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BEETHOVENSTR. D-91257 PEGNITZ POSTFACH 1320 D-91253 PEGNITZ

Technical bases

System description

Dual line central lubrication systems alternately supply lubricant, grease or oil over two main lines under pressure to the dual line distributors.

The control piston opens the way to the metering piston. The lubricant is then delivered with the control pressure exactly metered to the lubrication points.

As the control pistons change over with the pressure change of the two main lines, this system can be used for large plants with main line length of more than 100 m and several 100 lubrication points.

Design

A dual line central lubrication system essentially consists of a central lubrication pump (1) with reservoir (2), a change-over valve (3), like e.g. 4/2-way or 4/3-way control valve or a pressure changeover switch, two main lines, distributors (4), a differential pressure switch (5) or a pressure sensor or control panel with pressure switch and the control (see scheme below).



Operating method

After switching on the central lubrication pump, main line I is pressurized with a change-over valve. At the same time, main line II is relieved. The return connection for this purpose is at the pump. When the operating pressure exceeds the adjusted pressure of the pressure relief valve, the flowing out medium can be directed back into the return connection.

During the pressurization time "t1", the lubricant is metered and supplied to the lubrication points over one side of the dual line distributors. The directional control valve reverses at the adjusted operating pressure "p1/2", the pump delivers into main line II and main line I is relieved again. During pressurization time "t2", the lubricant is metered and supplied to the lubrication points over the dual line distributors' other side.

When the adjusted operating pressure "p2/2" is reached, the pump is switched off, the directional control valve returns into its starting position and break time "t3" begins. The operating times "t1" and "t2" can be different. Therefore the lubrication intervals at an automatically controlled system should not be fixed over break time "t3" but cycle time "t4".



Alternative control (half cycles)

Short lubrication intervals bear the risk that the pressure in the relieved main line ("p 1/1 + p2/1") reduces insufficiently and that, as a consequence, the differential pressure between main line I and II reduces so much that the dual line distributors do not supply the lub points with sufficient pressure. To prevent that the relief pressures build each other up, it is useful to run lubrication cycle "t7" in two half cycles "t3" and "t6". Especially for long main lines and unfavorable pressure conditions, this ensures enough time for the pressure relief.



Technical basics

Technical basics

System design and installation

You can choose between hydraulic, pneumatic and electric pump actuation. See different pump types as e.g. grease lubrication pump F-Super 3, electric barrel pump EFP 1 or hydraulic barrel pump HFP 1 under "Grease- and oil lubrication pumps catalogue".

A 4/3-way control valve (electric control), a 4/2way control valve (pneumatic control) or a pressure switch (hydraulic control) can be used as directional control valve.

At short main lines, the pressure changeover can be carried out with a 4/2-way valve, controlled by the lubricant pressure, as the pressure loss to be expected is low.

When high pressure loss is to be expected in the pressurized main line and thus a long time for the pressure relief of the main line, which is connected to the lubricant reservoir with a 4/3-way valve, the change-over of this valve should be initiated and controlled by a differential pressure switch.

A control, depending on the differential pressure, ensures that also the most distant dual line distributors have enough pressure for control and supply of the lubrication points. The differential pressure switch should be installed before the last dual line distributor to guarantee lubricant exchange.

Both main lines have to be ventilated when being put into operation so that a perfect function of the dual line distributors is ensured. The example diagram shows that the pressure slowly increases at the end of main line I and the pressure of the relieved main line II slowly decreases at the end of the line. Only after a certain time "t2", depending on the main lines' length and other operating conditions like lubricant and temperature, the necessary differential pressure " Δ p" for the control of the dual line distributors and the supply of lub points is reached at the end of the line.



In the case of a widespread layout of the dual line system, the dual line distributors have to be installed into branch lines. The installation of the distributors into the main line causes a too high pressure loss by the decrease of cross section.



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Technical bases

System calculation

A scheme corresponding to number and arrangement of the lub points has to be made. The following scheme shows an example with a motor pump unit.

- 1 = Pump
- 2 = Lubricant reservoir
- 3 = 4-way valve
- 4 = Dual line distributor
- 5 = Differential pressure switch



For determining the necessary pump unit, the delivery volume has to be calculated under consideration of the system design information.

While for grease the contained air which cannot completely be removed in the production process has to be considered, this is no problem with oil.

Necessary output rate:

 $Q = (i \bullet (ki + si)) + (l \bullet vl)$

- *i* = number of all outlets of the dual line system (include also closed outlets)
- ki = metering volume at the outlets "i" [cm^3]
- si = control volume to the outlets "i" [cm³] (can be seen from the technical data of the dual line distributor)
- vl = compression volume of the pipes [cm³/m] (can be seen from the lubricant manufacturer's information)
- I = total length of the main lines [m]
- Q = pump delivery volume [cm³]

Example

Specifications:

- medium grease, approx. 1% air (see lubricant manufacturer's information)
- 100 m main pipe lines with nominal width 15 mm
- 30 dual line distributors with 4 outlets each
- metering volume per outlet of the dual line distributor 3 cm³
- control volume per outlet 0,50 cm³

Calculation:

Compression volume vl [cm³/m] =

 $\frac{1.5 \,[\text{cm}]^2 \bullet \pi \bullet 100 \,[\text{cm}] \bullet 1 \,[\%]}{4 \bullet 100 \,[\%]} = 1,767 \,\,\text{cm}^3/\text{m}$

Pump delivery volume

Q $[cm^3] = (30 \cdot 4 \cdot (3 [cm^3] + 0.50 [cm^3])) + (100 [m] \cdot 1.767 [cm^3/m])$

 $Q[cm^3] = 596,7 cm^3/lubrication cycle$

In the example calculation a pump delivery volume of 596,7 cm³ is necessary for a whole lubrication cycle and pressurization of main line I and II. At a lubrication cycle of e.g. 1 hour, the delivery volume theoretically has to be 596,7 cm³/h in our example. Possible deviating operating conditions like e.g. bigger air inclusions in the lubricant have to be considered and a sufficient reserve for the pump has to be determined.

