Circulating Lubrication Systems (Oil)

Screw-in Restrictors, Metering Valve Distributors, Flow Volume Dividers

Screw-in restrictor

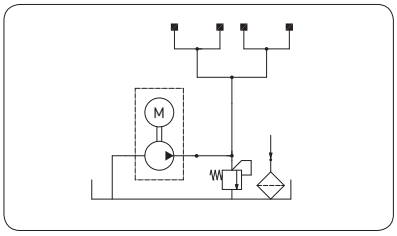
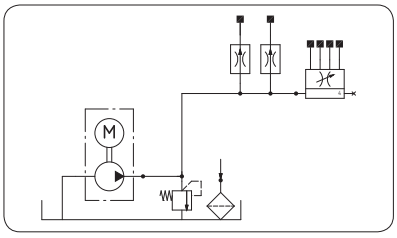
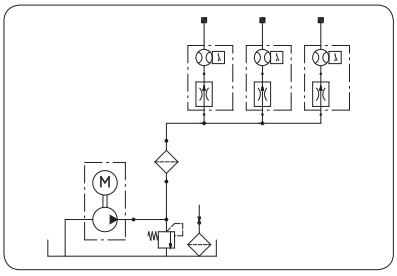
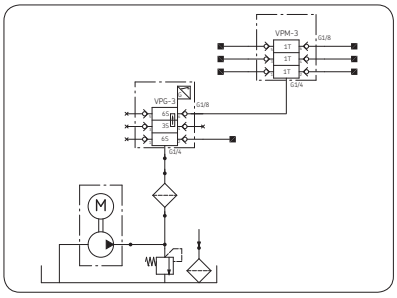
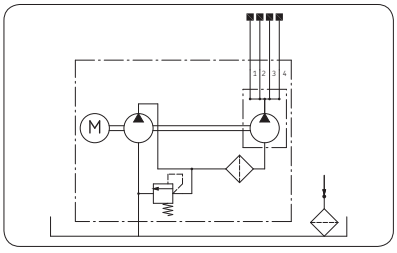
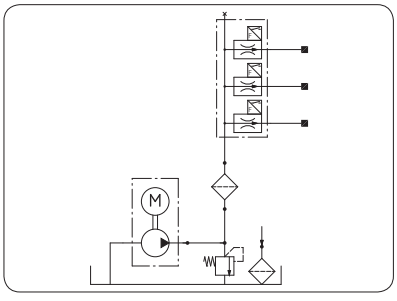
Metering valve distributor

Flow volume divider SP/SMT
(cf. leaflet 1-5017-EN)

A continuous flow oil is often necessary for the lubrication or cooling of machines or systems requiring large amounts of oil. This flow is produced by gear, gerotor, vane and piston pumps and then distributed to meet the needs of the individual lube points.

The system is very simple if there is only one lube point to be supplied. But if the lubricant is to be delivered to a number of lube points in equal quantities or certain proportions, there are several possibilities entailing different expenses and effects.

If must be remembered that circulating lubrication systems require an oil return line from the lube points to the oil reservoir. Adequate filtering of the oil must be provided for. Restrictors, especially for small amounts of oil, are sensitive to dirt.

	Distribution systems		System description
1		***1a*** ***Restrictor tubes***	A pump supplies a network of lines connected to all the lube points via manifolds and branch lines. The quantity is apportioned in inverse proportion to the resistance of the restrictor tubes, screw-in restrictors or metering valve distributors. Screw-in restrictors can be installed on manifolds (cf. leaflet 1-0103-EN or screwed directly into the threads of the lube points.
		***1b*** ***Screw-in restrictors and adjust. metering valve distributors***	
		***1c*** ***Flow monitors with choke***	System similar to **1b**, but the interchangeable metering valve is installed upstream of a flow monitor in which an electrical contact is actuated by a piston moved by the oil flow. The contact returns to its neutral position when there is oil pressure without a simultaneous flow of oil. See leaflet 1-1704-EN
2		***Progressive feeders***	The flow from the pump is divided up by a feeder. The flow from this “master feeder” can be further divided up for up to a total of some 100 lube points by way of downstream progressive feeders. See leaflets 1-3013-EN to 1-3017-EN
3		***Multi-circuit pumps***	Multi-circuit pumps (e.g. 2, 4, 5, 8, 10, 20 zones) supply the lube points direct with prespecified quantities of oil that correspond to the pumps’ delivery rates. It is possible to work with or without priming pressure, depending on the operating pressures and accuracy requirements to be expected. Subdistribution of the individual zones is possible in accordance with systems **1** and **2**. See leaflet 1-1204-EN
4		***Flow volume divider***	The oil is distributed via non-adjustable flow dividers. The volumetric flow in the main line is divided up into individual parallel flows. Secondary distribution as per systems **1** and **2** is possible. See leaflet 1-5017-EN

