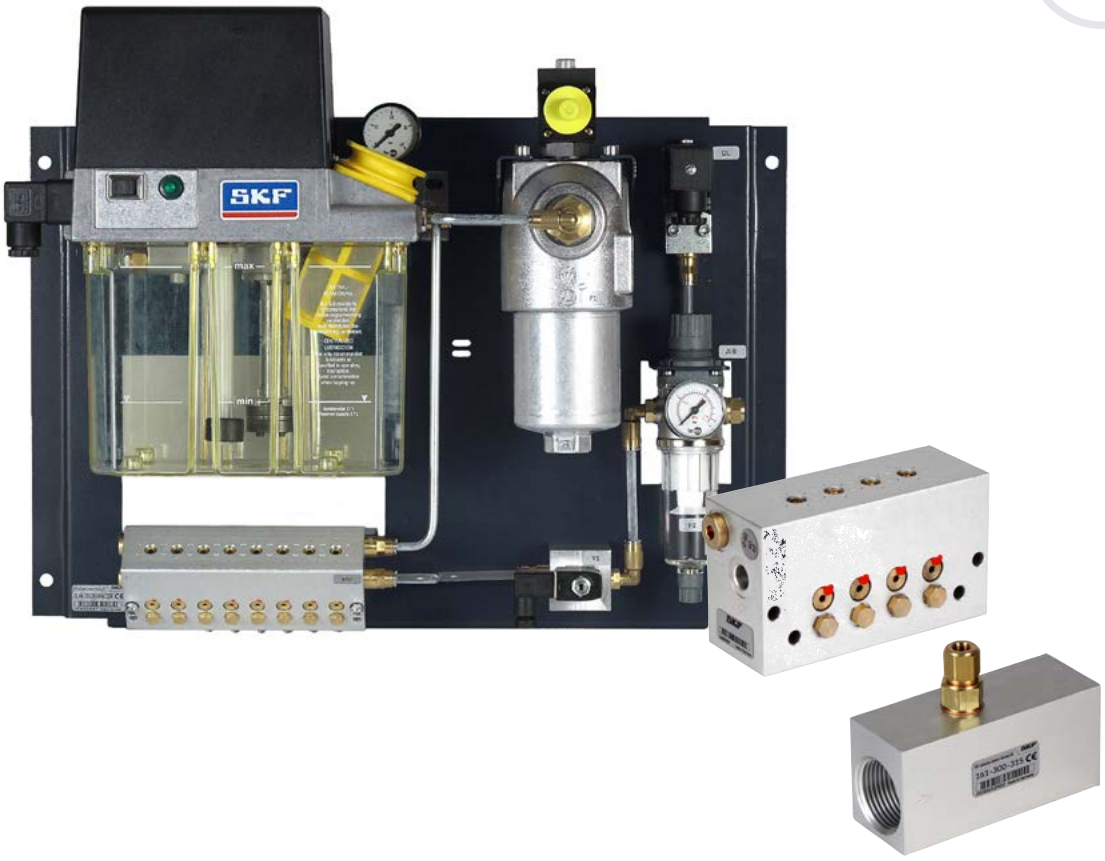
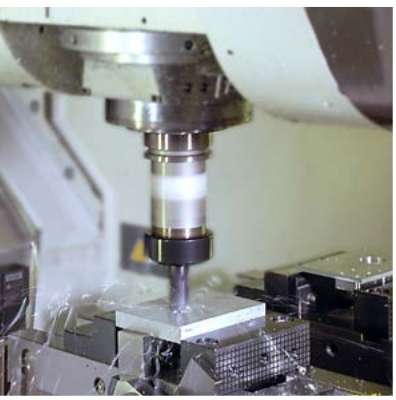
SKF Oil+Air Lubrication Units and Mixing Valves

Product Series OLA, MV and 161

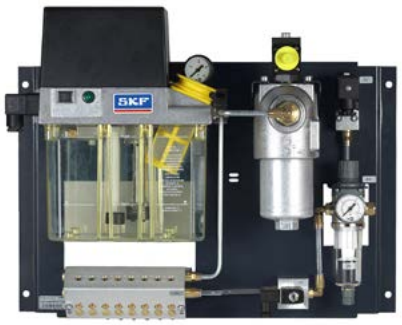
For use in SKF Oil+Air Centralized Lubrication Systems



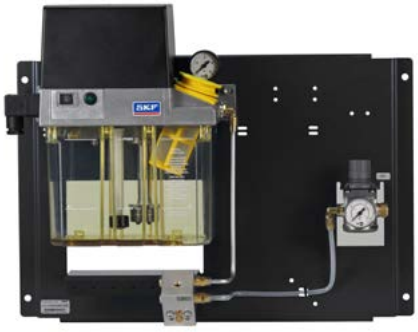


Contents

SKF Oil+Air lubrication unit
0LA8-1B6BB... (maximum equipment level)



SKF Oil+Air lubrication uni
0LA1-1B0XA... (minimum equipment level)



Mixing valves with metering MV204-1...

Mixing valves without metering MV21

Mixing valves without metering MV32

Mixing valves with metering 161-300-338

Mixing valves without metering 161-300-313

Mixing valves without metering 169-000-253

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] Air	Oil	Number of outlets	Metered quantities [cm³/cycle] 0,01	0,02	0,03	0,06	0,10	0,16	Page
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
Mixing valves with metering												
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
Mixing valves without metering												
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 define 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.

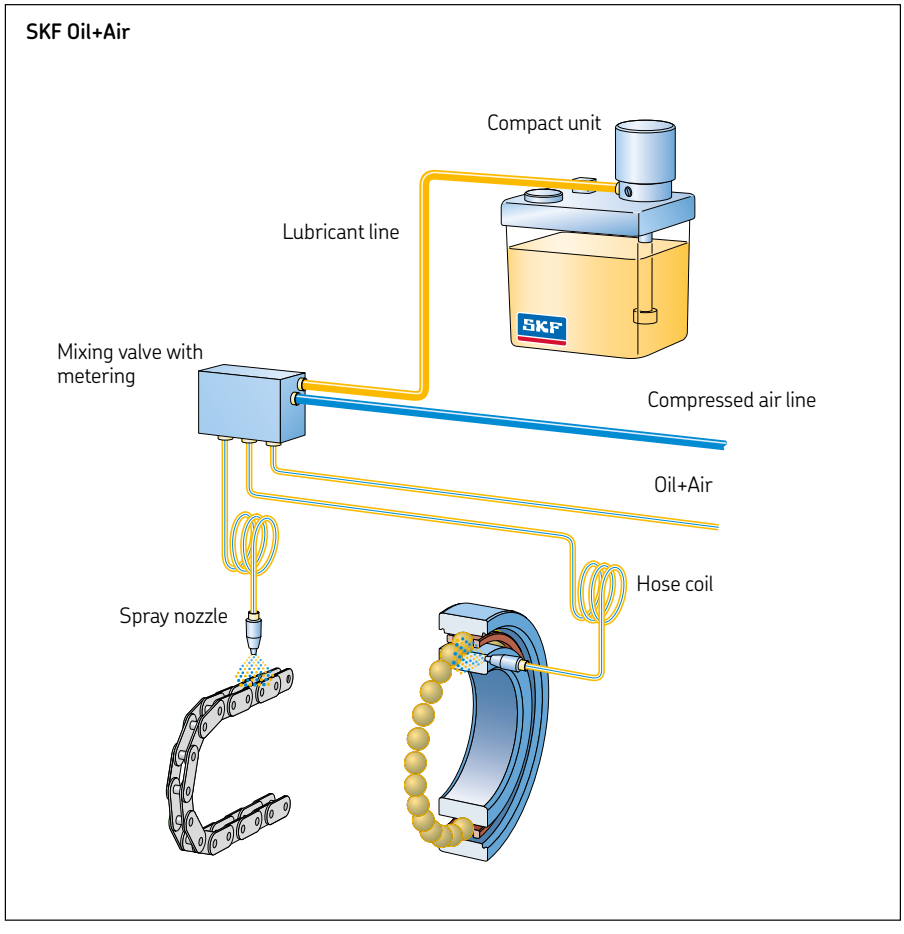
Oil-streak sensors can be employed for monitoring in SKF Oil+Air lubrication systems. Oil-streak sensors continuously monitor the oil flow in the secondary line. Oil+air lubrication units can be configured individually for each application.

