System description

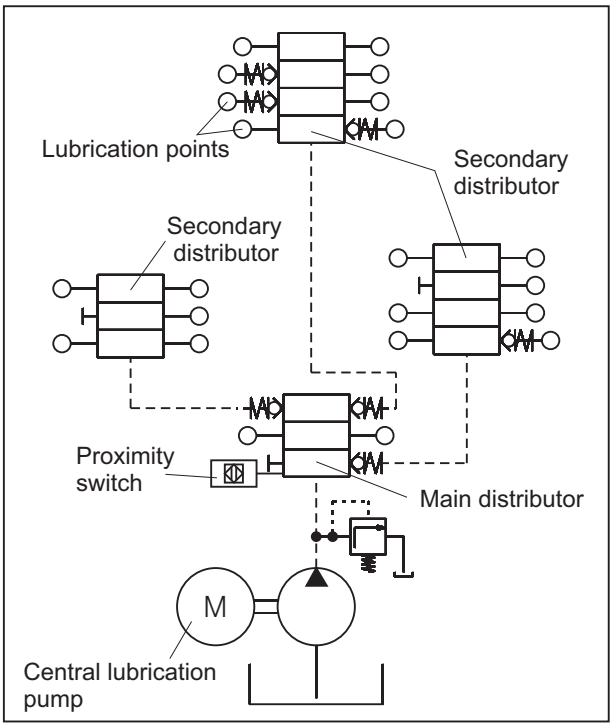
At progressive central lubrication systems is the lubricant progressively distributed to the lubrication points by the main and secondary distributors.

BEKA progressive systems are designed to deliver oil, fluid greases and multi-purpose greases up to NLGI-cl. 2.

The progressive system works with pressures of 10 to 300 bar, depending on the back pressure or the line- and distributor resistance.

Construction

A progressive system mainly consists of a central lubrication pump, the progressive distributors and a control unit.



Applications

The main application fields of progressive systems are presses and synthetic processing machines, printing- and paper processing machines, machine tools, packing machines, textile machines, wood- and metal working machines (non-cutting and cutting) as well as mobile machines.

Advantages

- simple design
- well-arranged construction and easy installation
- easy expansion, alteration or reduction of existing systems possible
- maintenance-free components
- exact metering due to a wide range of types
- economic supply of many lubrication points by one single pump
- simple electronic monitoring of the lubricant volume

Function

Progressive systems distribute the lubricant progressively via a follower piston control.

Because of this follower piston control a progressive system can easily be monitored with a pressure limitation valve. If one of the lubrication points is not lubricated, the follower piston control is stopped. The system blocks and the lubricant comes out of the pressure limitation valve.

The volume flow can additionally be monitored by a proximity switch at the distributor.

A central lubrication pump delivers the lubricant to one or several main distributors. These distributors bring the lubricant in the right quantity to one or several secondary progressive distributors and then to the individual lube points. An electronic control device regulates the break- and lubrication time of the pump.

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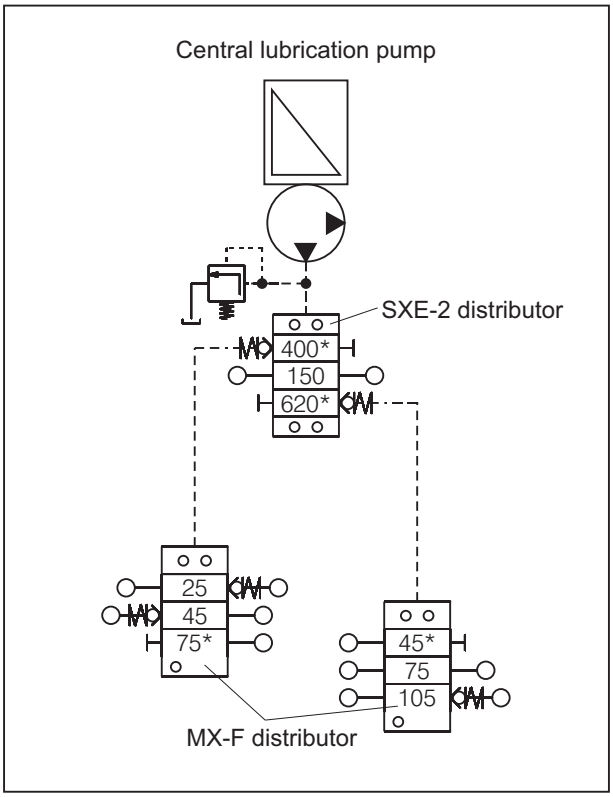
System design