The pipe line nominal widths have to be dimensioned in a way that at the lowest operating pressure also at the most distant dual line distributors the necessary differential pressure between the two main lines for the operation of distributors and overcoming of the lub points' counter pressure is reached. When the changeover valve reverses due to a signal by a differential pressure switch at the line end, the pump as a maximum operates with the pressure which is necessary for reaching the adjusted differential pressure. When the changeover is time-dependent or is effected via a pressure changeover valve, the highest pressure to be expected for reaching the pressure difference has to be adjusted at the line end.

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Technical bases

Dual line components

At dual line central lubrication systems the lubricant, grease or oil, is under alternately pressure supplied to the dual line distributors via two main lines. First one half and then the other half of the lubrication points connected to the distributors is lubricated. The changeover valves cause the alternate pressurization and pressure relief of the main lines depending on the differential pressure.

The dual line distributors and the directional control valves are available in different types (see overview).

Dual line distribute	ors:		
	B∨ Type-no.: Operating pressure: Temperature range: No. of outlets, standard: Connection inlets: Connection outlets: Control volume per outlet: Material:	3981 max. 300 bar min. 35 bar -30 °C to 80 °C max. 8 G 1/4 G 1/4 250 mm ³ steel, galvanized	Features: • Metering screws from 70 to 300 mm ³ can be combined, fine graded
	BW Type-no.: Operating pressure: Temperature range: No. of outlets, standard: Connection inlets: Connection outlets: Control volume per outlet: Material:	3980 max. 300 bar min. 35 bar -30 °C to 80 °C max. 8 G 1/4 G 1/4 250 mm ³ steel, galvanized	Features: • Metering screws from 300 to 1500 mm ³ can be combined, fine graded
	BZ Type-no.: Per. overpressure: Temperature range: No. of outlets, standard: Connection inlets: Connection outlets: Connection outlets: Control volume per outlet: Material: galva	4001 400 bar -30 °C to 80 °C max. 8 G 3/8 G 1/4 500 mm ³ anized steel or 1.4305	 Features: Readout Metering volume via adjusting screw from 250 to 3000 mm³ infinitely variable
	UXZ Type-no.: Per. overpressure: Temperature range: No. of outlets, standard: Connection inlets: Connection outlets: Control volume per outlet: Material:	4006 150 bar -30 °C to 80 °C max. 20 G 3/8 G 3/8 1300 mm ³ steel galvanized	 Features: Metering washer 1000, 1500 and 2000 mm³ can be combined Simple function monitoring

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For controlling the main lines:	
	4/3-way control valve
	Type-no · 4340
	Nominal voltage: 24 V DC 110 V AC 230 V AC
	Nominal power: 20 W 20 W 20 W
	Nominal current: 0.83A 0.2A 0.1A
	Relative duty cycle: 100 %
	Elect. connection: plug DIN 43 650 PG 9
411	Protection class: IP 54
	Insulation class: F
	Volume flow : $Q_{max} = 8 l/min$
30	Operating pressure: 400 bar
The o	Lubricant: oil up to 20.000 mm ² /s
	grease up to NLGI-cl. 2
	Housing material of connection block: GG-25
	Seals: NBR
	Temperature range: -15 °C to 80 °C
	Weight: approx. 5,5 kg
	4/2-way control valve
	Type-no.: 4065
	Volume flow: $Q_{max} = 20 \text{ l/min}$
	Per. operating pressure, hydraulic: max. 350 bar
	Lubricant: oil and grease
	Control pressure, pneumatic: 3-10 bar
	Temperature range: -10 °C to 70 °C
	Material: steel, galvanized
60	Connections, hydraulic G 3/8
	pneumatic G 1/4
	Pressure changeover switch
	Order-no.: see data sheet
(B)	Changeover pressure,
	adjustable: 30 - 150 bar
	80 - 300 bar
	Lubricant: oil 50 to 20.000 mm ² /s
Contraction of the second s	grease up to NLGI-cl. 2
	Temperature range: -20 °C to 80 °C
	Volume flow: $Q_{max} = 8 l/min$
	Material: steel, galvanized
	Weight: 2,5 kg
For controlling the changeover:	
	Differential pressure control gear
	Order-no.: 4305 0001
	Switching differential pressure: 40 bar
Balle and	Max. operating pressure: 400 bar
	Operating volume: 0,25 cm ³
	Max. voltage: 240 V AC
	Max. constant current: TOA
	Protection class. IP 65 Cable connection: Double Cable Connection: Double Cable Cabl
	Cable connection. Pg 13,5
	Pressure sensor
	Order-no.: 042100321
	Per. overpressure: 0 - 400 bar Connection main line: G 3/8
	Dr. avorprospuro: C. 400 box
	Connection main line: 0-400 Ddf

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Dual line distributors

Functional description

Function: phase 1

The dual line distributor is under pressure supplied with lubricant from the main line (I). The control piston (K1) moves in arrow direction (A) and pushes the lubricant back via the relieved



Function: phase 2

After control piston K1 has opened the duct (1), the lubricant flows before the right front side of the metering piston (K2) and moves it in arrow direction (A). The lubricant before the metering piston (K2) is now supplied to the lubrication point via duct 2. When the metering piston (K2) is in its final position the main line (I) is pressurized up to the adjusted changeover pressure of the dual line system. The changeover of the dual line system now connects the main line (I), which has been under pressure up to now, with the lubricant reservoir of the pump so that the lubricant in the line is relieved and the pressure drops.

Function: phase 3

At the same time, the directional control valve connects the main line (II) with the pump and the pressure in this line increases. The control piston (K1) now moves in arrow direction (B) and the lubricant before the control piston is supplied to the relaxed main line.



Function: phase 4

After control piston K1 has opened duct 2, the lubricant flows before the left front side of the metering piston (K2) and moves it in arrow direction (B) to the right. The lubricant before the metering piston (K2) is now supplied to the lub point via duct 1. When the metering piston (K2) is in its final position, the pressure in the main line II increases until the adjusted changeover pressure of the dual line system is reached. Now there is a pressure changeover in the main lines I and II and the procedure as described under



Functional description

The lubricant which is under pressure supplied to main line I moves the control piston (K1) and the displaced volume is delivered back via main line Il to the lubricant reservoir on the opposite side.

When the control piston (K1) has reached its final position, the metering piston (K2) is pressurized and the displaced volume from the opposite side is delivered over outlet 2 to outlet 3.