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



SKF Oil+Air lubrication systems

Fundamentals

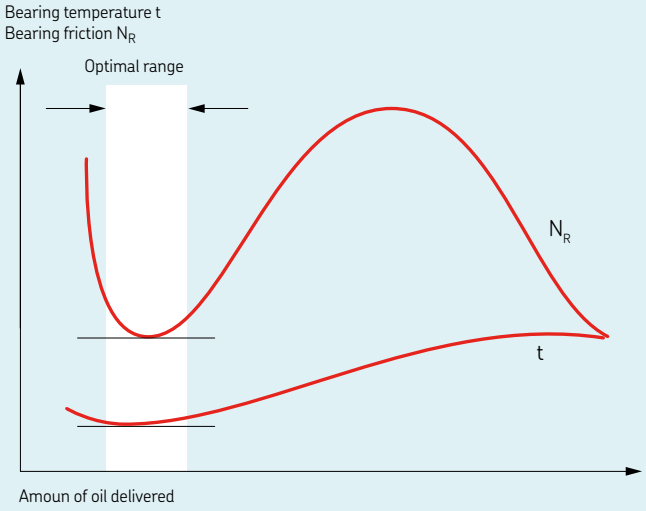
Principles of oil+air lubrication - example: rolling bearings

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 (NR) 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 x dm of < 1 to 1,5 x 10^6 mm x 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.

Conditions for oil+air lubrication



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 × d × B

Q = quantity in mm^3/h
w = coefficient = 0,01 mm/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 mm^3/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 <= 5 µm. 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 disulfides 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 with external dimensions 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.

Fig. 1

Bearing example 1

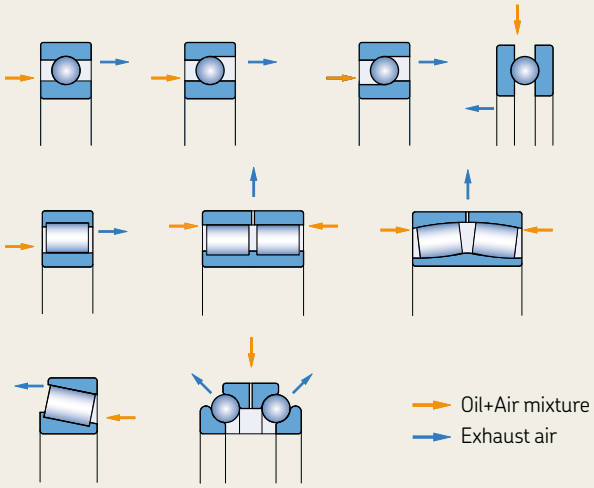
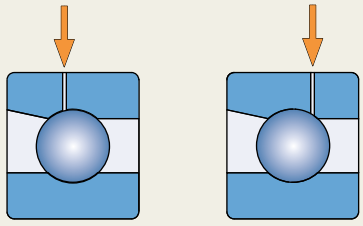


Fig. 2

Bearing example 2



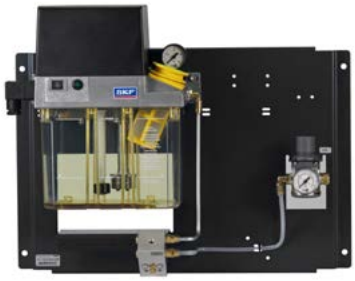
SKF Oil+Air lubrication unit – OLA

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

3/2 directional air control valve

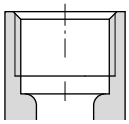
Compressed air control valve with air filter and water seperator