The drive is decisive for the selection of progressive system components.

You can select between manual, hydraulic, pneumatic and electrical actuation.

The choice of the lubrication metering components depends on the size and the number of the bearing points which have to be lubricated.

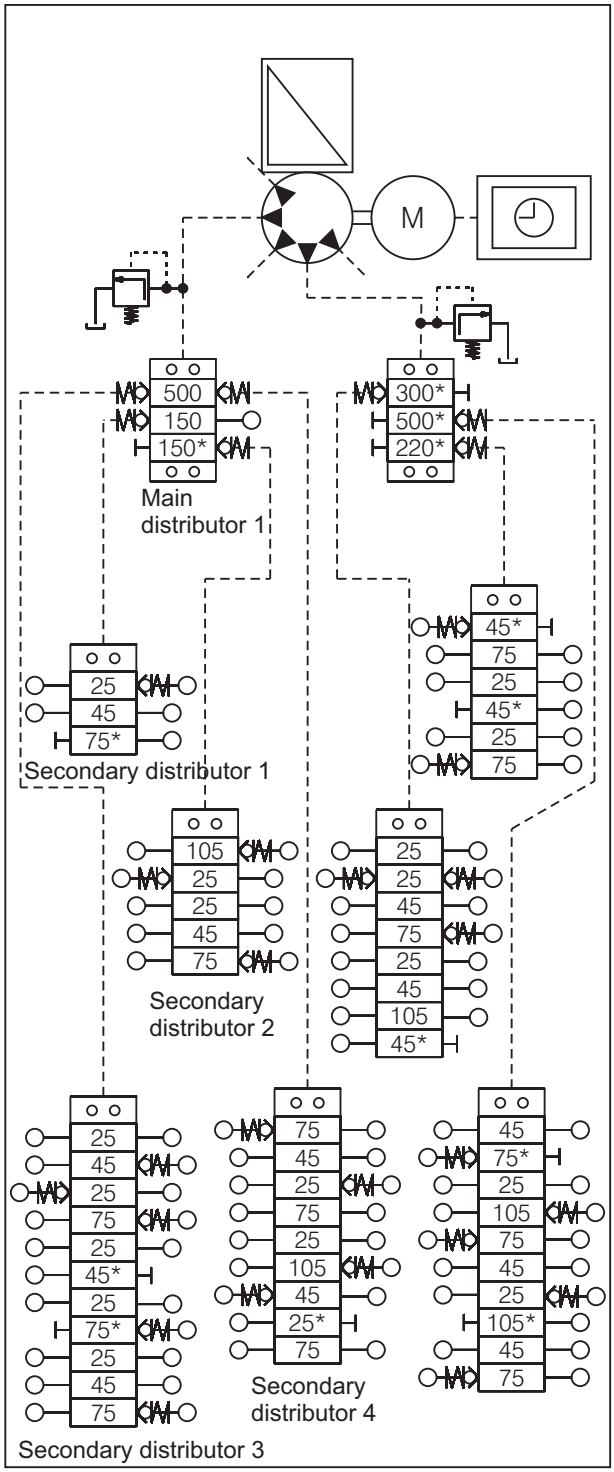
Different models of progressive distributors can be combined in one system. A system consisting of MX-F distributors can have a SXE-2 distributor as a main distributor, for example.