After the pressure changeover from main line I to main line II, the control piston (K1) is shifted to the opposite direction and the displaced volume of the other side is delivered back into the lubricant reservoir via main line I.

When the control piston (K1) is in its final position, the metering piston (K2) is pressurized via duct 2 and the displaced volume is over duct 1 delivered to outlet 4.



Figure 1 and 2: Pressurization in main line I and pressure relief in main line II.



Figure 3 and 4: Pressurization in main line II and pressure relief in main line I.

- = Pressurized main line
- = Relieved main line
- Following metering stroke

Subject to alterations!

Dual line distributors

Functional description

Figure 1:

Pressurization in main line I and pressure relief in main line II.

The lubricant which is under pressure supplied to main line I moves the control piston K1 to the right. The piston releases the lubricant flow to the following metering pistons.

The metering pistons K2 to K4, which are controlled over piston K1, are shifted to the right. The displaced volume on the right side reaches the outlets 1 to 3 over the ring ducts of the pistons K1 to K3.



Figure 2:

Pressure changeover to main line II and pressure relief in main line I.

Pressurized by the lubricant via main line II, the control piston K1 is shifted to the left and the displaced volume there is delivered into the relieved line.

Piston K1 releases the lubricant flow to the following metering pistons.

The metering piston K2 is moved to the left and the displaced lubricant is delivered to outlet 4.



UXZ

Figure 3:

After moving the metering piston K2, the pistons K3 and K4 are shifted to the left and the displaced volume is delivered to outlets 5 and 6.

When a proximity switch is installed at the last piston, the contact opens and closes once with each cycle of the distributor. The changeover of the way valve and the end of a lubrication cycle can be controlled with this signal change.



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Dual line distributors

Dual line distributors

The BV dual line distributors are distributor units with hydraulic changeover, whose metering pistons are controlled by the supplied lubricant over the control pistons in a way that the lubricant comes out of all outlets opposite to the distributor's pressurized side. The displaced lubricant is delivered back on the distributor's pressureless side via the main line.

The pressure changeover of the two main lines builds the complete working cycle.

The BV dual line distributors are manufactured in a unit construction. The advantage is that the distributors are designed very robust and spacesaving.

Different delivery volumes per piston stroke per pair of outlets are effected by metering screws.

Dual line distributor BV 08 with eight outlets:



Section view:

Technical data:

Operating pressur	re: pr	nax. = 3	300 bar
	pr	nin. =	35 bar
Temperature range	ə:	-30 °C t	0°08 o
Lubricant:	0	il, fluid g	grease,
	grease up to n	nax. NL	GI-cl. 2
Viscosity range:		≥50	mm²/s
Control volume pe	r outlet:	25	50 mm ³
Material:	ste	el, galv	anized
Weight:	BV 02=1,4 kg, E	3V04 =	2,1 kg,
	BV06 = 2,9 kg,	BV 08 =	3,6 kg

Metering volume [mm ³]					
70	100	150	220	300	



TYPE	BV 02	BV 04	BV 06	BV 08
Outlets	2	4	6	8
Dim. "A"	52	80	108	136
Dim. "B"	36	64	92	120





Metering volume

The metering volume per operating cycle and outlet is, depending on the size of the metering screws, between 0,07 cm³ and 0,30 cm³. Another metering volume per outlet can only be reached by changing the metering screws.

Metering screw 0,07 cm³ Order-no.: F0374-04-01 001





Metering screw 0,10 cm³

Order-no.: F0374-04-01 002

Metering screw 0,15 cm³ Order-no.: F0374-04-01 003

Metering screw 0,22 cm³ Order-no.: F0374-04-01 004



Metering screw 0,30 cm³ Order-no.: F0374-04-01 005



Spare parts

Should the sealing ring, which seals the distributor, be damaged when the metering screw is replaced, it can be reordered.

Sealing ring DIN 7603 - A8x12x1, Order-no.: 0907603029211

When the main lines do not continue after the distributor, both connections at the distributor's end have to be closed with screw plugs and sealing rings.

Screw plug G 1/4;

Order-no.:

090090800513

Sealing ring DIN 7603 - A 13 x 18 x 1,5; Order-no.: 0907603030211

Dual line distributor BV 08:



** Outlet fittings may only be executed as nonreturn valves.

Order-key for type 3	5981						3981 4 31 2 3
Type-no.	3981						
Code-no.	3981 —						
No. of outlets	2	4	6	8			
Code-no.	2	4	6	8 —			
Inlet L	closed	ø6	ø8	ø10	ø12	G 1/4	
Code-no.	1	2	3	4	5	6 ——	
Inlet R	closed	ø6	ø8	ø10	ø12	G 1/4	
Code-no.	1	2	3	4	5	6 —	
Outlet (non-return valve)	ø4	ø6	ø8				
Code-no.	1	2	3 —				
Metering volume [cm ³] *	0,07	0,10	0,15	0,22	0,30		Fill empty places
Code-no.	1	2	3	4	5 —		with "0" depending on the
Special models	without						number of outlets
Code-no.	00 —						
* per pair of outlets from th	e left to th	ne riaht					

001 4 21 2 2200 00

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Dual line distributors

BW

Technical description

The BW dual line distributors are distributor units with hydraulic changeover, whose metering pistons can be controlled by the supplied lubricant over the control pistons in a way that the lubricant comes out of all outlets opposite to the distributor's pressurized side. The displaced lubricant is delivered back on the distributor's pressureless side via the main line.

The pressure changeover of the two main lines builds the complete working cycle.

The BW dual line distributors are manufactured in a unit construction. The advantage is that the distributors are designed very robust and spacesaving.

Different delivery volumes per piston stroke per pair of outlets are effected by metering screws.