Mixing valve with metering

Air control valve without air filter

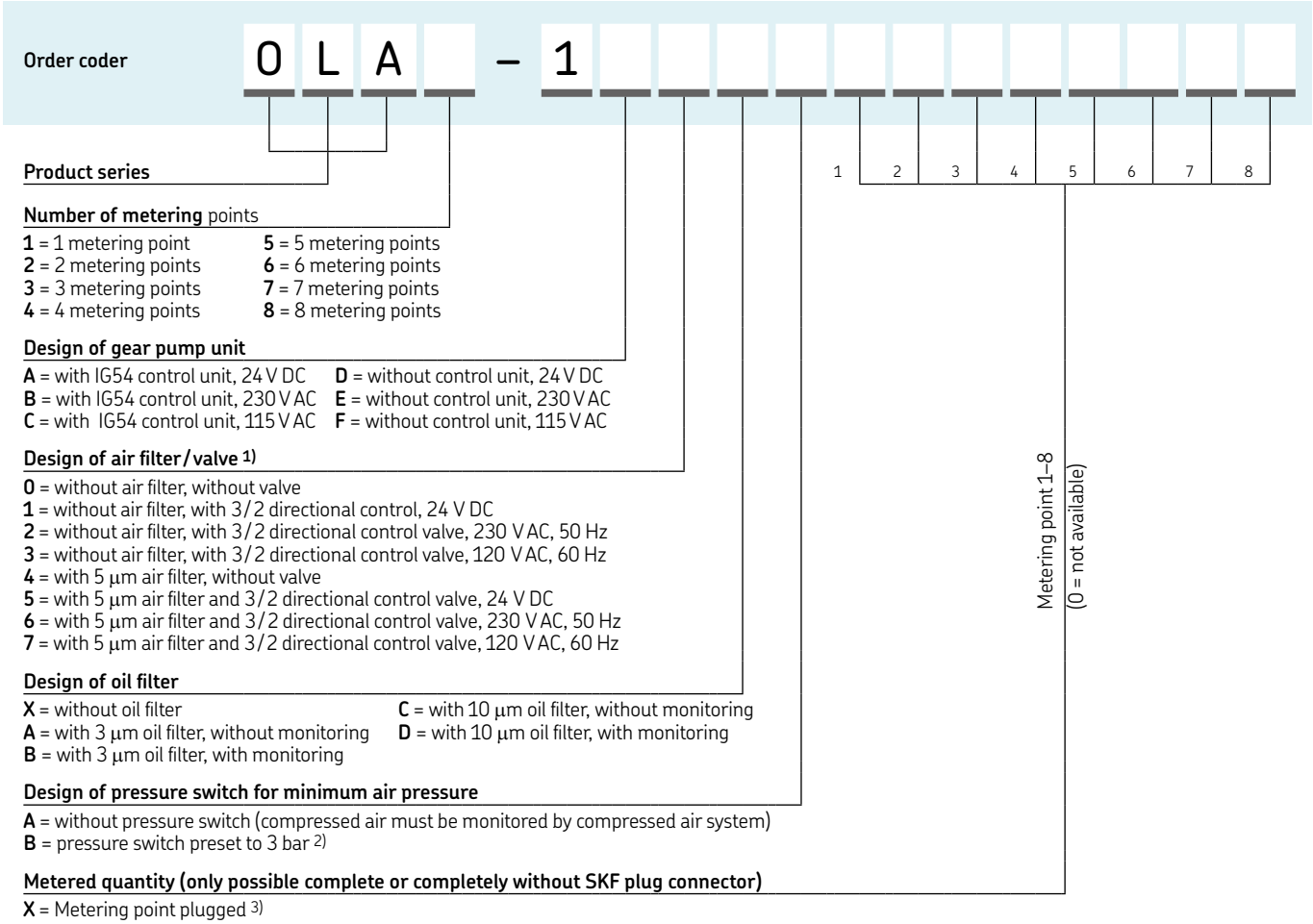
SKF plug connectors

Counterbore for solderless tube union for tube diam ∅4 mm



SKF Oil+Air lubrication unit – OLA

Configurator



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

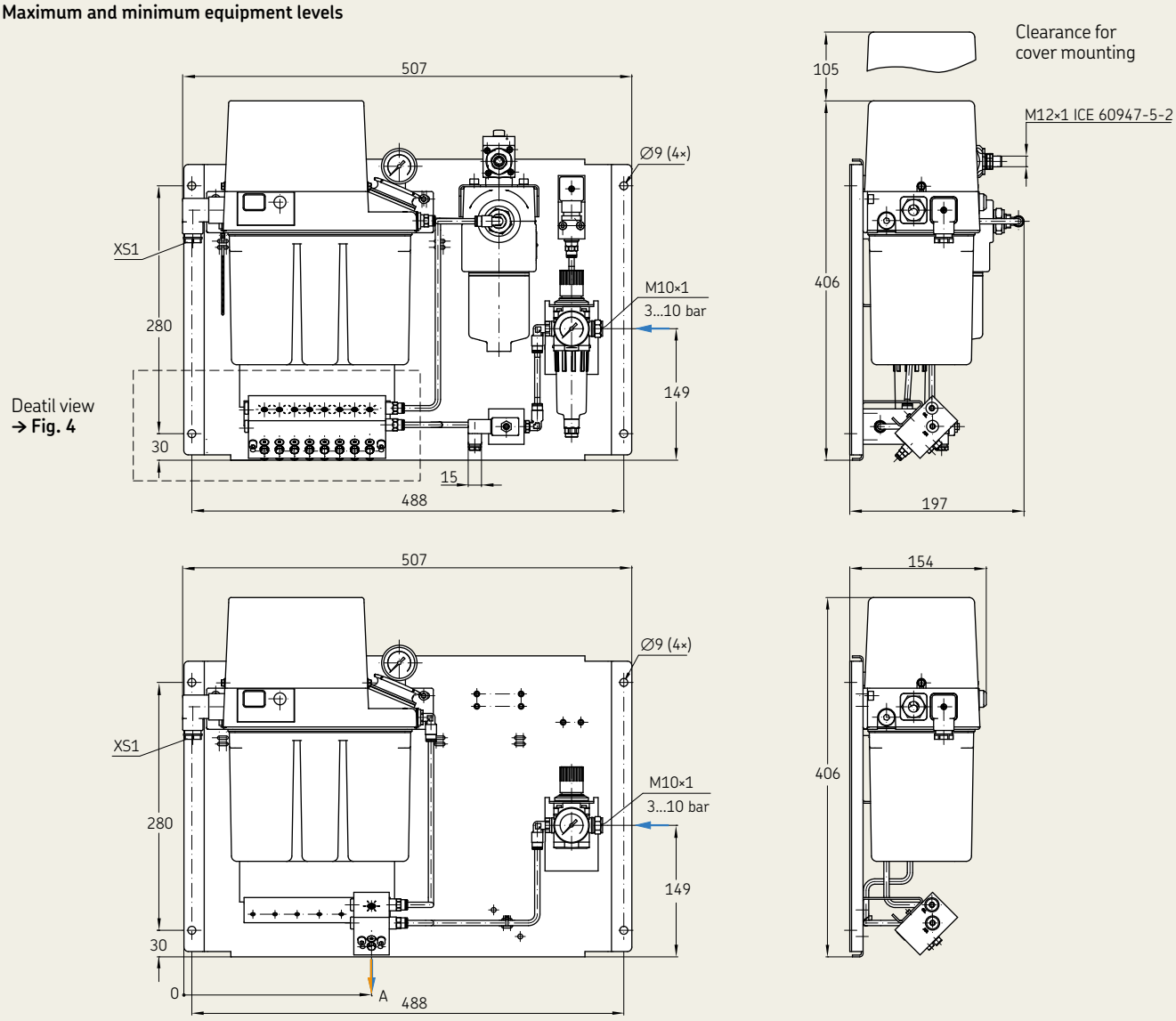
- Product series OLA
- One metering point
- Without control unit, 230 V AC
- Without air filter, without valve
- Without oil filter
- Without pressure switch for minimum air pressure
- Metered quantity 0,03 cm3/cycle

SKF Oil+Air lubrication unit – OLA

Dimensions

Fig. 3

Maximum and minimum equipment levels

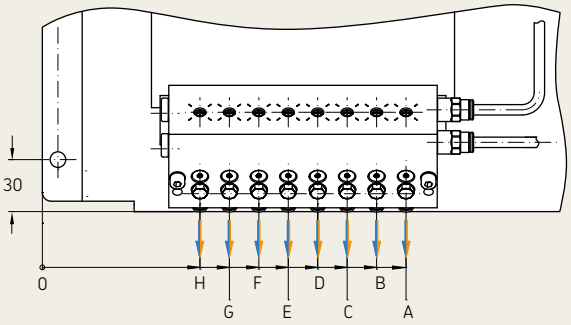


Dimensions of oil+air mixing valve with metering

	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

Fig. 4

Detail view of oil+air mixing valve with metering



SKF Oil+Air lubrication unit – OLA

Technical data

Gear pump unit [1)]

Delivery rate of unit [2)]	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 elastomersn
Operating viscosity	20 to 1 500 mm²/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

1) techn. Daten des Öl+Luft-Mischventils MV20x →Seite 13
2) bezogen auf eine Ölviskosität von 140 mm²/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[1)]	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 %

1) Depending on wiring

Motor (gear pump unit)

Rated frequency [Hz]	50	60	
Rated voltage	115/230 VAC	115/230 VAC	24 VDC
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 capturee	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

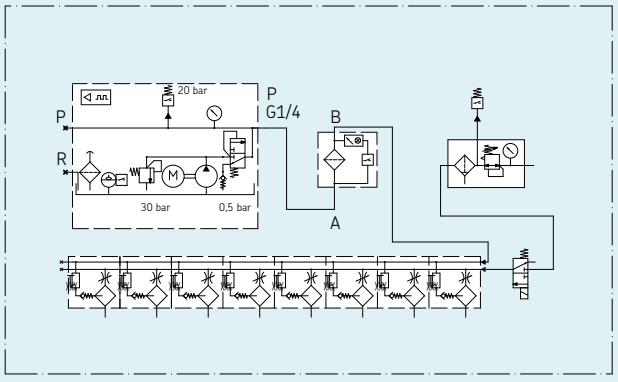
IG54-20-S4-I control unit (optionally in gear pump unit)