Design and installation of progressive systems

A scheme is created first, corresponding to the number and position of lubrication points and the drive of the pump.

The following example shows a progressive system with an electrically driven pump and integrated control.



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Calculation of the main distributor

The main distributors transport the lubricant to the secondary distributors.

The metering volume of the individual secondary distributors is calculated of the metering volume code numbers. Those are added and related to each other.

See figure on the previous page:

Secondary distributor 1:
(25 + 45 + 75) x 2 = 290

Secondary distributor 2:
(105+25+25+45+75) x 2 = 550

Secondary distributor 3:
(25 + 45 + 25 + 75 + 25 + 45 + 25 + 75 + 25 + 45 + 75) x 2 = 970

Secondary distributor 4:
(75 + 45 + 25 + 75 + 25 + 105 + 45 + 25 + 75) x 2 = 990

The metering volume code numbers have to be multiplied with 2 as the distributor disks deliver on the left and on the right.

Relation Code-no.	Main distributor 1 (e. g. SXE-2)	Relation distributor
290 = 1	app. SXE-2 150	app. 1
550 = 1,9	app. SXE-2 150 x 2 = 300	app. 2
970 = 3,35	app. SXE-2 500	app. 3,33
990 = 3,4	app. SXE-2 500	app. 3,33

The relations does not have to correspond exactly. A tolerance of ± 0,2 is permissible.

Lines

The pump is connected with the main distributors, respectively the main distributors are connected with the secondary distributors by steel pipe, high pressure hose or polyamide pipe.

Use non-return valves in each outlet when higher bearing back-pressures have to be expected

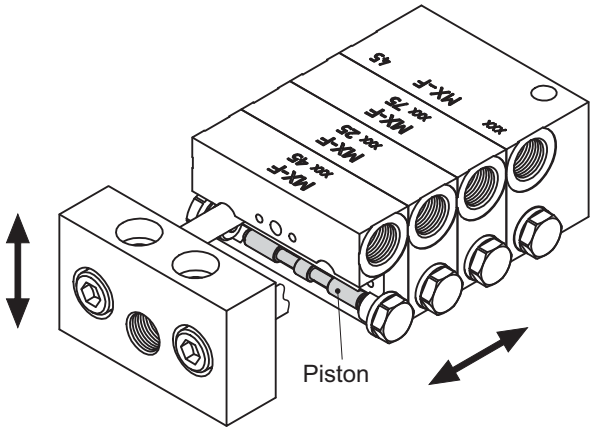
.

They are also necessary for the outlets of those main distributors which supply the secondary distributors.

Installation of the distributor

Caution:

The position of the distributor (piston) has to be contrary to the direction of shock (arrow sign).



The installation surface has to be even and must not have any obstacles that could result in stress of the distributor during the assembly.

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Selection criteria

- Drive (manual, hydraulic, pneumatic, electric)
- Lubricant (oil, fluid grease, grease)
- Metering volume
- Range of pressure, depending on the number and counter-pressure of the lubrication points, distributors and the line system.

Calculation of the pump operation time

The pump operation time is calculated with the metering volume code numbers of the secondary distributors and the pump's metering volume per stroke or per minute (time control).

See figure of a calculation of the main distributor

Secondary distributor 1:
25 + 45 + 75 = 145 x 2 = 290 mm³

Secondary distributor 2:
105 + 25 + 25 + 45 + 75 = 275 x 2 = 550 mm³

Secondary distributor 3:
25 + 45 + 25 + 75 + 25 + 45 + 25 + 75 + 25 + 45 + 75 = 485 x 2 = 970 mm³

Secondary distributor 4:
75 + 45 + 25 + 75 + 25 + 105 + 45 + 25 + 75 = 495 x 2 = 990 mm³

Calculating a lubrication cycle

290 mm³/cycle + 550 mm³/cycle+
970 mm³/cycle + 990 mm³/cycle =
2800 mm³

Calculation of the output rate of the pump

(e.g. FKGM-EP with electrical drive and gear, with pump element PE 120)
Motor revolutions: 1400 r/min
Transmission of the gear: 80:1
(see data sheet)