Distributor outlets I and II

Dual line distributor BW 08 with eight outlets:

Section view:

Distributor outlets Control piston

TYPE	BW 02	BW 04	BW 06	BW 08
Outlets	2	4	6	8
Dim."A"	52	80	108	136
Dim."B"	36	64	92	120



Technical data:

Operating pressu	ire:	p max. = 3 p min. =	300 bar 35 bar
Temperature rang	je:	-30 °C t	0 80 °C
Lubricant:	greaseup	oil,fluid g to max. NL	grease, GI-cl. 2
Viscosity range:		≥50	mm²/s
Control volume p	er outlet:	25	50 mm ³
Material:		steel, galv	anized
Weight:	BW 02 = 1,4 kg BW 06 = 2,9 kg	g, BW 04 = g, BW 08 =	2,1 kg, 3,6 kg

ivietering volume [mm ³]						
300	500	750	1000	1250	1500	
	•					

Outle

Outle

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Metering volume

The metering volume per operating cycle and outlet is, depending on the size of the metering screws, between 0,3 cm³ and 1,5 cm³. Another metering volume per outlet can only be reached by changing the metering screws.

Metering screw 0,3 cm³ Order-no.: F0374-04-00 007







Metering screw 0,75 cm³ Order-no.: F0374-04-00 002



Metering screw 1,0 cm³ Order-no.: F0374-04-00 003



Metering screw 1.25 cm³ Order-no.: F0374-04-00 004





Metering screw 1,5 cm³



Order-key for type 3980

Spare parts

Should the sealing ring, which seals the distributor, be damaged when the metering screw is replaced, it can be reordered.

Sealing ring DIN 7603 - A 13 x 18 x 1,5; Order-no.: 0907603030211

When the main lines do not continue after the distributor, both connections at the distributor's end have to be closed with screw plugs and sealing rings.

Screw plug G 1/4;

Order-no.: 090090800513

Sealing ring DIN 7603 - A 13 x 18 x 1,5; Order-no.: 0907603030211

Dual line distributor BW 08:





* per pair of outlets from the left to the right

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Dual line distributors

ΒZ

Dual line distributors

The BZ dual line distributors are distributor units with hydraulic changeover, whose metering pistons can be controlled by the supplied lubricant over the control pistons in a way that the lubricant comes out of all outlets opposite to the distributor's pressurized side. The displaced lubricant is delivered back on the distributor's pressureless side via the main line.

The pressure changeover of the two main lines builds the complete working cycle.

The BZ dual line distributors are manufactured in a unit construction. The advantage is that the distributors are designed very robust and spacesaving.

Different delivery volumes can be adjusted by the travel of the metering piston at the adjustment screw.



Dual line distributor BZ 04 with four outlets:

Dimension drawing:



57

80

Technical data:

Operating pr	ressure:	400 bar	
Temperature	erange:	-30 °C to 80 °C	
Lubricant:	Lubricant: oil and grease up to m		
Viscosity ran	ge:	≥50 mm²/s	
Control volu	me per outlet:	500 mm ³	
Material:		steel, galvanized or 1.4305	
Woight:	B702-1	6 ka B704 - 23 ka	

Weight: $B\angle 02 = 1,6 \text{ kg}, B\angle 04 = 2,3 \text{ kg}, B\angle 06 = 2,9 \text{ kg}, B\angle 08 = 3,6 \text{ kg}$

Special model with monitoring

The metering piston's stroke can be monitored (see figure on the right) with a proximity switch M8x1 (plug M12x1).

For example, a BZ 04 distributor needs two proximity switches to monitor both metering pistons.

The number of proximity switches and their positions have to be indicated <u>separately.</u>

The proximity switch is delivered without cable, this also has to be ordered separately (see "Accessory Progressive distributors").

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Dim "L"

state: 01.12EN

05-1-30-02

Combination of outlets

Opposite outlets can be combined to one outlet, when the sealing screw M4x8-DIN 912 (see figure below) has been removed. The unnecessary outlet has to be closed.

When an outlet is closed without removing the screw plug M4, also at the opposite outlet no lubricant is metered.

Metering volume - Adjustment

The metering volume per cycle and outlet is 3 cm³ at full stroke. Reducing the metering volume by up to 0,25 cm³ is possible by a stroke limitation with the adjustment screws. The outer screw serves as set screw.

The dust cap protects the indicator pin against dirt and at the same time serves as visual indicator for the function.



Order-key for type 4001

Spare parts

To separate combined outlets again, the sealing screw with sealing ring has to be screwed in again and the screw plug has to be replaced with an outlet fitting.

Sealing screw DIN 912 - M4x8;	
Order-no.:	090791120121
Sealing ring DIN 7603 - A 4 x 8 x 1;	
Order-no.:	090760301211

At combined outlets, e.g. when the sealing screw is removed, one outlet has to be locked with a screw plug and a sealing ring.

 Screw plug G 1/4;
 090090800513

 Order-no.
 090090800513

 Sealing ring DIN 7603 - A 13 x 18 x 1,5;
 090760303011

When the main lines do not continue after the distributor, both connections at the distributor's end have to be closed with screw plugs and sealing rings.

 Screw plug G 3/8;

 Order-no.:
 090090800713

 Sealing ring DIN 7603 - A 17 x 21 x 1,5;

 Order-no.:
 090760301711

1001 2 5 00 1 06 01

Order-key for ty	pe 400 i				40013500	
Type-no.	4001					
Code-no.	4001 —					
No. of outlets	2	4	6	8		
Code-no.	1	2	3	4 ———		
Number of used ou	tlets	1 to 8				
Code-no.		1 to 8 🛛 —				
Inlet (straight coupling)	G 3/8	Pipe ø8 mm	Pipe ø10 mm	n Pipe ø12 mm		
Code-no.	00	08	10	12 ——		
Position of the inlet	ts left	both sides	right			
Code-no.	1	2	3 —			
Outlet (straight fitting)	G 1/4	Pipe ø6 mm	Pipe ø8 mm	Pipe ø10 mm		
Code-no.	00	06	08	10 ——		
Outlet (non-return valve)		Pipe ø6 mm	Pipe ø8 mm	Pipe ø10 mm		
Code-no.		26	28	30 ——		
Special model	without	1.4305				
Code-no.		01 ——				
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Dual line distributors

Technical description

The UXZ dual line distributors are built with variable disks. This has the advantage that the distributor, depending on the number of lub points, can be extended or shortened. Because of the disk construction individual middle elements (metering elements) with different metering volumes can be trimmed to a complete dual line distributor.

All piston strokes can be monitored by the installation of a proximity switch at the last middle element.

The different metering volume per piston stroke is effected by different piston diameter.