lAuxiliary equipment for systems **1a** and **1b** is specified in this leaflet.

<table>
<tr><th>Volumetric flow per lube point</th><th>Perm. operating pressure [bar]</th><th>Max. number of lubrication points</th><th>Monitoring</th><th>General remarks and criteria</th></tr>
<tr><td>a few cm^3
to several l/min</td><td>2–20</td><td rowspan="3">Unlimited in practice.

Tubing cross sections and pump have to be adapted.</td><td rowspan="2">No monitoring of individual points, pressure can only be monitored in the main line.</td><td rowspan="3">1a
For an even distribution of oil provide for the most symmetric layout possible. Lay tubing with the largest possible cross sections from the pump to the junctions.
When individual points require different amounts of oil, change the lengths or cross sections of the restrictor tubes to obtain the respectively needed quantity.
Inexpensive, reliable, insensitive to dirt. Planning is complicated when extensive, asymmetric systems with different oil needs are involved.
1b 1c
Restrictors can clog up when unfiltered oil is used. It is therefore necessary to install a microfilter upstream in the systems, preferably with a dirt indicator. Planning and quantity regulation easy. The pressure losses in the tubing have to be taken into account when the system is designed.
1a 1b 1c
Metering imprecise with fluctuating and varying back pressures. Often of no importance in circulating lubrication systems not used for cooling purposes at the same time.
The systems do not depend on the viscosity.</td></tr>
<tr><td>Screw-in restrictors:
0.2–230 cm^3/min

Metering valve
0–2000 cm^3/min</td><td>2–20

0–10</td></tr>
<tr><td>0.05–14 l/min</td><td>5–25</td><td>Oil flow is monitored. An alarm is triggered if the flow drops below the bottom limit of the range for the flow monitor selected.</td></tr>
<tr><td>a few cm^3
to 1 l/min</td><td>5–200

Pressure should not exceed 100 bars in circulating lubrication systems.</td><td>2 to roughly 100</td><td>Central monitoring of functions of all distributors easy since system-related.</td><td>Pulsating oil current. Very exact apportioning of quantities, even with back pressures.

Planning complicated, especially changes at a later date.

The systems depend on the viscosity.</td></tr>
<tr><td>0.015–1.2 l/min per outlet</td><td>20 or 80 depending on pump</td><td>2, 4, 5, 8, 10, 20 zones per pump</td><td>Monitoring of one or more strings of lines with flow monitors or the like possible.</td><td>Easy to plan.

A monitored string of lines already shows the pump is operating and “lubricant is available”.

The lower the pressure difference between the priming pump and distributing pump the more even the delivery rates are in relation to each other.</td></tr>
<tr><td>0,09–100 l/min per outlet port</td><td>Max. 200 depending on flow divider</td><td>Limited in practice.</td><td>Monitoring of one or more strings possible due to system.</td><td>The incoming volumetric flow is divided up into individual parallel flows.
The volumetric flow produced does not depend on the system pressure and is nearly independent of the viscosity.

The individual volumetric flow rate can be altered by an exchange of plug-in nozzles.</td></tr>
</table>

Screw-in restrictors

See important product usage information on the back cover.

Screw-in restrictors are used to deliver relatively small amounts of oil to the lube points. The sizes are identified by code numbers.

The diagrams show the flow rates of the individual sizes as a function of the pressure and as measured with an operating viscosity of the oil amounting to 140 mm^2/s. The flow rate varies with the viscosity.