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)

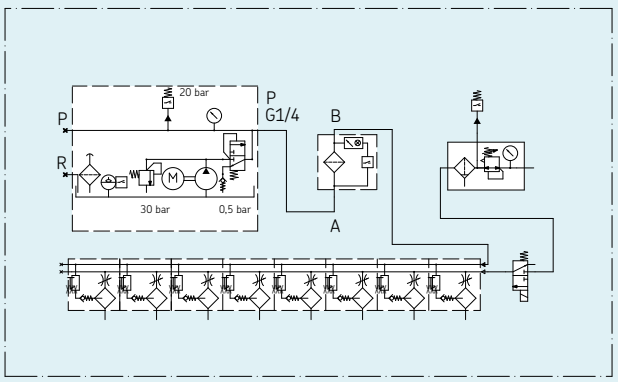
SKF Oil+Air lubrication unit – OLA

Hydraulic layouts

Oil+air lubrication unit with control unit



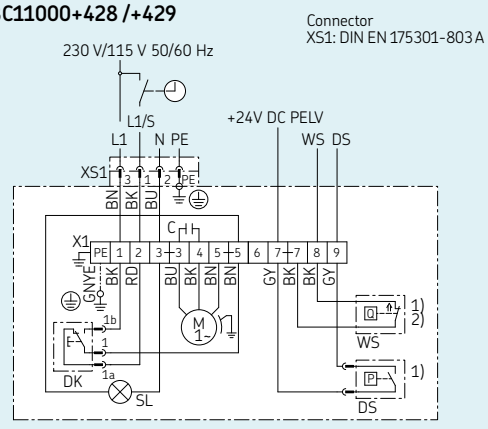
Oil+air lubrication unit without control unit



Wiring diagrams

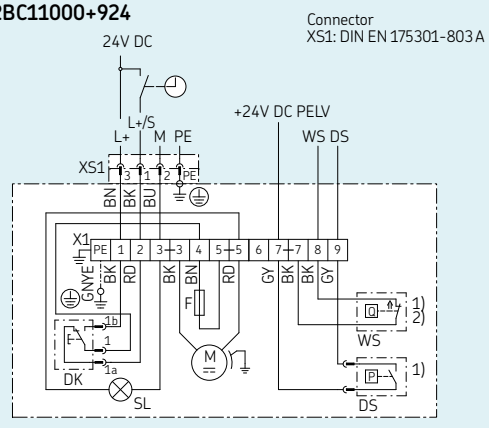
Design of gear pump unit

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



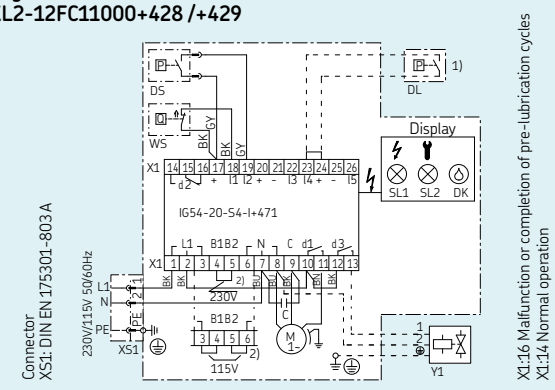
1) optional
2) optional: Kontakt schließt bei minimalem Füllstand

Design D
MKU2-12BC11000+924



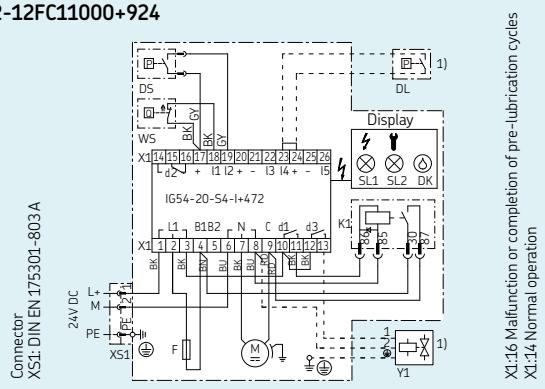
1) optional
2) optional: Kontakt schließt bei minimalem Füllstand

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



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!

Design A
MKL2-12FC11000+924



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

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 cm³ 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 ∅4 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

Order code M V [ ] [ ] [ ] – 1 [ ] [ ] – [ ] [ ] [ ] [ ] [ ] [ ] [ ] [ ]

1 2 3 4 5 6 7 8

Product series

Adjustability of air metering
20 = Adjustable
30 = Not adjustable

Number of metering points
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

Seal type
00 = NBR
S8 = FKM (FPM)

Metered quantity (only possible complete or completely without SKF plug connector)
X = Metering point plugged [1)]
0 = No metering point available
1 = 0,01 cm³/cycle with counterbore for solderless tube union
2 = 0,02 cm³/cycle with counterbore for solderless tube union
3 = 0,03 cm³/cycle with counterbore for solderless tube union
4 = 0,06 cm³/cycle with counterbore for solderless tube union
5 = 0,10 cm³/cycle with counterbore for solderless tube union
6 = 0,16 cm³/cycle with counterbore for solderless tube union
A = 0,01 cm³/cycle with SKF plug connector
B = 0,02 cm³/cycle with SKF plug connector
C = 0,03 cm³/cycle with SKF plug connector
D = 0,06 cm³/cycle with SKF plug connector
E = 0,10 cm³/cycle with SKF plug connector
F = 0,16 cm³/cycle with SKF plug connector

Dosierstelle 1–8
(0 = nicht vorhanden)

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

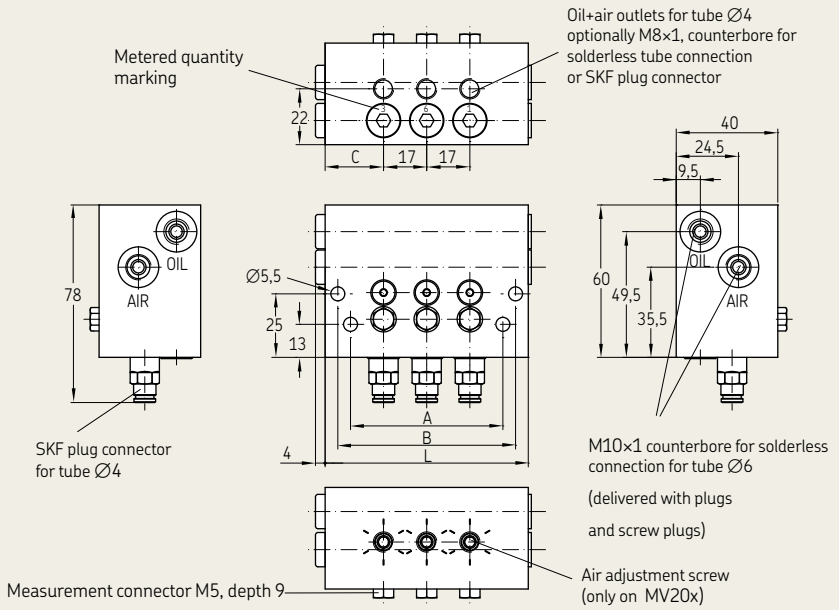
Order example for MV206-100-AACCFF00

- Product series MV
- Adjustable air metering
- 6 metering points
- Sealing material NBR
- Metering of metering points 1, 2 = 0,01 cm³/cycle with SKF plug connector
- Metering of metering points 3, 4 = 0,03 cm³/cycle with SKF plug connector
- Metering of metering points 5, 6 = 0,16 cm³/cycle with SKF plug connector

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

Dimensions

MV203-1... / MV303-1...