In contrast to progressive distributors, a dual line distributor UXZ can also operate with only one piston, i.e. one metering element.

Technical data

Operating pressure - inle	et: max. 150 bar
Temperature range:	-30 °C to 80 °C
Metering lubricant:	oil - fluid grease - grease up to NLGI-cl. 2
Volume flow range (oil):	50 - 6000 cm³/min
Viscosity range:	≥50 mm²/s
Control volume per outle	et: 1300 mm ³
Material:	steel, galvanized
Number of elements:	

Max.10 Metering elements UXZ 10/20

Dual line distributor UXZ with three metering elements and six outlets:



Dimension drawing:





				ets
Middle element	Meterir	ig volume	Code-	
designation	per outlet	p. element	no.	
UX 1000	1130 mm ³	2260 mm ³	1000	
UX 1500	1540 mm ³	3080 mm ³	1500	
UX 2000	2000 mm ³	4000 mm ³	2000	

Outlets	2	4	6	8	10	12	14	16	18	20
Dim. "A"	118,8	148,8	178,8	208,8	238,8	268,8	298,8	328,8	358,8	388,8
Dim. "B"	77	107	137	167	197	227	257	287	317	347

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End element UXZ

and accessories").

0°

Order-no.:

00

0

All pipe fittings with a suitable connecting thread and suitable nominal pressure can be screwed into the initial element's distributor inlets as well as into the middle element's outlets (see "Fittings

4006 99 000

UXZ

Elements

UXZ dual line distributors always consist of one initial element (with control piston), between one and ten middle elements (with metering piston) and one end element (without piston).

All elements are delivered without fittings at the distributor inlet and outlet, as a standard. The connecting thread at the inlets (initial element) as well as at the outlets (middle elements) is G 3/8.

Initial element UXZ

Order-no.:

4006 97 0000



Middle element (Metering element) UX

Middle elements are available with three different metering volumes.

Each middle element has two outlets.

Table of order-no. for middle elements:

Designation	Order-no.
UX 1000	4005 98 1000
UX 1500	4005 98 1500
UX 2000	4005 98 2000



Dual line distributors

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state: 01.12EN

05-1-40-02

Dual line distributors

Combination of two outlets at one middle element.

For lub points which need more lubricant, it could be necessary to combine two outlets at the dual line distributor.

Two outlets of a middle element are connected with a distributor bridge with outlet. The metering volume of both outlets then comes out of the distributor bridge's outlet.



The metering volume is calculated from the metering volume code-number of the combined outlets.

Distributor bridge with
distributor, total order-no.outlet for
4005980010101



consisting of:

- Item 1 1 bridge strip, Order-no.: F0414/07-00
- Item 2 2 hollow screws without outlet, Order-no.: 04033331306
- Item 3 2 Sealing rings A18x24x1,5 Order-no.: 090760301811
- Item 4 2 Sealing rings A17x23x2 Order-no.: 090760306611

Combination of outlets at several middle elements

It is not possible to connect the outlets of two adjacent middle elements with a distributor bridge. If necessary, the outlets can be drilled lengthwise in our company. This cannot be changed again afterwards.

Two outlets combined at adjacent middle elements

One outlet of each of the two adjacent middle elements is connected with a connecting hole. This connection may only be drilled by BEKA. One of the two outlets has to be closed with a screw plug and a sealing ring.

For combining the outlets at adjacent middle elements afterwards, the concerned middle element has to be replaced by one with a hole.

The metering volumes of the two connected outlets together come out of the open outlet.



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Screw plug with sealing ring for closing outlets

Order-no.:

Screw plug G3/8: Sealing ring A17x21x1,5: 090090800713 090760301711



Note: Outlets must not be locked without directing the lubricant to another outlet, as otherwise the distributor blocks!

Three outlets combined at adjacent middle elements

Two outlets of a middle element are combined with a distributor bridge with outlet. With a connecting hole, the third outlet of the adjacent middle element is connected to an outlet of the first middle element. The drilling may only be done by BEKA.

The combined outlet at the neighboring middle element has to be closed with a screw plug and a sealing ring.

For combining the outlets at adjacent middle elements afterwards, the concerned middle element has to be replaced by one with a hole.

The metering volumes of the three combined outlets together come out of the distributor bridge's outlet.

Four outlets combined at adjacent middle elements

Two outlets of one middle element are combined with a distributor bridge with outlet. Both outlets of the adjacent middle element are each connected to the outlets of the first middle element with a connecting hole.

The combined outlets of the adjacent middle elements have to be closed with one screw plug and a sealing ring each.

For combining the outlets at adjacent middle elements afterwards, the concerned middle element has to be replaced by one with a hole.

The metering volume of the four combined outlets together come out of the distributor bridge's outlet.





Subject to alterations!

Dual line distributors

Dual line distributors

Elements with proximity switches

Proximity switches can be installed to UXZ dual line distributors for monitoring the system, for the use of cycle controls or for counting the piston strokes.

Three different proximity switches are available (see table). Without further indication, we mount the proximity switch M12x1 on the right side, as a standard. An installation of another proximity switch or on the left side has to be indicated separately.

Note: The proximity switch at dual line distributors always has to be installed at the last middle element.

Middle elements with proximity switch have to be indicated when the order is placed, as retrofitting them to an existing distributor element is not possible.

A proximity switch can only be installed later to an existing dual line distributor UXZ by replacing one middle element.

The proximity switch is delivered without cable, this has to be ordered separately (see "Accessory progressive distributors").

Dual line distributor UXZ with attached proximity switch:



Functional description:

A pin (2) is fixed at the piston of the middle element (1). This pin approaches the proximity switch (3) with each piston stroke and initiates a signal. The signal can be evaluated differently, depending on control type and individual case.



At the models M18x1 / M30x1,5, the pin operates leakage free in the medium.

