

Progressive Central Lubrication System

APPLICATION

Centralized lubrication systems with progressive distributors preferably serve the lubrication of machinery. The lubrication capacity is up to approx. 100 lubrication points per system.

The systems are suitable for grease and oil.

MODE OF OPERATION

Progressive distributors distribute the lubricant to the lubrication points connected to their outlets, in small metered quantities progressively in a given sequence. When the last lubrication point has been supplied, the process of lubrication automatically starts again at the first lubrication point. If lubrication is interrupted at any point, because the pump is switched off or the delivery line is blocked, it continues from the same point when the system is re-started.

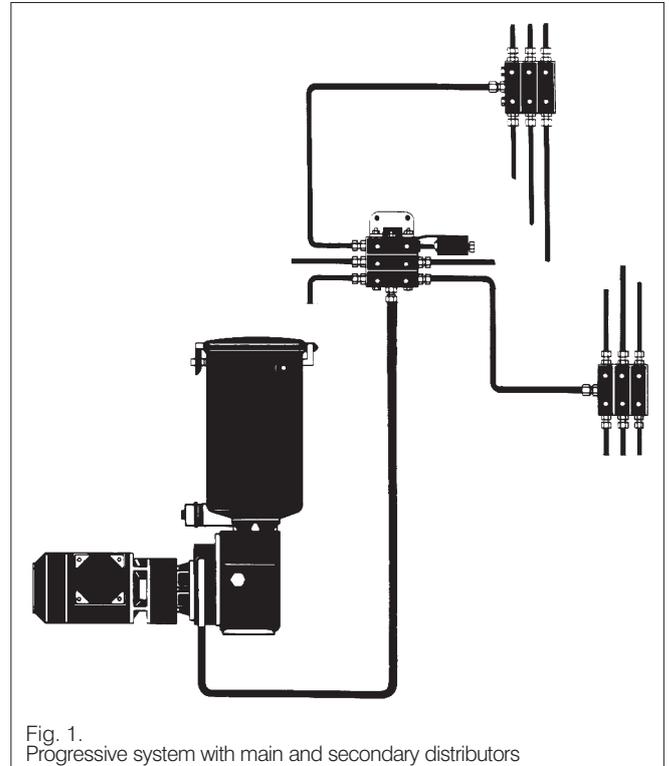


Fig. 1. Progressive system with main and secondary distributors

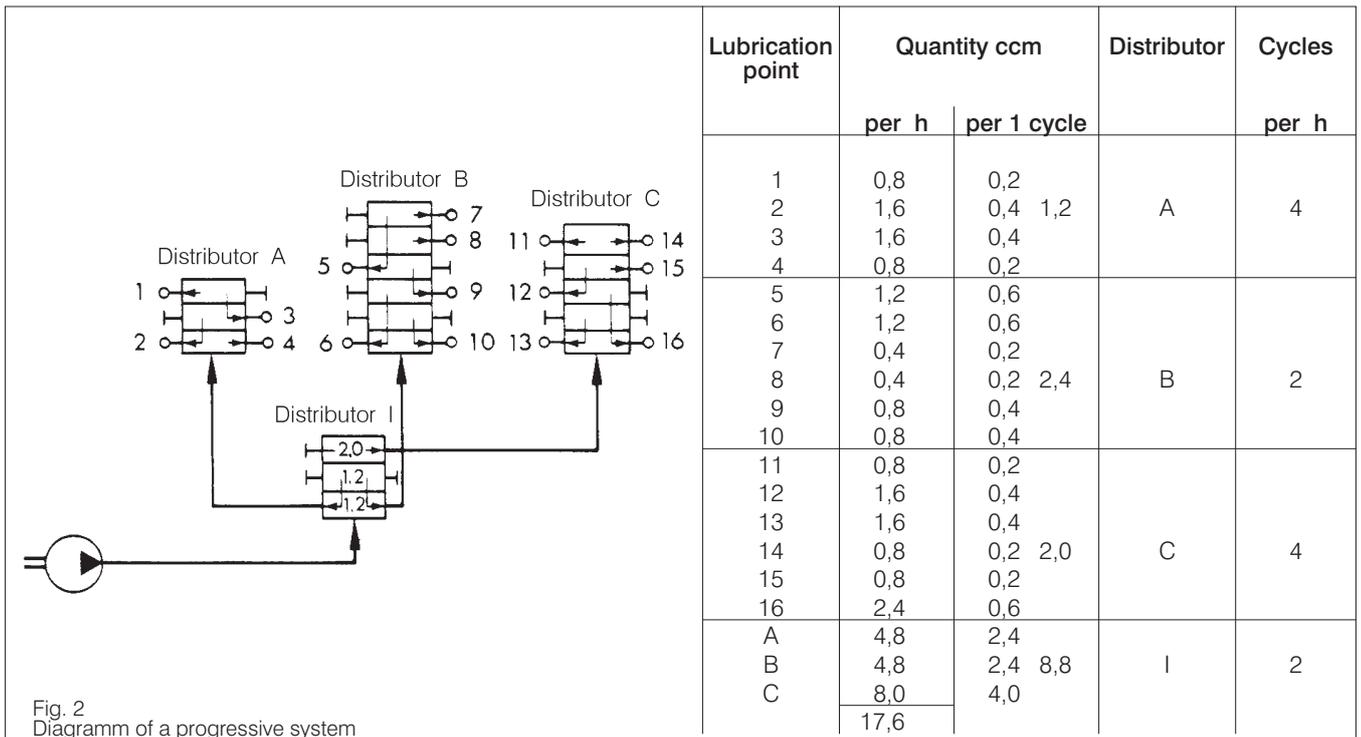


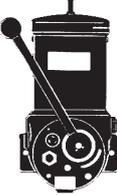
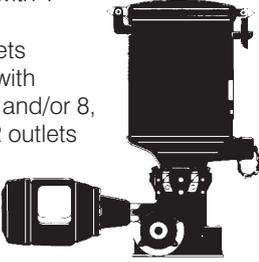
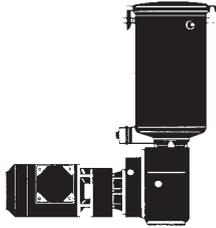
Fig. 2 Diagramm of a progressive system

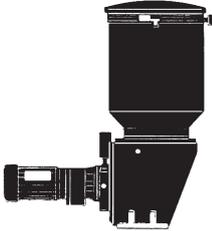
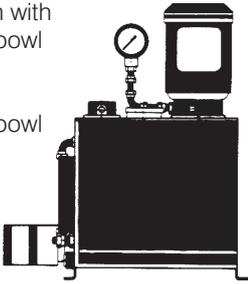
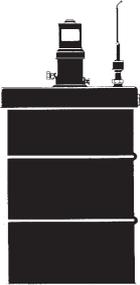
PUMPS

A simple feed pump may be used. The delivery pressure and rate must be adequate for the number of lubrication points used and the back pressure in the piping. If a pump which does not incorporate a pressure relief valve is used, a pressure relief valve or a switch unit should be inserted in the line to the first distributor to protect the pump against over pressure.