The restrictors are marked with a direction arrow .The types **A** and **D** can either be combined and fitted to manifolds (cf. leaflet 1-0103-EN) or types **B** and **C** directly screwed into the ports of the individual lube points.

Special attention must be paid to the use of clean oil, the recommended filter size being 10 µm.

Screw-in restrictors of types **C** and **D** additionally contain one check valve each that can help to prevent leaks, for instance.

The scope of delivery also covers union nuts and tapered rings when types **C** or **D** are ordered.

Type A

Port tapped for solderless tube connection.

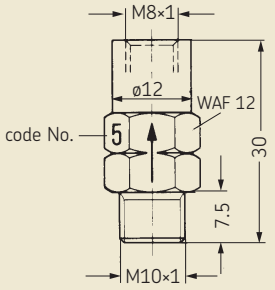
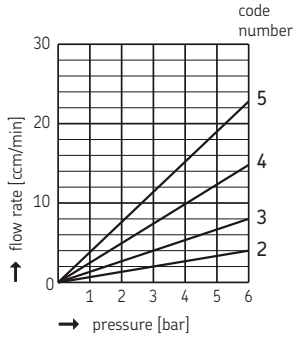
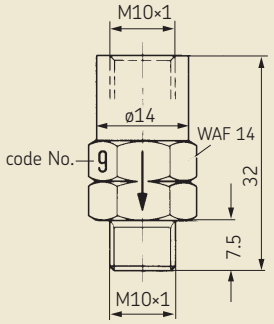


Diagramm (types A and B)



Type B

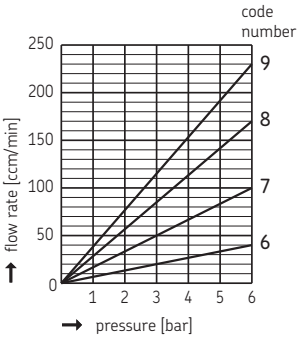
Port tapped for solderless tube connection.



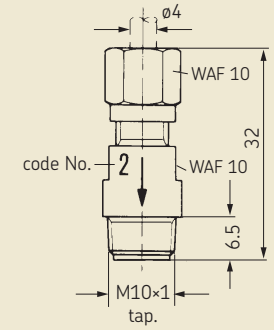
Order No.	for tube diam.	Code No.	Type
VD1-102	4	2	A
VD1-103		3	
VD1-104		4	
VD1-105		5	
VD1-106		6	
VD1-107		7	
VD1-108		8	
VD1-109		9	
VD2-102	6	2	B
VD2-103		3	
VD2-104		4	
VD2-105		5	
VD2-109		9	

Washer, order No. 504-019

Diagram (types A and B)



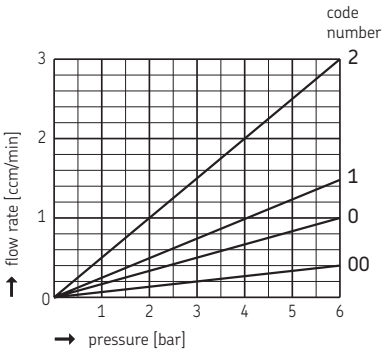
Type C



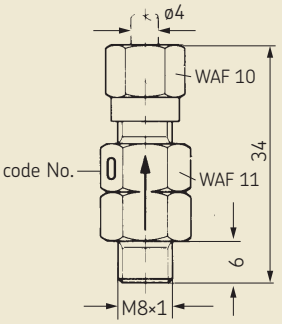
Order No.	for tube diam.	Code No.	Type
VD3-099	4	00	C
VD3-100		0	
VD3-101		1	
VD3-102		2	

Tube connection acc. to DIN 2353

Diagram (types C and D)



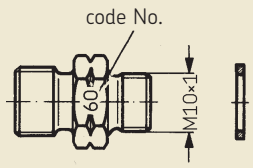
Type D



Order No.	for tube diam.	Code No.	Type
VD4-099	4	00	D
VD4-100		0	

Washer, order No. DIN 7603-A8×11.5-CU

Connecting piece with restrictor (compl. with washer)