Dimensions of designs

	L	A	B	C
MV201-1...	40	20	22	20
MV202-1...	55	43	45	19
MV203-1...	80	60	70	23
MV204-1...	105	77	95	27
MV205-1...	130	94	120	31
MV206-1...	130	111	120	22,5
MV207-1...	155	128	145	26,5
MV208-1...	155	145	145	18
MV301-1...	40	20	22	20
MV302-1...	55	43	45	19
MV303-1...	80	60	70	23
MV304-1...	105	77	95	27
MV305-1...	130	94	120	31
MV306-1...	130	111	120	22,5
MV307-1...	155	128	145	26,5
MV308-1...	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 [cm³/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 cm³/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 Nl/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 0,02cm³ 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^3/cycle.

The lubricant supply connection has a counterbore for a solderless tube union for lines with ∅4 mm. The connection for compressed air is either G1/2 or G3/4 depending on the design..

161-300-338

Technical Data

161-300-338, 161-300-339

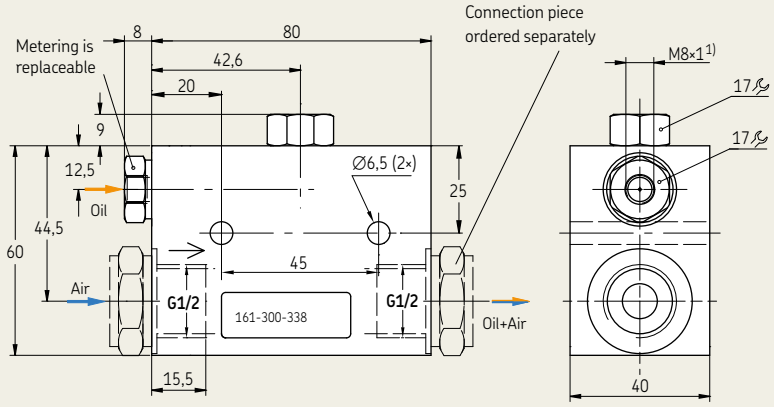
Actuating pressure, air	3–10 bar
Actuating pressure, oil	12–45 bar
Operating viscosity	20–1 500 mm^2/s
Pumped medium	Mineral or synthetic oil, compatible with NBR elastomers
Mounting position	as illustrated

Dosiereinheit auswechselbar

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

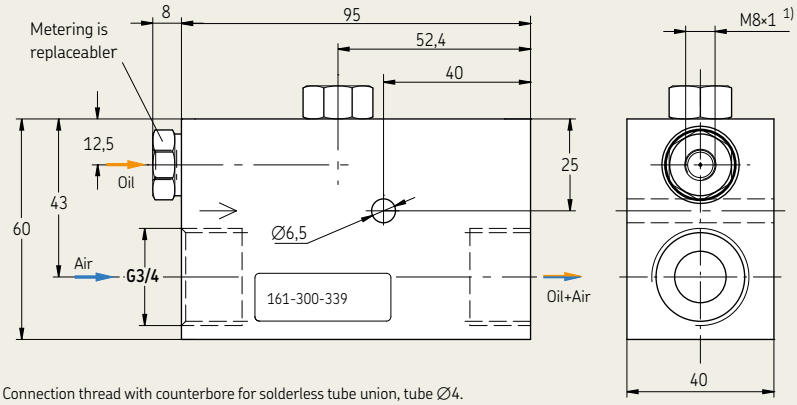
Dimensions

161-300-338



1) Connection thread with counterbore for solderless tube union, tube ∅4.

161-300-339



1) Connection thread with counterbore for solderless tube union, tube ∅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 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.

The lubricant supply connection has a counterbore for a solderless tube union for tube ∅4 mm. The connection for compressed air is either G1/2 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.

161-300-315

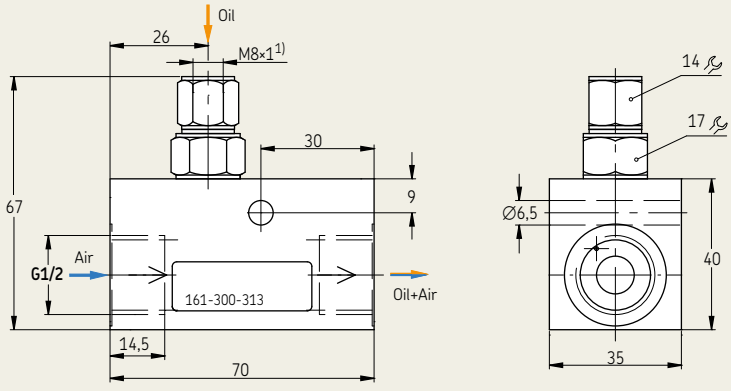
Technical Data

161-300-313, 161-300-315

Actuating pressure, air	3–10 bar
Actuating pressure, oil	3–40 bar
Operating viscosity	6–760 mm²/s
Pumped media	Mineral or synthetic oil, compatible with NBR elastomers
Mounting position	as illustrated

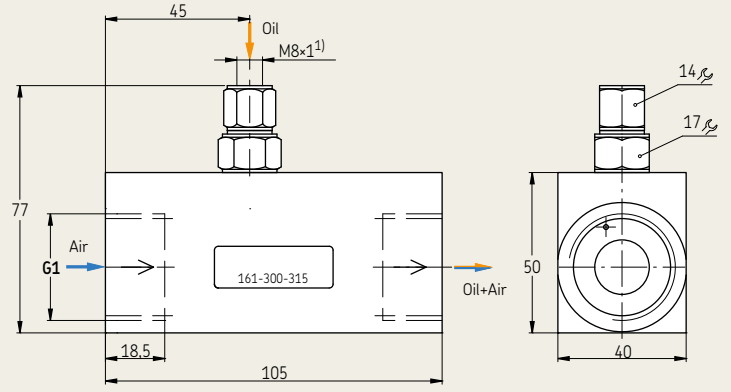
Dimensions

161-300-313



1) Connection thread with counterbore for solderless tube union, tube ∅4.

161-300-315



1) Connection thread with counterbore for solderless tube union, tube ∅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.

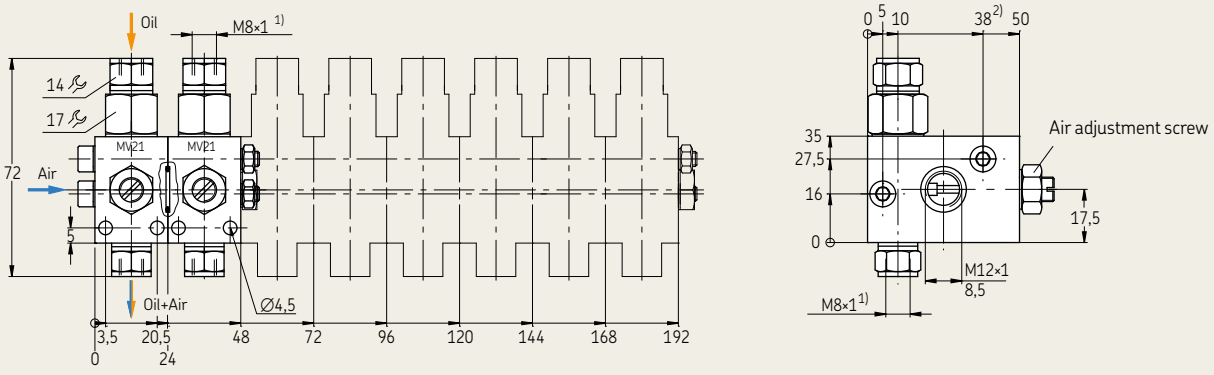
Within the mixing valve, the supplied compressed air transports the lubricant into the secondary line and to the lubrication point. The metered quantity depends on the number of lubrication cycles on the intermittently operated centralized lubrication systems and the selected metering on the single-line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