When a pressure relief valve is used and return of lubricant to the pump is necessary, the pump used should have a connection for the return line.

The max. delivery pressure for progressive distributor type ZP-A must not exceed 160 bar, for progressive distributor ZP-B the upper limit is 300 bar.

| | Designation and Code no. | Quantity | Max. possible delivery pressure bar | Reservoir capacity l | Drive power | for details see publication no. |
|-------------------------|--|--|---|----------------------|---|------------------------------------|
| Manually operated pumps | grease TBD-H  max. 8 outlets | 0,5 cm ³ per stroke and outlet | 25 | 0,25 0,65 | | P_2005_1_GB_TBD H |
| | grease VB - B  | 2 cm ³ double stroke | 120 | 1 1,6 4 | | P_2005_1_GB_VBB |
| Motor-driven pumps | grease and oil FZ-B with 1 or 2 outlets FZ-A with 1 to 6 and/or 8, 10, 12 outlets  | 1.2 and/or 2,4 cm ³ per outlet with 1 rotation of the delivery plunger max. 6 rotations/max. of the delivery plunger with ratchet drive max. 10 rotations/min with flange motor | 200 for short periods 250 | 2,5 8 30 | drive by alternatively lubricated machine or by flange motor/as per choice 0,18 kW | P_2005_1_GB_FZA P_2005_1_GB_FZB |
| | BM-B  | 2,0 l/h 4,0 l/h | up to 400 pressure control valve set to system pressure | 8 30 | 0,18 kW alternatively 0,37 kW | P_2005_1_GB_BMB |