Order No.	for tube diam.	Connection thread [1]	Code No.
GD60	4	M12×1.5	60
GD61			61
GD62			62
GD63			63
GD64			64
GD65			65
GD80	6	M14×1.5	80
GD81			81
GD82			82
GD83			83
GD84			84
GD85			85
GD86			86
GD87			87
GD88			88
GD89			89

[1] *Ports tapped for solderless tube connection to DIN 2353 (cutting sleeve)*

Determining the restrictor size

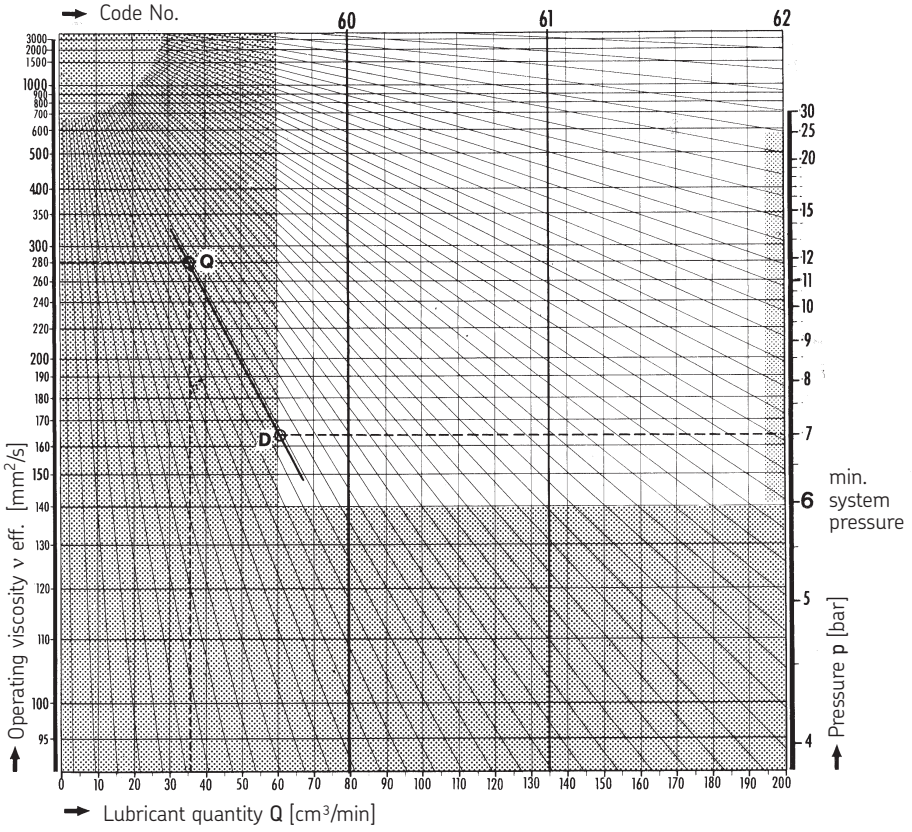
1. Draw a straight line along the index lines through point Q eff.
2. Determine the point at which pintersects with this line, resulting in D.
3. Select the restrictor **closest** to point D.

