional control valve for 230 V, 50 Hz
21	<b>221-296-027+758</b>	3/2 directional control valve for 120 V, 60 Hz
22	<b>221-296-027+924</b>	3/2 directional control valve for 24 V DC
23	<b>993-000-196</b>	Valve body, complete for 3 / 2 directional control valve
24	<b>176-271-001</b>	Pressure switch 3 bar for monitoring of minimum air pressure
25	<b>169-101-606</b>	Pressure gauge for air pressure reducing valve (sealing ring ordered separately = item 26)
26	<b>248-610 03</b>	Sealing ring G1 / 8 CU for pressure gauge
27	<b>231-900-028 U1</b>	Air pressure control valve + 5 µM filter complete with air filter and water separator
28	<b>231-900-028</b>	Air pressure control valve without air filter and water separator
29	<b>231-900-035</b>	Water separator container
30	<b>231-900-034</b>	Filter insert 5 µM
31	<b>995-810-047</b>	Complete documentation for oil+air lubrication unit, incl Declaration of Incorporation and Conformity











**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.



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