| | Designation and Code no. | Quantity | max. possible delivery pressure bar | Reservoir capacity l | Drive power | for details see publication no. |
|--|---|--|--|---|---|---------------------------------|
| Motor-driven pumps grease and oil | BS-B  | 7,0 l/h 14,0 l/h 22,0 l/h | up to 400 attached pressure control valve set to system pressure | 30 60 or 100 | 0,37 kW alternatively 0,75 kW or 1,5 kW | P_2005_1_GB_BSB |
| | Autolub E  | 1 - 3 delivery elements 1,0 cm ³ /min or 1,6 cm ³ /min or 2,1 cm ³ /min as per choice | 250 | 2 4 | 40 W at 12 + 24 V DC | P_2005_1_GB_AUTOLUB-E |
| Lubricating oil circulation units oil | re-circulation system with 10 ltr. bowl  with 25 ltr. bowl | 0,06 l/min 0,12 l/min 0,18 l/min 0,25 l/min 0,50 l/min 0,75 l/min 1,00 l/min 2,20 l/min 4,50 l/min | 25 16 | 10 25 40 65 | 0,18 kW 0,37 kW | |
| Pneumatically operated pumps grease | TBD-P  | 9 outlets with 0,5 cm ³ /Hub or 1 outlet with 4,5 cm ³ /stroke | 100 | 1,6 4 | compressed air 2 to 5 bar | P_2005_1_GB_TBD P |
| | BF-G  | at an air pressure of 4 bar approx. 6,5 l/h | approx. 160 | delivery from commercially available tanks 50 / 200 | compressed air 3 to 10 bar gear ratio i = 45 : 1 | P_2005_1_GB_BFG |

EXAMPLES of progressive central lubrication systems

Progressiv distributor with screwed-in grease nipple
for supplying up to max. of 20 lubrication points. The grease gun is operated until the movement indicator has moved in and out once, as a sign that all the lubrication points have received their right amount of lubricant. Before applying the grease gun, clean the grease nipples.

If the machine has more than 20 lubrication points, distributor strips with grease nipples connected to progressive distributors are provided.

Progressive system with main and secondary distributors and a hand-operated pump of type VB-B

As compared with the system having a distributor strip, this system has the advantage, that because of the pipe connections between the pump and the main distributor and on to the secondary distributors, no dirt can reach the distributors. The main distributor divides up the grease fed to it by the pump between the secondary distributors in the right proportions.

The secondary distributors deliver metered quantities to the lubrication points. The operator continues to operate the pump until the signal lamp lights up and goes out again. Every lubrication point connected to that distributor has then received one shot of lubricant.

The pump depicted is also suitable for single-line systems. The pressure relief device is not required on progressive systems. It can be made ineffective by a non-return valve in the main supply line.

Progressive system with pneumatically operated multi-line pump

If several distributors are required, the outlets 1-9 can be used, each outlet delivering 0.5 ccm lubricant per operation.

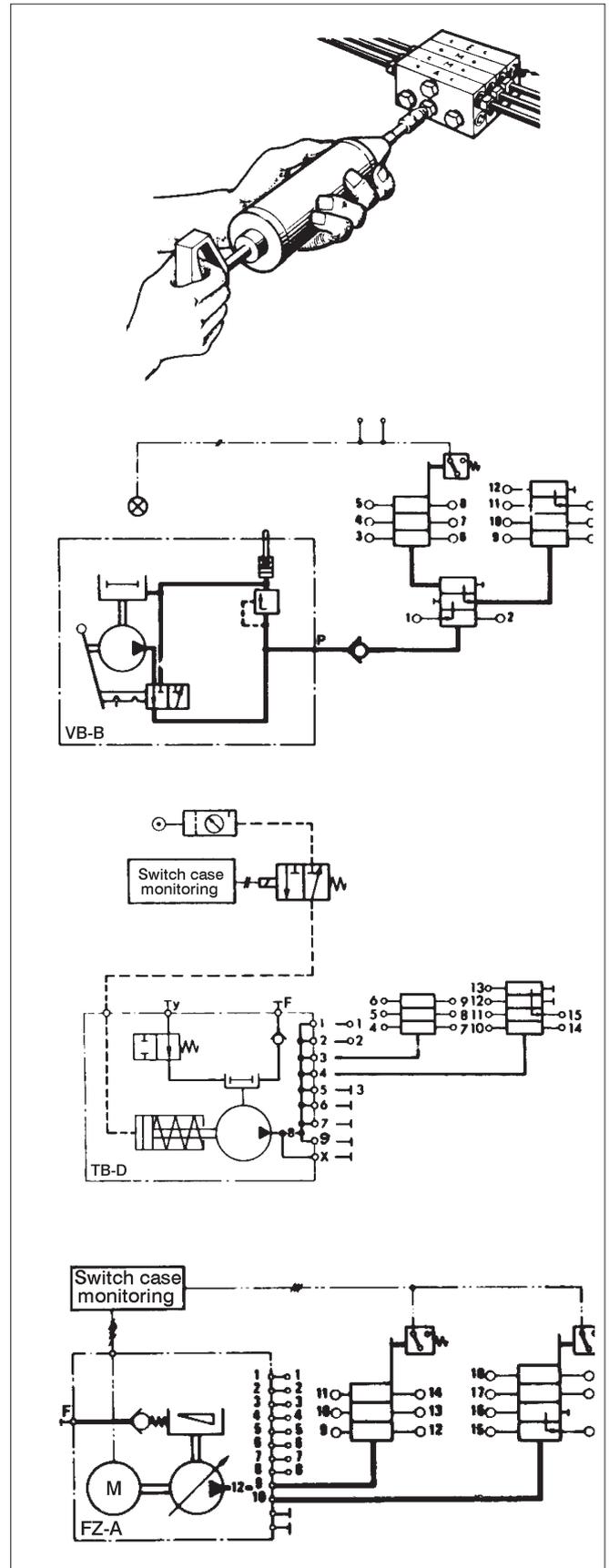
If only one distributor is to be supplied with lubricant, the entire quantity of $9 \times 0.5 = 4.5$ ccm delivered by the pump is taken from outlet X. In the example shown, the lines from connections 1 and 2 lead directly to the lubrication points and the lines from the connections 3 and 4 lead to the progressive distributors, which deliver the lubricant to the lubrication points in turn. Outlets 5 to 9 are closed.