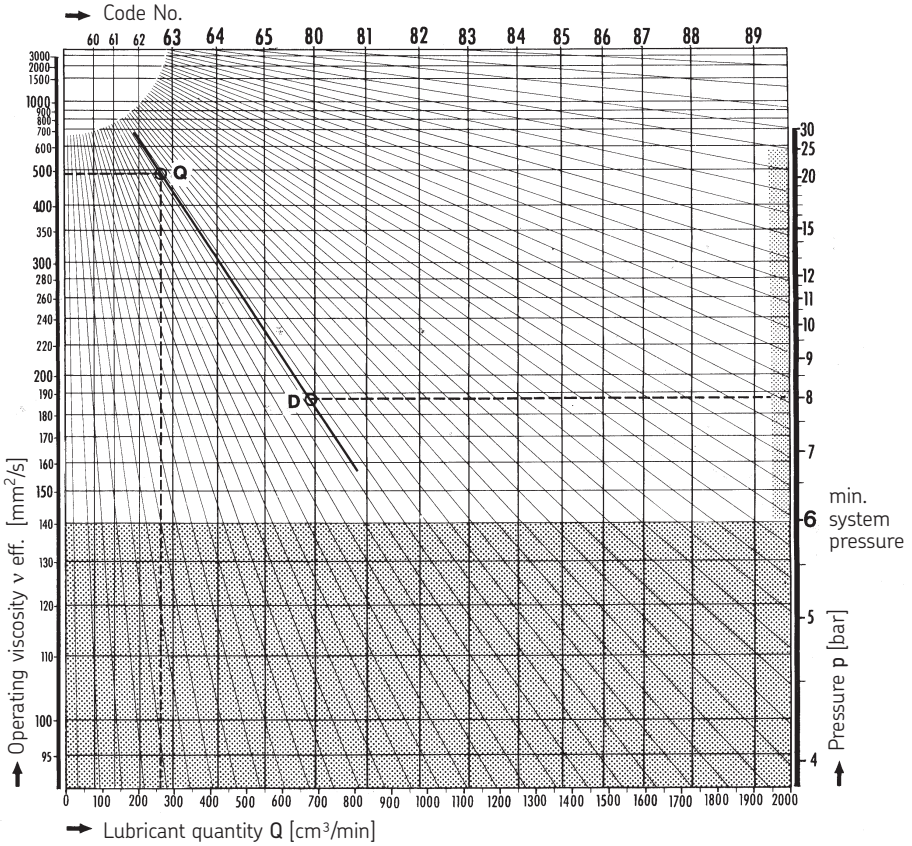
D must be inside the white field, i.e. small amounts cannot be "apportioned and monitored" with the unit.

Example 1
required: Q = 36 cm³/min,
given: ν eff = 280 mm²/s,
p = 7 bar
Result: restrictor size No. 60 (borderline case)

Example 2
required: Q = 260 cm³/min,
given: ν eff = 480 mm²/s,
p = 8 bar
Result: restrictor size No. 80

Nomograph for determination of restrictor size





Metering valve distributors

These metering valve distributors are used if an infinitely variable adjustment of the flow rate per lube point is required – even at a later date.

In the case of **type A – for flow rates within the drop-feed range –** knurled lock nuts and knurled screws are provided for adjustment purposes. It is necessary to provide for a sufficiently large drain-off in order to maintain a free fall of drops in the sight-glass.

In the case of **types B and C**, the **continuous flow rate** is adjusted after the upper hexagonal lock nut is loosened. Spring-loaded metal pins in sight glasses indicate that oil is flowing when they move away from the mark.

Technical data

Operating pressure . . . . . 10 bars
Viskosity range . . . . . 10 to 1000 mm²/s
Temperature range . . . . . 0 to +60 °C
Mounting position. . . . . as shown

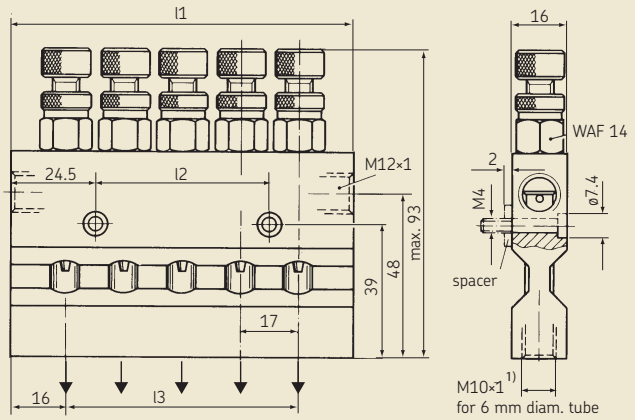
Output range
type A . . . . . 0 to 10 cm³/min
type B . . . . . 10 to 1000 cm³/min
type C . . . . . 10 to 2000 cm³/min

Indicating range B and C at 110 mm²/s
commencement of indication . . . . at 10 cm³/min
end of indication. . . . . at 1000 or 2000 cm³/min