Attached externally metering:
- SKF Monoflex distributors 0,01–0,2 cm^3
- Injection oiler 0,003–0,03 cm^3
- Micro pumps from 0–0,30 cm^3

MV21

Dimensions

MV32



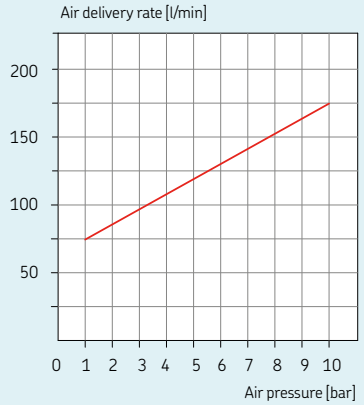
1) Connection thread with counterbore for solderless tube union, tube Ø4.

2) Ø5,5 Tie-rod bore hole consisting of sections

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^2/s
Pumped media	Oil with mineral or synthetic base, compatible with NBR elastomers
Mounting position	preferably as illustrated
Metered quantities (external lubricant distributors)	0,003–0,3 cm^3/cycle

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

Designs

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

169-000-253

Flow divider 169-000-18x

Order number	Number of outlets
169-000-182	2
169-000-183	3
169-000-184	4
169-000-185	5
169-000-186	6

Flow divider 169-000-25x

Order number	Number of outlets
169-000-252	2
169-000-253	3
169-000-254	4
169-000-255	5
169-000-256	6

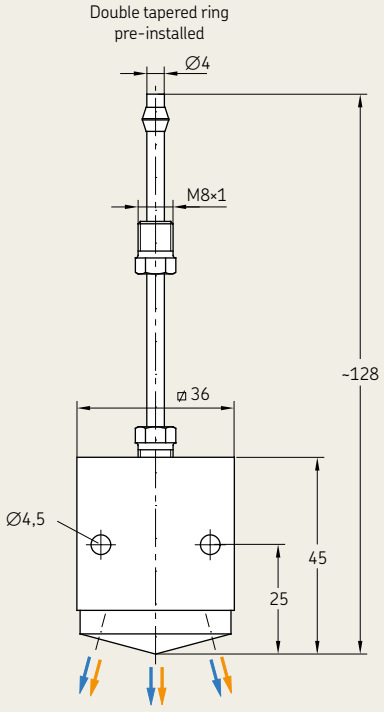
Technical Data

169-000-18x, 169-000-25x

Actuating pressure, air	max. 10 bar
Actuating pressure, oil	5 bar
Operating viscosity	max. 3 000 mm²/s
Pumped media	Oil with mineral or synthetic base, compatible with NBR elastomers
Mounting position	preferably as illustrated
Metered quantities (external lubricant distributors)	0,01–0,2 cm³/cycle

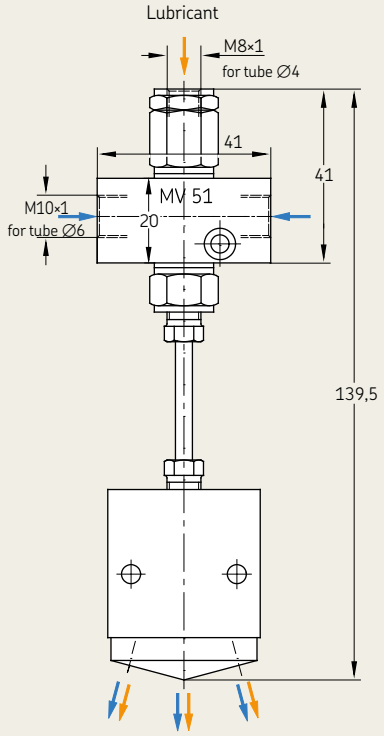
Dimensions

169-000-183



Lubrication point connections M8×1 for tube Ø4

169-000-253



Lubrication point connections M8×1 for tube Ø4

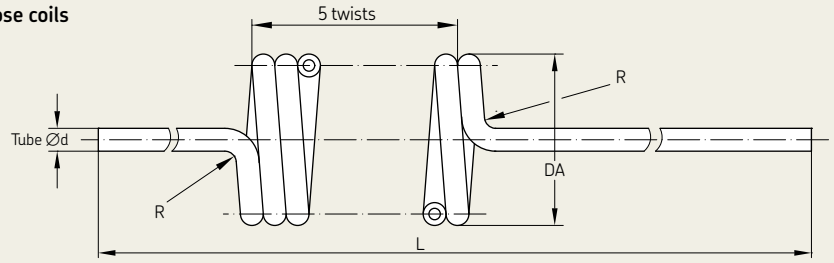
SKF Oil+Air lubrication

Accessories

Hose coils

Order number	tube ∅ [mm]	DA [mm]	L [mm]	R [mm]
828-090-004	4×0,85	30	2545	14
828-090-020	4×0,85	30	10545	14
828-090-021	4×0,85	30	4045	14

Hose coils

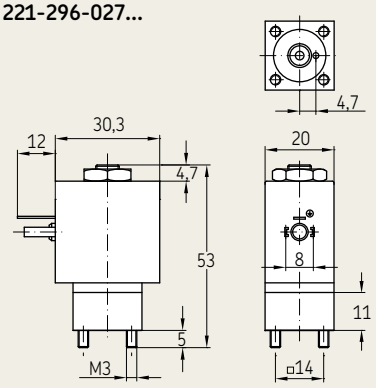


3/2 directional control valve

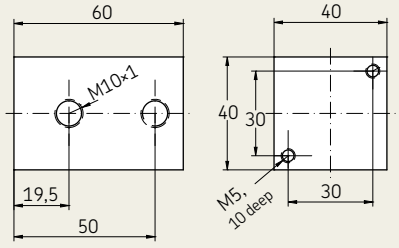
	Order number
230 V AC, 50 Hz	**221-296-027+263**
120 V AC, 60 Hz	**221-296-027+758**
24 V DC	**221-296-027+924**
Valve body	**993-000-196**

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)



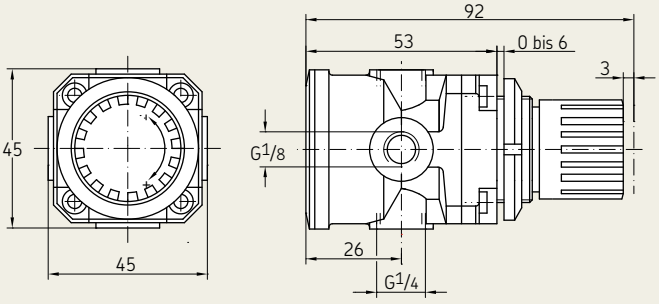
Air pressure control valve

Order number.	**231-900-028**
Type	Diaphragm regulator
max. primary pressure	0–16 bar
Secondary pressure	0,5–10 bar
Operating temperature	0–80 °C
Sealing material	NBR