1400 r/min ÷ 80 = 17,5 r/min

Metering volume of the pump element:
120 mm³/stroke

120 mm³/stroke x 17,5 r/min = 2100mm³/min

Calculation of the pump operation time

2800 mm³ ÷ 2100 mm³/min = 1,3 min
that is: 1 min 18 sec

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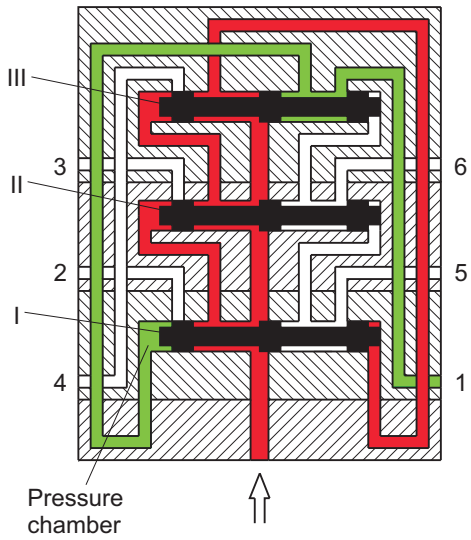
Functional description of distributors in disk design.

At distributors in disk design, the lubricant is always supplied to the outlets of the distributor disk, in which the piston moves.

The progressive distributors consist of distributor disks, which are combined to distributor blocks by connecting rods (hexagon socket screws) and disks. O-rings seal the individual elements.

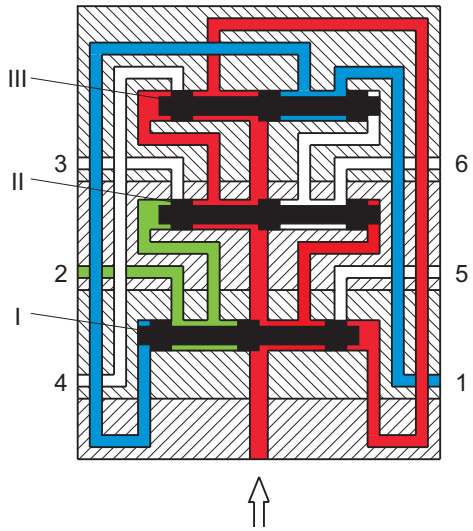
According to the functional description, the following distributors operate: MX-F, LX-4, SX-1, SX-2, SX-3, SX-5, UX.

The lubricant flows through all distributor disks to the piston (I) (fig. A). The piston (I) is shifted to the left and the lubricant of the piston's left pressure chamber is pushed towards outlet 1.



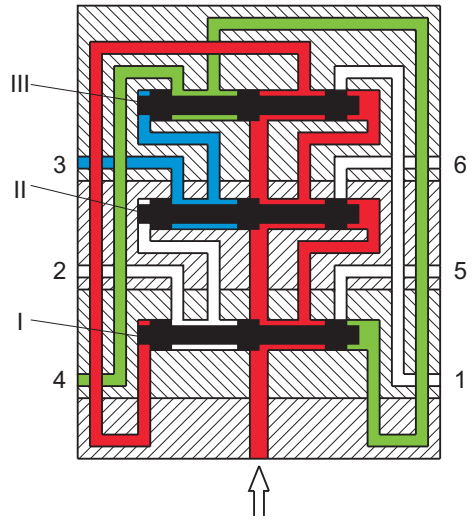
After that, the lubricant is delivered to the outlets 2 and 3 by the progressive movement of the pistons (II and III). Then the lubricant is directed to the left side of the piston (I) (fig. C) and delivered out of the piston's right pressure chamber to outlet 4.

Figure B



The pistons (II and III) are shifted and the lubricant is pushed to the outlets 5 and 6.