Order No.	Number of lube points	Dimensions [mm] l1	l2	l3	Type
242-016.00	1	32	–	–	A
242-026.00	2	49	–	17	A
242-056.00	5	100	51	68	A
242-146.00	14	253	204	221	A
242-024.00	2	49	–	17	B
242-034.00	3	66	17	34	B
242-044.00	4	83	34	51	B
242-054.00	5	100	51	68	B
242-064.00	6	117	68	85	B
242-104.00	10	185	136	153	B
242-124.00	12	219	170	187	B
242-025.00	2	66	–	23	C
242-035.00	3	89	23	46	C
242-045.00	4	112	46	69	C
242-055.00	5	135	69	92	C
242-065.00	6	158	92	115	C

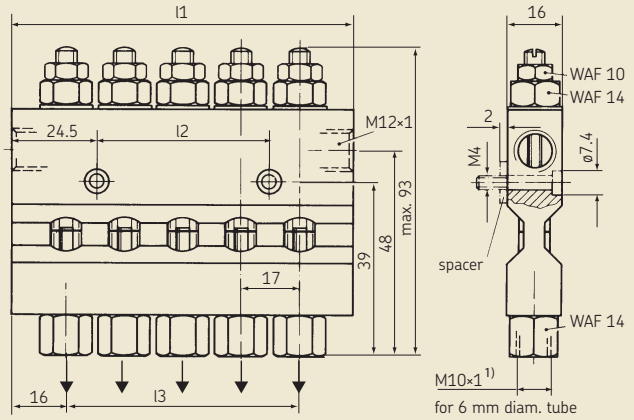
	Types A and B	Type C
Adapter for main tube	**406-162** for 6 mm diam. **408-162** for 8 mm diam. **410-162** for 10 mm diam.	**410-018** for 10 mm diam. **412-004** for 12 mm diam.
Screw plug	408-211	412-011
Washer	508-215-CU	DIN7603-A18×22-CU

Type A



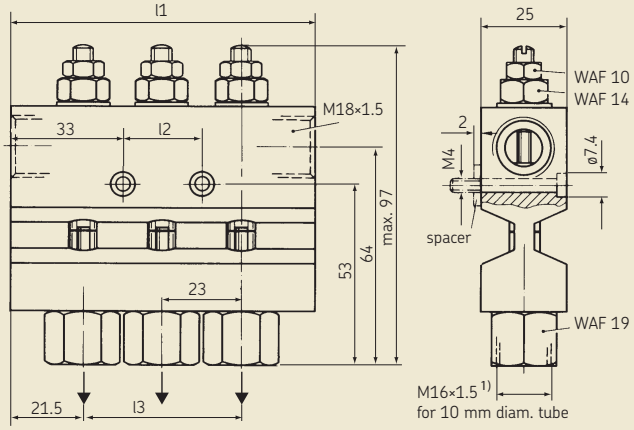
1) Ports tapped for solderless tube connection