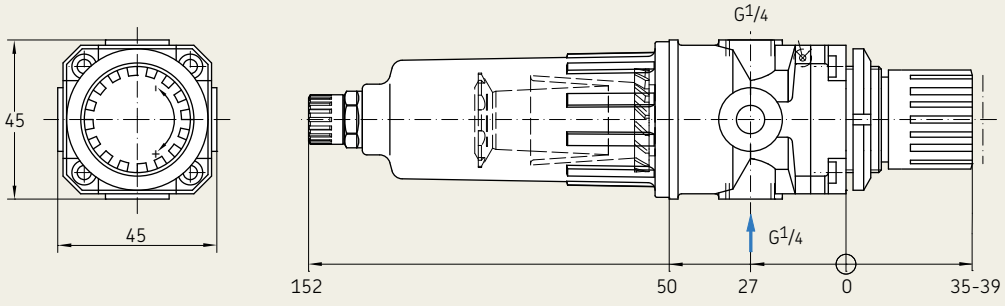
Air pressure control valve incl. filter and water separator

Order number	**231-900-028.U1**
Filter	5 µm

231-900-028



231-900-028.U1



SKF Oil+Air lubrication

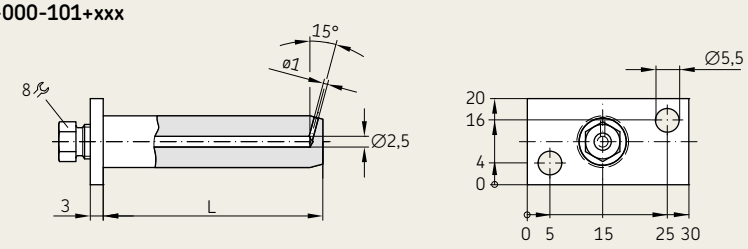
Accessories

Nozzles

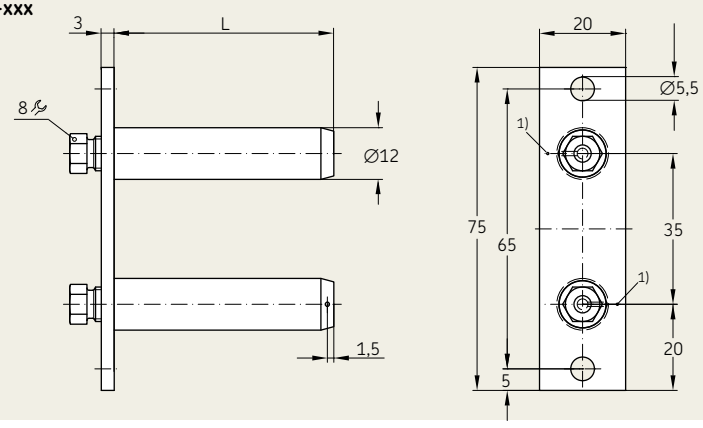
Order number	Description
169-000-101+xxx [1]	Nozzle for tube ∅4 mm L=15–120 mm
169-000-102+xxx [1]	Double nozzle for Rohr ∅4 mm L=15–120 mm
P-89.29	Nozzle for tube ∅4 mm
P-89.29-S3	Nozzle for tube ∅4 mm, stainless steel
P-89.29-VS	Nozzle for tube ∅4 mm, with claw groove for SKF plug connectors

1) Specify the desired lenght L for xxx

169-000-101+xxx

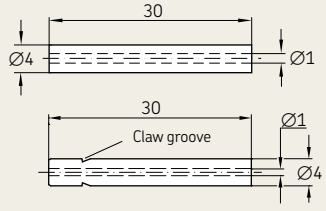


169-000-102+xxx



1) Spray direction is indicated by marking

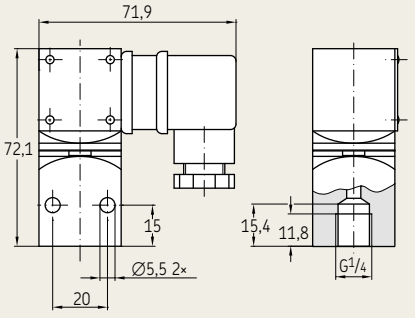
P-89.29(-S3)
P-89.29-VS



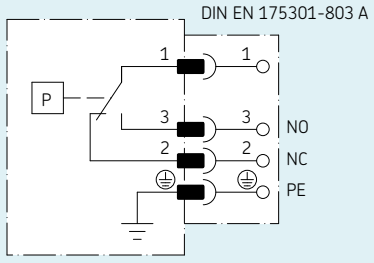
Pressure switch for minimum air pressure

Order number	**176-271-001**
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

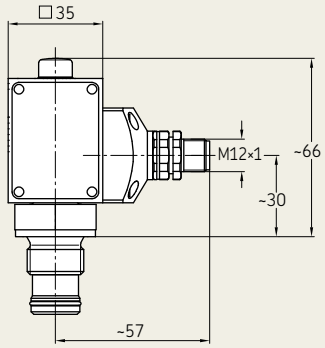


Contact position shown: Switch depressurized

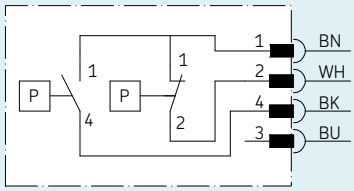
Differential pressure switch

Order number	**176-200-009**
Contact type	1×NC contact, 1×NO-contact
Max. voltage	24 V AC/DC
Max. switching capacity	15 VA/W
Opening pressure	Δ5 bar -10 %
Max. operating pressure	420 bar

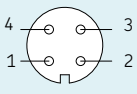
176-200-009



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

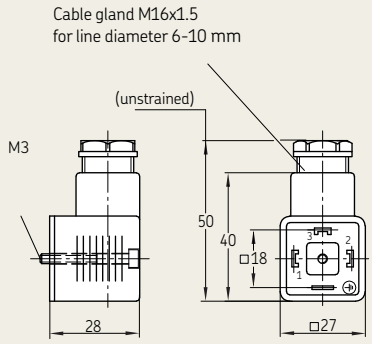
Accessories

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

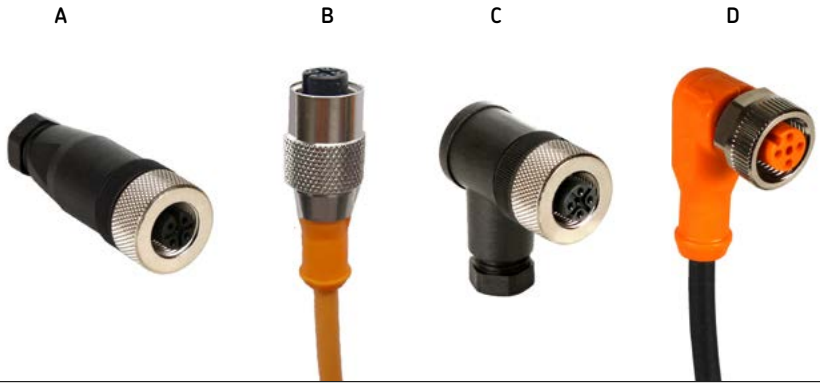
179-990-033



Circular connector M12×1

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, 4×0,34 mm²) (D)