Progressive system with multi-line pump operated by electric motor

The pump will give adjustable metered quantities to each of two outlets, so that it is possible, within limits, to vary the quantity of lubricant delivered to the progressive distributors per pump stroke, or the quantity of lubricant delivery to the lubrication points per unit of time.

With short lengths of piping and a large pump capacity, the type ZP-A distributor can be used, otherwise type E 4 distributor should be used.

By using an additional time relay, it is possible to monitor whether each limit switch has generated at least one signal during the check period. If one signal is lacking, there is a fault in the distributor involved and a warning signal is given.

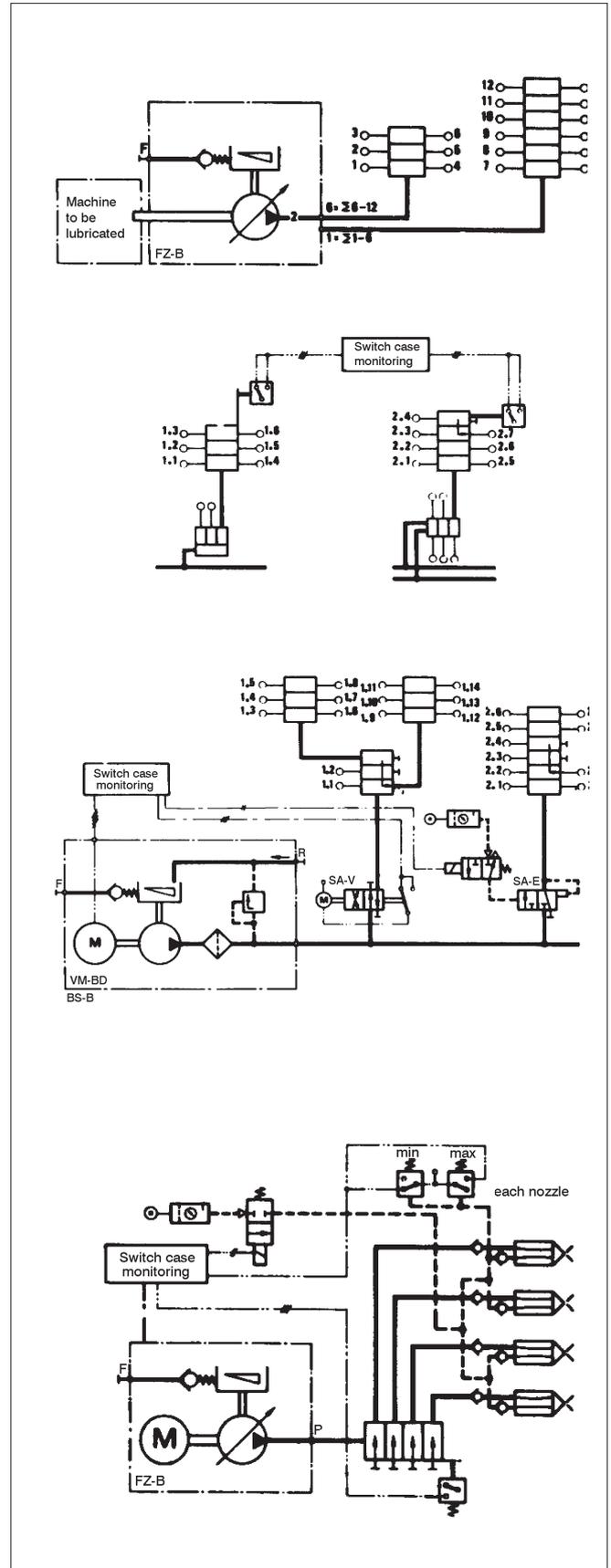


EXAMPLES of progressive central lubrication systems

Progressive system with pump driven by the machine being lubricated

In this example the pump is driven from the machine being lubricated, via an oscillating lever, clutch, V-belt or chain; the expense of any additional control system is thereby eliminated.

The FZ-B type pump has two outlets and the quantity delivered per outlet is adjustable. If ZP- type progressive distributors are used, there is a minimum flow rate which should be maintained, regardless of the nature of the lubricant.



Single-line and dual-line systems connected to progressive distributors

When checking the operation of a single-line system is not customary and of a dual-line system is very expensive, the progressive distributors connected to the lines offer a relatively inexpensive way of monitoring the operation of the distributors.

Progressive systems with two or more lines connected in parallel and able to be isolated, or operated independently of one another.

Both the progressive systems in this example are connected to the supply line, the first via an SA-V type 4/2-way valve operated by an electric motor and the second via a pneumatically operated 3/2-way valve also functioning as a pressure regulating valve. By this means, the pressure at the progressive distributor inlets is limited to the permissible level of approx. 160 bar, even if the pressure in the supply line is higher. The pump is switched on automatically as soon as the progressive system is switched on.

If the lubricant requirement at the lubrication points is large compared with the pump capacity, the separate lubrication groups are interlocked in such a way that only one can be switched on at a time while the others assume their waiting position.