Size:	M12x1 (Standard)	M18x1 (Special model)	M30x1,5 (Special model)			
Connection:		plugabble M12x1				
Switching type:		PNP make contact				
Capacity:		200 mA				
Voltage:		10 to 60 V DC				
Per. ambient temperature:	-40 °C to 85 °C					
Function indicator:	LED yellow					
Housing material:	stainless steel					
Protection class:	IP 67 / IP 69K					
Metering elements:	UX 1000 to UX 2000					
Spare part order-no.:	100091865 1000912586 10009125					
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Table of proximity switches:

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Installation dimensions for proximity switch M12x1:



Table of order-no. for metering element with proximity switch M12x1 (standard):

Metering element	Install. pos.	Order-no.
UX 1000 N12/24 R	right	4005 98 1005
UX 1000 N12/24 L	left	4005 98 1007
UX 1500 N12/24 R	right	4005 98 1505
UX 1500 N12/24 L	left	4005 98 1507
UX 2000 N12/24 R	right	4005 98 2005
UX 2000 N12/24 L	left	4005 98 2007

Installation dimensions for proximity switch M18x1:



Table of order-no. for metering elements with proximity switch M18x1 (special model):

Metering element	Install. pos.	Order-no.
UX 1000 N18/24 R	right	4005 98 1003
UX 1000 N18/24 L	left	4005 98 1004
UX 1500 N18/24 R	right	4005 98 1503
UX 1500 N18/24 L	left	4005 98 1504
UX 2000 N18/24 R	right	4005 98 2003
UX 2000 N18/24 L	left	4005 98 2004

Installation dimensions of proximity switch M30x1,5:



Table of order-no. for metering element with proximity switch M30x1,5 (special model):

Metering element	Install. pos.	Order-no.
UX 1000 N30/24 R	right	4005 98 1008
UX 1000 N30/24 L	left	4005 98 1009
UX 1500 N30/24 R	right	4005 98 1508
UX 1500 N30/24 L	left	4005 98 1509
UX 2000 N30/24 R	right	4005 98 2008
UX 2000 N30/24 L	left	4005 98 2009

Terminal diagram:



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Dual line distributors

Dual line distributors

UXZ

UXZ dual line distributors can also be equipped with a control pin indicator.

A control pin indicator cannot be retrofitted. The only possibility of a later installation is to replace a middle element.

It is possible to attach a control pin indicator at all middle elements, but should be done at the last middle element for the case of a later installation of a proximity switch. A proximity switch only may be installed to the last middle element.

The control pin indicator is installed on the right side, as a standard. Installation on the left side has to be indicated separately.

The installation of a control pin indicator has to be indicated when the order is placed.



Table of order-no. for middle element with control pin indicator:

Middle element	Order-no.
UX 1000	4005 98 1001*
UX 1500	4005 98 1501*
UX 2000	4005 98 2001*

* Please indicate the installation position of the control pin indicator: right (standard) or left

Functional description:

At the indicator, the pin (1) is directly connected with the piston (2) of the dual line distributor. With each stroke, the pin (1) is compulsory pushed out or drawn back.



Installation dimensions:



For the control pin indicator it is possible to retrofit a proximity switch M12x1 when necessary.

Order-no. for proximity switch with housing for a later installation: 4005 96 0001



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Extension or shortening of distributors

Dual line distributors UXZ can any time be adapted to the application because of their disk construction. If new lub points are added or others are no longer necessary, the distributor can be extended or shortened by the installation or removal of middle elements.

Description:

- screw off the nuts (2) of both ends of the connecting rods (1) and take the rods out
- separate the distributor at the desired point
- add the new middle elements or remove the unnecessary ones
- screw the distributor together with the corresponding connection rods and the nuts (see table)



Note: A UXZ distributor can consist of 10 middle elements as a maximum.

Dual line distributors

When one of the O-rings which are used for sealing the distributor between the individual elements, is damaged and does not seal anymore, a set of seals, containing all O-rings of the UXZ distributor, can be ordered.

Set of seals for middle elements: Order-no.	4005D0002
Set of seals for initial elements:	4000000001
Order-no.:	4006D0001

Table of connecting rods (one piece):

Distributor	Connecting rods	Order-no.
UXZ 1/2	M7 x 142	080 2000 441
UXZ 2/4	M7 x 172	080 2000 442
UXZ 3/6	M7 x 202	080 2000 443
UXZ 4/8	M7 x 232	080 2000 444
UXZ 5/10	M7 x 262	080 2000 445
UXZ 6/12	M7 x 292	080 2000 446
UXZ 7/14	M7 x 322	080 2000 447
UXZ 8/16	M7 x 352	080 2000 448
UXZ 9/18	M7 x 382	080 2000 449
UXZ 10/20	M7 x 412	080 2000 450



Dual line distributors

Order-key

Distributor inlet

The dual line distributor UXZ can be delivered with or without fittings. When the fittings should be delivered already installed into the distributor, they have to be marked with the pipe diameter and series L.

G3/8 without fitting

GE06L, GE08L, GE10L, GE12L or GE15L for straight male coupling, pipe-Ø6, 8, 10, 12 or 15

The fittings can also be ordered separately (see "Fittings and accessories").

When there is no indication concerning the fittings made, we deliver without fittings as standard!

Distributor outlet

The type of fitting at the distributor outlets has to be indicated with the diameter and series L or S when the order is placed.

G3/8 without fittings

GE06L, GE08L, GE10L or GE12L for straight male coupling, pipe-Ø6, 8, 10 or 12

WS12L or WS10S for swivel elbow connection, pipe-Ø10 or 12

RGE06L, RGE08L, RGE10L or RGE12L for non-return valve, pipe Ø-6, 8, 10 oder 12

Note:

No indication of the series means that a straight male coupling or a non-return valve of the series L (cutting ring) are delivered as standard.

Metering volume

The metering code numbers 1000 to 2000 (see table "Technical description") of the metering elements have to be indicated for each side from the distributor inlet in the order in which the lubricant comes out. They have to be separated by a **slash** (/). A lengthwise connection of the outlets has to be indicated with a **plus** (+) instead of a slash.

The metering code numbers of combined outlets sum up (see "Combination of outlets").

Screw plugs and outlets locked by distributor bridges are marked with a line (-).

Proximity switches

Three different proximity switches are available.

N12/24	for	proximity	switch	M12x1
N18/24	(star for p moc	ndard) proximity swite lel)	ch M18x1	(special

N30/24 for proximity switch M30x1,5 (special model)

For other proximity switches, the thread diameter of the proximity switch has to be indicated after the code letter N and the proximity switch's voltage has to be indicated after the slash (/).