Circular connector

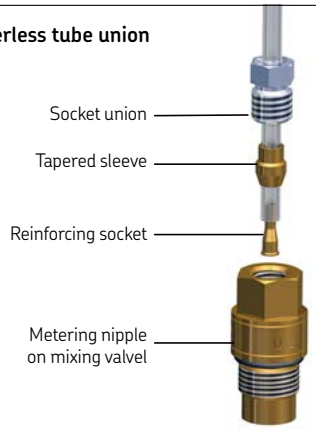


Tube unions for plastic tubing ∅4 mm

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



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
WVN715-R04×0.85	Plastic tubes ∅ 4 mm, semirigid (unplasticized), length 50 m	1-0103-EN
WVN716-R04×0.85	Plastic tubes ∅ 4 mm, flexible (plasticized), length 50 m	1-0103-EN

Plastic tubes

Pressure filter for oil

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

Oil lfilters with monitoring

Oil filters without monitoring

Oil-streak sensors

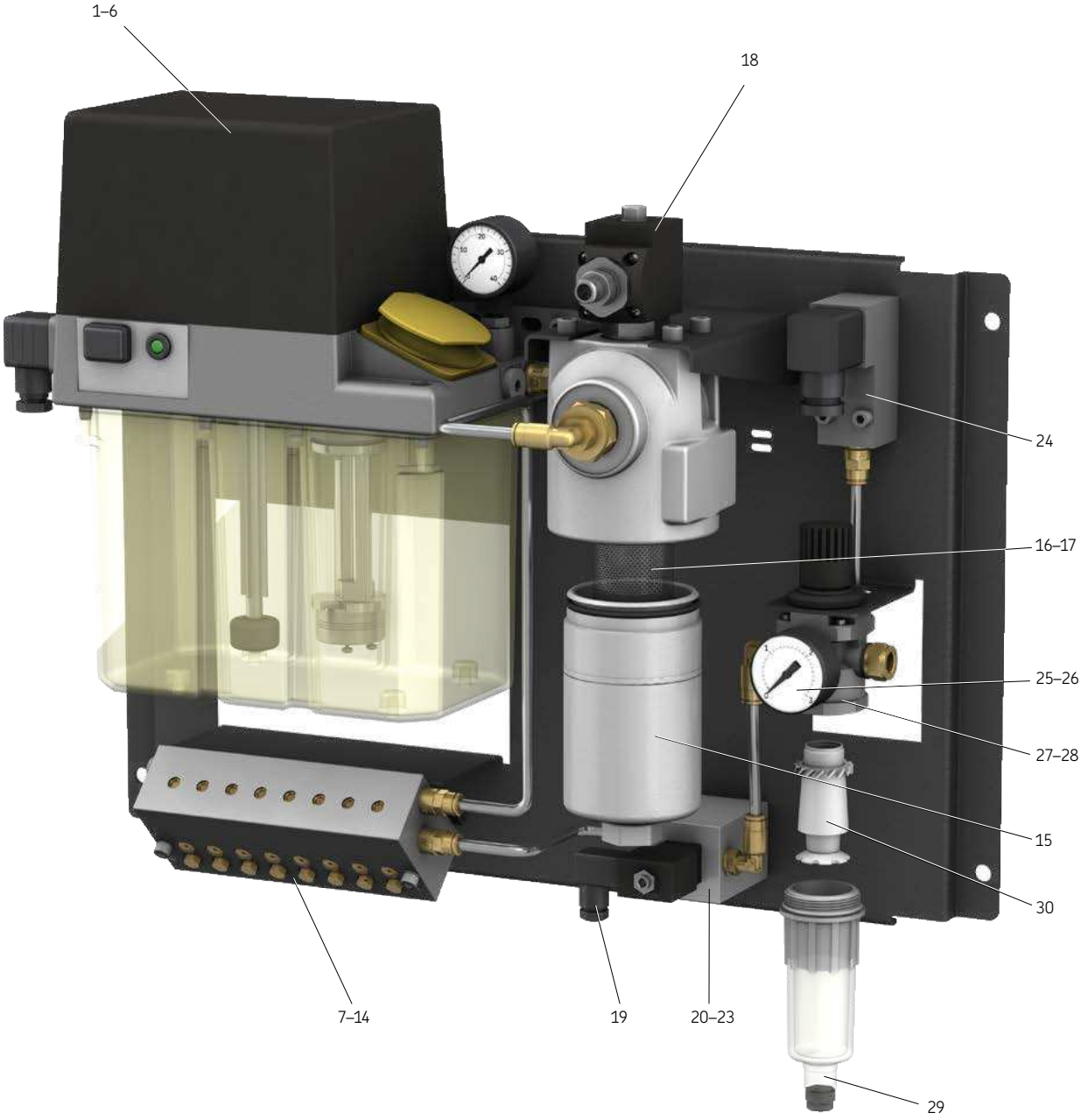
Order number.	Designation	Detailed information in brochure
GS4011-S50	Oil-streak sensor for 60–120 mm³/h and line diameter of 4 mm	1-1704-EN
GS4011-S20	Oil-streak sensor for 120–600 mm³/h and line diameter of 4 mm	1-1704-EN

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	**MKL2-12FC11000+428**	Gear pump unit with IG54-20-S4-I control unit, for 230 V 50/60Hz
2	**MKL2-12FC11000+429**	Gear pump unit with IG54-20-S4-I control unit, for 115 V 50/60Hz
3	**MKL2-12FC11000+924**	Gear pump unit with IG54-20-S4-I control unit, for 24 V DC
4	**MKU2-12BC11000+428**	Gear pump unit without control unit, for 230 V 50/60 Hz
5	**MKU2-12BC11000+429**	Gear pump unit without control unit, for 115 V 50/60 Hz
6	**MKU2-12BC11000+924**	Gear pump unit without control unit, for 24V DC
7	**MV201-1...**	Oil+air metering unit, 1-port
8	**MV202-1...**	Oil+air metering unit, 2-port
9	**MV203-1...**	Oil+air metering unit, 3-port
10	**MV204-1...**	Oil+air metering unit, 4-port
11	**MV205-1...**	Oil+air metering unit, 5-port
12	**MV206-1...**	Oil+air metering unit, 6-port
13	**MV207-1...**	Oil+air metering unit, 7-port
14	**MV208-1...**	Oil+air metering unit, 8-port
15	**853-880-011**	NG40 housing for oil filters
16	**169-400-250**	Filter element 10 µm for oil filters
17	**169-400-260-V57**	Filter element 3 µm for oil filters
18	**176-200-009**	Differential pressure switch for oil filters
19	**179-990-465**	Connector socket for 3/2 directional control valve
20	**221-296-027+263**	3/2 directional control valve for 230 V, 50 Hz
21	**221-296-027+758**	3/2 directional control valve for 120 V, 60 Hz
22	**221-296-027+924**	3/2 directional control valve for 24 V DC
23	**993-000-196**	Valve body, complete for 3/2 directional control valve
24	**176-271-001**	Pressure switch 3 bar for monitoring of minimum air pressure
25	**169-101-606**	Pressure gauge for air pressure reducing valve (sealing ring ordered separately = item 26)
26	**248-610.03**	Sealing ring G1/8 CU for pressure gauge
27	**231-900-028.U1**	Air pressure control valve + 5 µM filter complete with air filter and water separator
28	**231-900-028**	Air pressure control valve without air filter and water separator
29	**231-900-035**	Water separator container
30	**231-900-034**	Filter insert 5 µM
31	**995-810-047**	Complete documentation for oil+air lubrication unit, incl. Declaration of Incorporation and Conformity

Notes

Notes

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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