Progressive system connected to spray nozzles for spraying the faces of exposed gearwheels with grease and for monitoring the grease, compressed air and nozzle blockage (SP-A)

As soon as the limit switch on the progressive distributor signals to report that all the spray nozzles have been supplied with the appropriate amount of lubricant, the solenoid valve in the compressed air line is opened for a preset length of time. If the pressure switches for min. pressure do not report the minimum pressure during the monitoring period, a fault signal is given. A fault signal is also given if one of the nozzles is blocked; in this case the associated pressure switch for max. pressure issues a signal and thereby triggers off the alarm signal.

DISTRIBUTORS

DELIMON progressive distributors of type ZP-A and ZP-B are available with 3 to 12 segments, corresponding to 6 to 24 lubricant outlets. Distributors of types ZP-C and ZP-D are available in two different models with 3 to 6 segments, corresponding to 6 to 22 lubricant outlets (larger number of segments to order).

Distributors of type E 4 have 4 lubricant outlets.

| Type | Metered quantity per plunger stroke cm ³ | Flow rate for oil cm ³ /min. viscosity 45 mm ² /s at 50 °C | | for grease cm ³ /min penetration class 2 | |
|---------------------|--|---|----------------------|--|----------------------|
| | | min. | max. | | |
| E 4 | 0,4 | 1,0 | 200 | 0,1 | 200 |
| ZP-A and ZP-C | 0,1 0,2 0,3 | 0,5 | 1000 | 0,5 | 1000 |
| ZP-B and ZP-D | 0,5 1,2 2,0 | 0,5 | 1500 3000 5000 | 0,5 | 1500 3000 5000 |

The metered quantity per outlet can be adapted to the lubricant demand of the lubrication points by connecting outlets in parallel in distributors of types ZP-A and ZP-C, or in parallel and series in distributors of types ZP-B and ZP-D. This is done when assembling the distributors by simply removing seals or grup screws and plugging unused outlets.

With the lubricant distributor type E 4, the quantities delivered can be combined externally the distributor by the use of appropriate fittings. Distributors may be installed in any orientation.

ZP-distributors can be provided with patented, integrated non-return valves within the outlets.

The quantity metered by one plunger in the distributor is delivered to the lubrication point from the next segment (in the entry direction). The plunger of the first segment delivers its metered quantity via the outlets in the last segment (end segment).