Type B



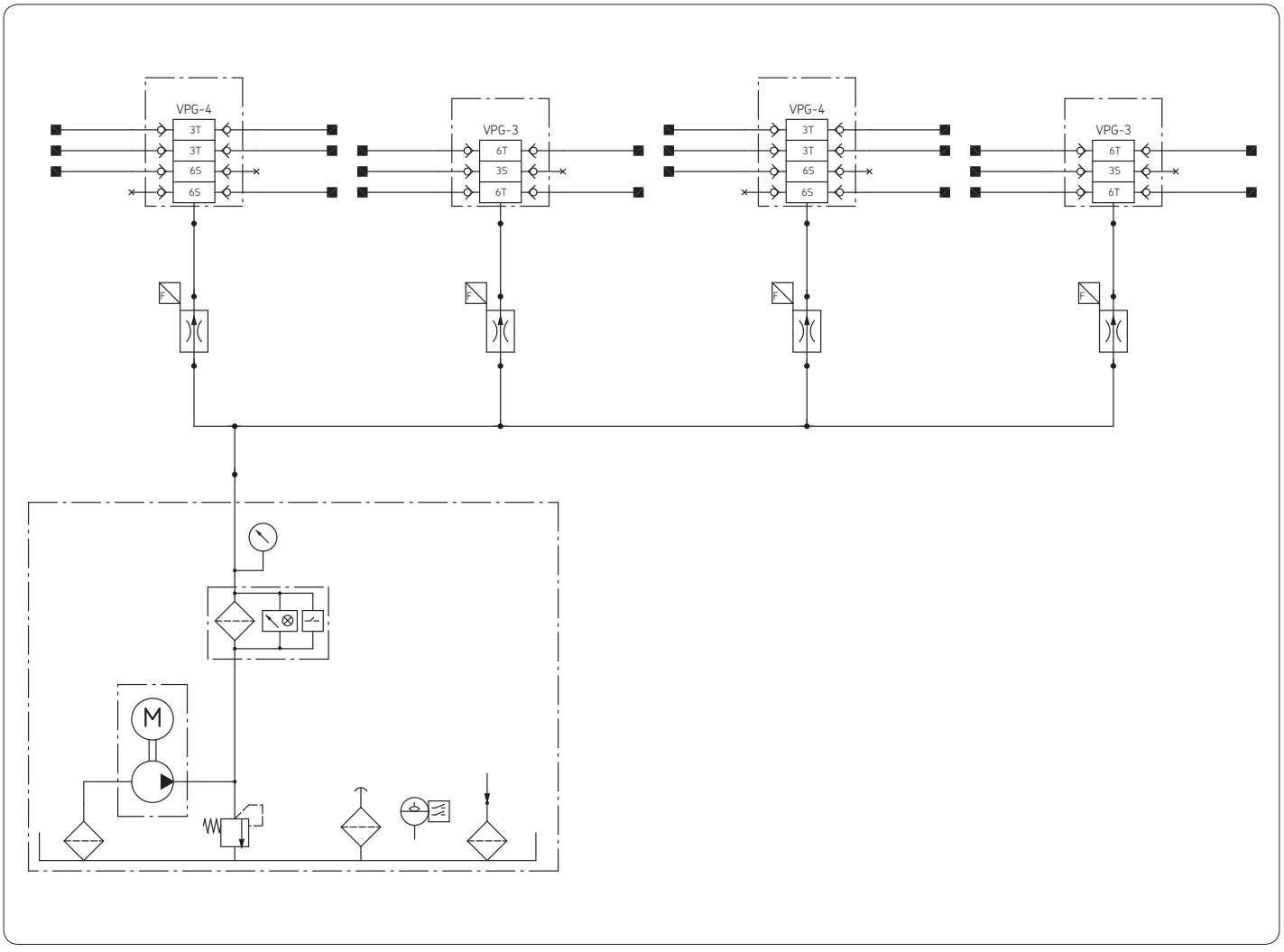
1) Ports tapped for solderless tube connection

Type C



1) Ports tapped for solderless tube connection

Layout of a circulating lubrication system (printing machine) with progressive feeders



Order No. 1-5006-EN
Subject to change without notice! (07/2009)

Important product usage information
All products from SKF may be used only for their intended purpose as described in this brochure and in any instructions. If operating instructions are supplied with the products, they must be read and followed.
Not all lubricants are suitable for use in centralized lubrication systems. SKF does offer an inspection service to test customer supplied lubricant to determine if it can be used in a centralized system. SKF lubrication systems or their components are not approved for use with gases, liquefied gases, pressurized gases in solution and fluids with a vapor pressure exceeding normal atmospheric pressure (1013 mbars) by more than 0.5 bar at their maximum permissible temperature.
Hazardous materials of any kind, especially the materials classified as hazardous by European Community Directive EC 67/548/EEC, Article 2, Par. 2, may only be used to fill SKF centralized lubrication systems and components and delivered and/or distributed with the same after consulting with and receiving written approval from SKF.

Further brochures
1-9201-EN Transport of Lubricants in Centralized Lubrication Systems

SKF Lubrication Systems Germany AG
Motzener Strasse 35/37 · 12277 Berlin · Germany
PF 970444 · 12704 Berlin · Germany
Tel. +49 (0)30 72002-0 · Fax +49 (0)30 72002-111
www.skf.com/lubrication

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