Figure C



After the piston III has been moved, the lubricant is directed to the piston's right side again (fig.A) and a new cycle of the progressive piston distributor is effected. This function is repeated as long as lubricant is supplied to the progressive distributor.

= pressure ducts
= already supplied
= following metering stroke

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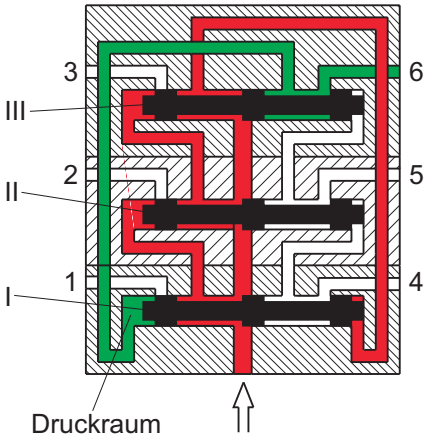
Functional description

The progressive distributor LX-3 mainly consist of individual distributor discs that are combined by connecting rods (hexagon sockets). The sealing of the individual elements is realized by O-rings.

Lubricant flows via the distributor inlet through all discs towards a piston (I) (fig. A). Piston (I) is moved to the left and lubricant is pressed from the left pressure chamber of the piston (I) to outlet 6.

Figure A



Now the metering pistons (II) and (III) are moved in sequence and lubricant is supplied towards outlets 1 (fig. B) and 2 (fig. C).

Figure B

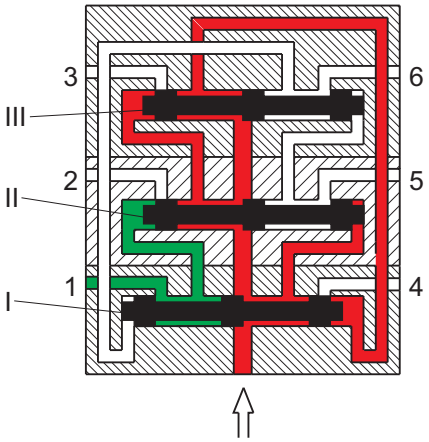
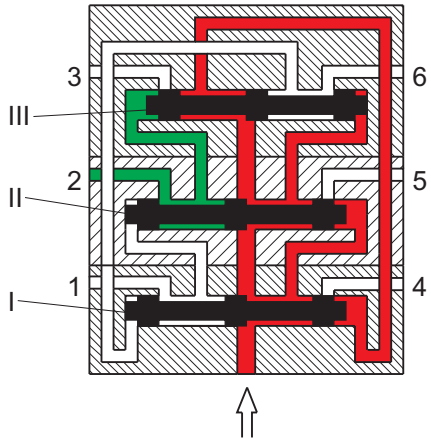
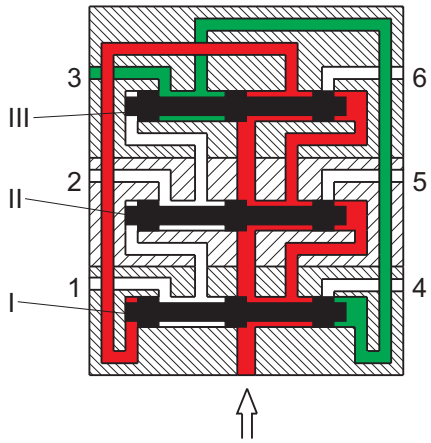


Figure C



When piston (III) has been moved, lubricant is supplied to the left side of the piston (I) (fig. D). This one is now moved to the right side and lubricant is forwarded from the right pressure chamber of the piston to outlet 3.

Figure D



Afterwards, piston (II) and (III) are moved to the right and lubricant of the right piston pressure chambers is pressed to outlet 4 and 5.

When piston (III) has been moved, lubricant is supplied to the right side of the piston (I) (fig. A) and a new circulation of the progressive piston distributor is carried out. This proceeding is repeated as long as the distributor receives lubricant.