The installation position of the proximity switch has to be marked with **NS** left or right as desired, after the metering code number of the metering element to which the proximity switch should be installed.

R = right L = left

Without indication of the installation position, the proximity switch is attached to the last element on the right side as standard.

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Dual Line Central Lubrication Systems

Dual line distributors

UXZ

Order example:



Position of the connections

	R 40	00 +	/ 1(000 / 15	500 NS
	L	/ 20	000 / 10	00 / 15	00
No. of metering elements					
No. of outlets					
Pipe diameter inlet					
Pipe diameter outlet					
Thread diameter of the proximity switch					
Voltage					
Position of the connections					
Metering code numbers at the outlets					

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BEETHOVENSTR. D-91257 PEGNITZ POSTFACH 1320 D-91253 PEGNITZ

Changeover units

4/3-way control valve

Use

The electrical actuated 4/3-way control valve serves for the alternate supply of the main lines I and II of dual line central lubrication systems.

The outlets of the pump can be connected directly to the inlets P1 to P3 of the control valve, not used inlets can be closed.

The pressure limitation valve, which is installed into the control valve, serves for protecting the system against excessive pressure.

From the connection R1 or R2 the lubricant is returned from the pressure limitation valve and



Application recommendation

Especially in systems, for which no compressed air for the control of devices is available, the use of an electrically actuated 4/3-way control valve is recommended. It consists of a base plate and two 3/2-way solenoid valves. In neutral position of the 3/2-way solenoid valves, both main lines are connected to the return line. This ensures that the lubricating cycle always starts with a low pressure and that the pressure does not increase with each cycle as this is the case at a 2-position switching.

In connection with a differential pressure switch, which is installed at the most remote point of the main lines, and reversing of the control valve or switching off the system, the pump only operates with the pressure which is necessary for reaching the differential pressure and for a safe function of the distributor.



Technical data

Electrical data:			
Nominal voltage: 2	24 V DC	110 V A C	230 V AC
Nominal power:	20 W	20 W	20 W
Nominal current:	0,83 A	0,2A	0,1 A
Relative operating	time:		100%
Electrical connecti	on:	plug DIN 43	3650 PG 9
Protection class:			IP 54
Insulation class:			F

Mechanical data:

Volume flow:	Q _{max}	= 8 l/min
Operating pressure:		400 bar
Lubricant:	oil up to 20.0	00 mm²/s
	grease up to l	NLGI-cl. 2
Housing material of conr	nection block:	GG-25
Seals:		NBR
Temperature range:	- 15 °	C to 80 °C
Weight:	appr	ox. 5,5 kg

Order designation

Order-no.:	4340 1 230 3 1 000
Valve type:	
Nominal voltage:	230 V AC = 1 24 V DC = 2 110 V AC = 3
Adjustment press 050 to 400 (e.g. 23	ure limitation valve:
Number of pressure $P1 = 1$; $P2 = 2$; $P3$	B = 3
Connection A of the G $\frac{1}{2} = 1$ (standard	ne outlets: d); G ¾ = 2
Special model: wi	thout

Spare part no. of the 3/2-way solenoid valve:

Nominal voltage	230 V AC	04100619
	24 V DC	04100617
	110 V AC	04100618
		Subject to alterations!

05-2-10-01 state: 01.12EN



Changeover units

FAZ02771-00

4/3-way control valve

Dimension drawing:



Operating method

The delivery pump, e.g. a grease high-pressure pump of the type "F-super 3" or electric barrel pump EFPM, supplies the lubricant over connection P1 (and/or P2, P3) into the connection block. When, with switching on the pump, the solenoid valve S1 is controlled, lubricant is supplied into the main pressure line A I. The main pressure line A II is relieved over connection R1 or R2. Connection R1 or R2 has to be connected to the lubricant reservoir.

When main line A I has the necessary operating pressure, solenoid valve S1 is switched off and S2 is controlled.

Main pressure line A II is supplied with lubricant and main pressure line A I is relieved via the connection R1 or R2.

When A II has reached the necessary operating pressure, solenoid valve S2 is switched off and the line is relieved.

Changeover units

Use

The pneumatically actuated 4/2- way slide serves for the mutual supply of the main lines I and II of dual line central lubrication systems.

Because of the separation between piston control and the control ducts, there are no dead points in which deposits due to hardening grease could come up. This means no failures by a blockade of the control piston, as known of hydraulic slides.



Application recommendation

The use of a control slide is especially recommended for grease dual line systems where the supply is carried out by pneumatically actuated grease barrel pumps.

In connection with a differential pressure switch, which is installed at the most remote point of the main lines, and reversing of the control slide or switching off the system, the pump only operates with the pressure which is necessary for reaching the differential pressure and for a safe function of the distributor.



Technical data

Operating pressure, hydraulic:	max. 350 bar
Volume flow:	$Q_{max} = 20 I/min$
Lubricant:	oil and grease
Control pressure, pneumatic:	3 - 10 bar
Temperature range:	-10 °C to 70 °C
Material:	steel, galvanized
Connections, hydraulic	G 3/8
pneumatic	G 1/4

5/2-way pneumatic valve:

Operating voltage:	see order designation
Electr. connection:	plug DIN 43 650
Protection class:	IP 65 (with elect.
	device outlet)
Repositioning:	spring
Housing material:	aluminum

Order designation

Order-no.:		4065 01	02 00)C
Туре: ———				
Connection:				
hydraul. G3/8, pne	eum. G1/4			
Nominal voltage:	220 VAC = 02	2	_	
	24 V DC = 03	; ———	_	
	24 V AC = 04		_	
without pneum	natic valve $= 00$) ———		
Special models: w	/ithout —			

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Changeover units

4/2-way slide

Changeover units

Dimension drawing:



Operating method

The delivery pump, e.g. a grease barrel pump supplies the lubricant over connection P into the connection block.

The piston of the 4/2-way gate is alternately pressurized with a 5/2-way pneumatic valve. In neutral position of the 5/2-way pneumatic valve, the pressure line P is connected with main line A II and main line A I with the return line R1. With control of the 5/2-way pneumatic valve, the gate piston is moved, pressure line P is now connected with A I and main line II with return line R2.