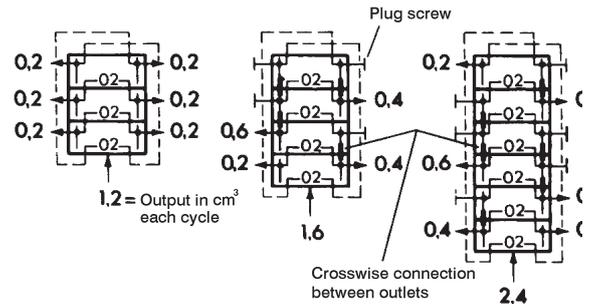


Fig. 3
Examples of the division of the quantity delivered between the different outlets of a type ZP-A distributor

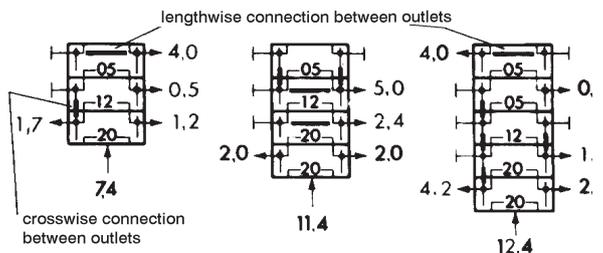


Fig. 4
Examples of the division of the quantity delivered between the different outlets of a type ZP-B distributor

Devices and instruments for monitoring, control and pressure limitation

Movement indicator

Each ZP-distributor can be supplied with two movement indicators installed within the end segment. All friction points connected to the distributor have been fed with lubricant one time when the movement indicators have made one full stroke movement in both directions. Distributors are available with and without movement indicator (as per choice).

Electrical monitoring equipment

To check the operation, either one distributor, or each of the distributors in the system, may be fitted with a limit switch; an electrical contact is thereby opened and closed once per complete cycle of the distributor and this can be indicated by pilot light or electrical pulse counter.

If the number of cycles exceeds 1 cycle per second, approach switches with electronic monitoring are used.

Over pressure protection

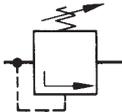
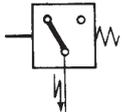
Pressure relief valves protect pumps and distributors against excessive pressures in the pipe from pump to distributor. If the pressure is too high, lubricant is returned to the reservoir via a return line. Some types of pump have a pressure relief valve already incorporated.

Pressure switches monitor the operated pressure for high or low levels; their output signal operates pilot lights or warning systems. If necessary the signal will shut down the pump motor or close a valve.

Over pressure indicators to be screwed into distributors of type ZP-

When a lubrication point becomes blocked, the pressure in the system exceeds the permissible level and an indicator pin projects from the over pressure indicator. When the fault has been eliminated, the indicator pin automatically returns to its initial position.

The over pressure indicator facilitates location of faults in a system (for details see 65112-1200 M1.1).

| Symbol | Designation | Remarks | | Code no. | Details in |
|---|---|---|--|--|----------------------------|
|  | Pressure relief valve NU - A | set at 200 bar | for small quantities of lubricant | 38132 - 1241 | PB_2005_1_GB_38132 |
| | Pressure relief valve SA - G | set at 160 bar | for larger quantities of lubricant | 38131 - 2111 | P_2006_1_GB_SAG |
| | Pressure relief valve ÜK 18 - 20 ÜK 18 - 70 | 1 to 20 bar 5 to 70 bar | for lubricating oil circulation systems | 38191 - 1113 38191 - 1123 | 38191 P 1e |
|  | Pressure switch | 2 to 20 bar 5 to 50 bar 40 to 400 bar | for grease and oil | 34241 - 1213 34241 - 1223 34241 - 1243 | Drawing 34241-1200 M1.1 |
|  | Over pressure indicator | see drawing 63642 - 1311 M 1 | | | |

ELECTRICAL CONTROL SYSTEM

We have developed special control modules for progressive systems

Progressive _____ 66202 - 3501

Progressive / Extension _____ 66202 - 3521

Progressive spray lubrication systems ____ 66202 - 2421

For detailed information, please ask for the relevant descriptions indicating the a/m code number.

We also supply complete switch cabinets in which the above mentioned modules are integrated.

ACCESSORIES

see publication no.:

type ZP - A _____ P_2005_1_GB_ZPA

type ZP - B _____ P_2005_1_GB_ZPB

type ZP - C _____ P_2005_1_GB_ZPC