= pressure duct

= following metering stroke

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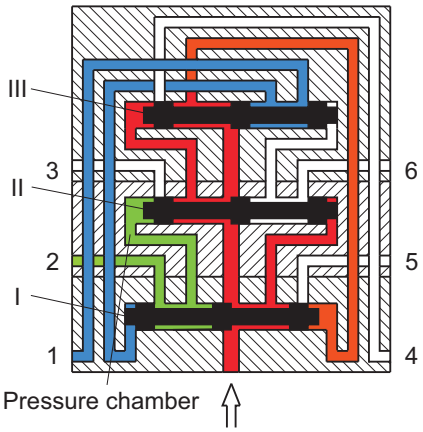
Functional description of distributors in segment construction

At distributors in segment construction, the lubricant is always delivered to those outlets of the distributor disk, in which the piston moves.

The progressive distributors in segment construction consist of metering-, initial-, middle-,and end elements, which are fixed with hexagon socket screws. The disks are combined by connecting rods with washers and nuts. O-rings seal the individual elements.

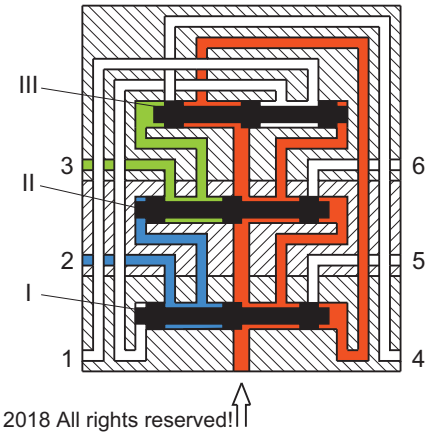
According to the functional description as shown here, the following distributors operate: SXE-2, SXE-3, SXD.

Figure A



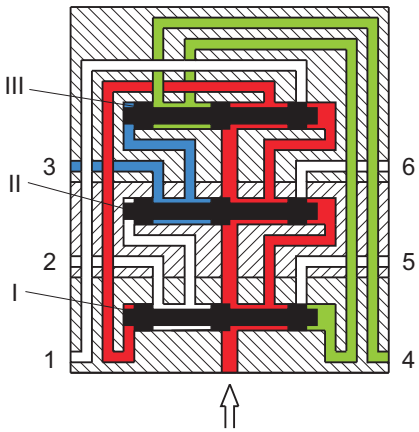
The lubricant flows to the second metering element's piston (II) (fig. A). The piston (II) is moved to the left and the lubricant is pushed out of the piston's left pressure chamber to outlet 2 (fig. B).

Figure B



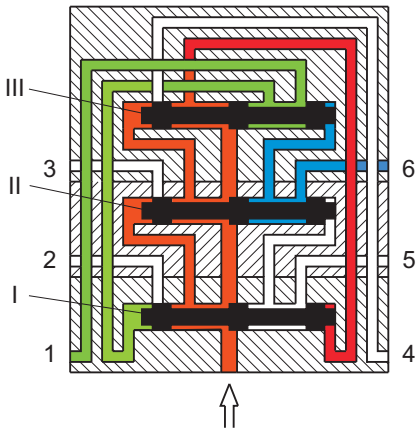
Following, the metering piston (III) is moved progressively and the lubricant is supplied to outlet 3. After the piston (III) has been moved, the lubricant is directed to the left side of the metering piston(I) (fig. C) and delivered out of the metering piston's (I) right pressure chamber to outlet 4.
After that, the metering pistons (II and III) are shifted and the lubricant is pushed to outlet 5 and 6.

Figure C



After the metering piston (III) has been shifted is the lubricant directed to the metering piston's (I) right side (fig. D) and the metering volume of the metering piston's (I) left pressure chamber is directed to outlet 1.

Figure D



A new cycle starts. This is repeated as long as lubricant is supplied to the progressive distributor.

= pressure ducts
= already supplied
= following metering stroke

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