R1 and R2 are internally connected with each other so that one outlet can be closed.

After the lubrication cycle is finished, the 5/2-way pneumatic valve has to be switched off that the pneumatically actuated way slide piston returns into its original position and the last pressurized main line A I is relieved during the following break time.

The next lubrication cycle starts with the pressurization of pressure line AII.

Changeover units

Pressure changeover switch

Use

The hydraulic pressure changeover switch is used for the alternate pressurization of both main lines in dual line systems. The size depends on the operating pressure optionally 150 bar or max. 300 bar.

After reaching the pressure, adjusted at the pressure springs, the pressure changeover switch reverses hydraulically. Determined by the size of the system, the pressure changeover switch with either 150 bar or 300 bar is used.



Application recommendation

Adjust the changeover pressure in a way that there is enough differential pressure for a safe function of the dual line distributor even with the highest pressure loss to be expected at the most remote point of the main lines. Changed operating conditions, as e.g. the operating temperature require a correction of the pressure adjustment.

Dimension drawing:





Technical data

Changeover pressure, a	djustable: 30 - 150 bar
	80 - 300 bar
Lubricant:	oil 50 to 20.000 mm²/s
	grease up to NLGI-cl. 2
Temperature range:	-20 °C to 80 °C
Volume flow:	Q _{max} = 8 l/min
Material:	steel, galvanized
Weight:	2,5 kg

Order designation

Pressure changeover switch:

Changeover pressure adjustable up to 150 bar, Order-no.: 042100263 Changeover pressure adjustable up to 300 bar, Order-no.: 042100090

Spare parts:

Pressure spring for max. 150 bar Order-no.: 104005158 (1 piece) Pressure spring for max. 300 bar 104005035 (1 piece) Order-no.:



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Pressure changeover switch

Operating method

The lubricant, which is supplied to the inlet by the pump, flows over the middle nut of piston A (fig. 1) into chamber C, keeps piston B and flows over the middle nut of this piston to main line 1. Main line 2 is relieved into the return line over the right nut of piston B.

As soon as the pressure, adjusted at spring M1, is reached, piston S1 opens and the lubricant gets into chamber D of piston A.

Piston A moves to the left and the lubricant flows into chamber E. Piston B moves to the right (fig. 2) and the lubricant flows over the middle nut of piston B to main line 2. Main line 1 is relieved into the return line over the left nut of piston B.

Changeover units

When the pressure, adjusted at spring M2, is reached in main line 2, the lubricant flows into the chambers C and F. The pistons A and B reverse and main line 1 is supplied again.

The changeover pressure, which is necessary for the operation of the dual line system, is determined by the adjustment of spring M1 and M2.



= Pressurized main line = Relieved main line



05-2-10-06 state: 01.12EN

Changeover units



Changeover units

Differential pressure switch

Use

The differential pressure switch is used for dual line central lubrication systems.

When the differential pressure of 40 bar is reached between the two main pressure lines, the differential pressure switch reports this to the control device (e.g. 4/3-way control valve) for the reversal or switching off of the changeover valve. The use of the differential pressure switch effects that in the main lines only the operating pressure which is necessary for the changeover of the dual line distributor and the delivery of lubricant is built up by the delivery pump. To prevent a hardening of the lubricant in the differential pressure switch, a dual line distributor has to be switched downstream.

Dimension drawing:

Technical data

Switching differential pressure:	40 bar
Max. operating pressure:	400 bar
Operating volume:	0,25 cm ³
Max. voltage:	240 V AC
Continuous current:	ЗA
Protection class:	IP 65
Cable connection:	2x M20x1,5
Urder designation	

Order-no.:





Changeover units

Electronic pressure sensor / Control panel G 3/8

Use

An electronic pressure sensor or a control panel G 3/8 with a pressure switch can be used as an alternative to the use of a differential pressure switch.

Electronic pressure sensor



Electron. pressure sensor 0 - 400 bar, alphanumeric display, 4 places Order-no.: 042100321

Installation example: Straight pipe socket 8 L - G 1/4 Order-no.: 04018721106 T-fitting with cutting ring T8L Order-no.: 04013641106

Other fittings under "Fittings and accessories"

Technical data

Application:	gasec	ous and fluid media
(f	or gaseous r	nedia max. 25 bar)
Electr. model:		DC PNP
Connection type:	make cont	act/break contact
		programmable
Connection thread	d:	G 1/4
Cable connection	thread:	M12x1
Measure range:		0 - 400 bar
Per. overload pres	sure:	600 bar
Operating voltage	:	18-36 V DC
Ambient temperat	ure:	-20 °C to 80 °C
Medium temperati	ure:	-25 °C to 80 °C
Protection class:		IP 67
Terminal scheme:		1



042100321

Order designation

Electronic pressure sensor	
Order-no.:	

Cable	box	with	5	m	PUR-cable,	M12	angled
without	t LED	, mal	еc	onr	nector		
Order-ı	no.:					1000	912997
Subject t	o alter	ations!					



Control panel G 3/8 with pressure

Technical data

Application:	gaseous	and fluid	media
Electr. model:			DC
Connection type:	Outlet 1	make c	ontact
	Outlet 2	break c	ontact
Connection thread:			G 1/4
Cable connection threa	ad:	N	112 x 1
Measure range:		0-4	00 bar
Per. overload pressure	:	6	00 bar
Operating voltage:		9,6-32	2VDC
Ambient temperature:		-25 °C to) 80 °C
Medium temperature:		-25 °C to) 80 °C
Protection class:			IP 67
Terminal scheme:		_1	



Order designation

completely premounted Order-no.:

FAZ03312-07

Electronic pressure switch as spare part Order-no.: 042100376

Cable box with 5 m PUR-cable, M12 angled, without LED, male connector Order-no.: 1000912997

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Changeover units

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	BEKA-MAX	Vehicle Lubrication Systems
91257 PEGNITZ/BAVARIA	FLUIUB	Spray Lubrication Systems
PO box 13 20	FOOD	Lubrication Systeme for Filling and packaging Industries
91253 PEGNITZ/BAVARIA	BEKA#//ND	Lubrication Systems for Wind Converters
GERMANY	BEKA WQQD	Lubrication Systeme for Wood Yards and Saw Mills
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