

# Progressive Systems for Commercial Vehicles

For grease up to NLGI grade 2



- Cut wear and tear
- Reduce downtime
- Lower maintenance costs

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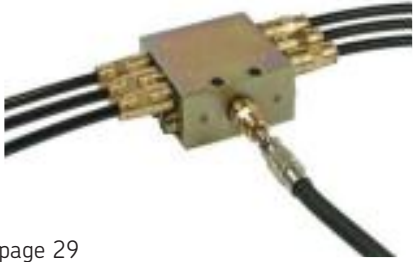
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## Systems overview

| Lubricant: Grease up to NLGI grade 2 |   |   |  |  |
|--------------------------------------|---|---|--|--|
| Selection criteria                   | Delivery rate                                       | Delivery rate depends on the running time and pump elements used  |  |  |
|                                      | Pump suitable for                                   | Farm machinery<br>Construction machinery<br>Special vehicles<br>Tractive units with superstructure<br>Trailers and semitrailers<br>(explosion-proof and hazardous-goods types on request) |  |  |
|                                      | Type of drive                                       | electric  | electric   |  |
| Type designation                     | Pump  | Piston pump, group KFG<br><br>page 12   | Piston pump, group KFGS<br><br>page 16 |  |
| Technical data                       | Operating pressure                                  | 300 bars max.   | 300 bars max.  |  |
|                                      | Reservoir capacity                                  | 2, 6 or 10 liters   | 2, 6 or 10 liters  |  |
| Auxiliary equipment                  | Lubricant distribution                              | Progressive feeders VPM, VPKM, VPBM   |  |  |
|                                      | Control system                                      | IG502-2-E control unit with and without monitoring  | IG502-I integrated control unit with and without monitoring<br><br>(integrated in the pump unit)                           |  |
|                                      | Main line<br>(connection: pump – feeder)            | Steel tubing $\varnothing$ 6×1<br>$\varnothing$ 8×0,7; $\varnothing$ 10×1   |  |  |
|                                      | Secondary line<br>(connection: feeder – lube point) | Plastic tubing $\varnothing$ 4×0,85 <sup>1)</sup><br>$\varnothing$ 6×1,25; $\varnothing$ 6×1,5  | Steel tubing $\varnothing$ 4×0,7 <sup>1)</sup> ; $\varnothing$ 6×0,7;<br>$\varnothing$ 6×1; $\varnothing$ 8×0,7            |  |

Single-line systems for commercial vehicles for fluid grease up to NLGI grade 000, 00, see brochure 1-9420-EN.

|  |   |   |  |
|--|---|---|--|
|  |   | 2 cm <sup>3</sup> /stroke   |  |
|  |   |   |  |
|  | electric  | manual  | manual   |
|  | Piston pumps, group KFA(S)<br><br>page 18 | Cartridge pump as lubrication aid PF-VPBM-...<br><br>page 28 | Lubrication aid<br><br>page 29 |
|  | 300 bars max.   | 400 bars max.   | 250 bars max.  |
|  | 1 liters  | 450 cm <sup>3</sup>   |  |
|  |   | VPBM (unit with pump)   | VPM, VPKM, VPBM  |
|  | IG502-I integrated universal control unit with and without monitoring<br>(integrated in the pump unit)                      |   |  |
|  | Hose line    ∅ 6 : 982-750-091; ∅ 8 : 982-750-111<br>∅ 10 : WVN711-10   |   |  |
|  | Hose line    ∅ 4 : 734-...-K <sup>1)</sup> ; ∅ 6 : 982-750-091<br>∅ 8 : 982-750-111   |   |  |

<sup>1)</sup> Secondary lines for tube diam. 4 are not suitable for temperatures below - 5 °C

## Glossary of terms

### Centralized lubrication system

One pump supplies a large number of friction points with lubricant via a system of lines and feeders/distributors.

### Check valve

Valve that permits flow in only one direction while blocking flow in the opposite direction.

### Consistency

See penetration.

### Contact time

Operating time of pump.

### Control and monitoring units

Electronic units that control and monitor the designated functions of the centralized lubrication system and indicate malfunctions.

### Cycle switch

The stroke of the piston in a progressive feeder can be checked by a cycle switch, thus making it possible to monitor the entire feeder system.

### Directional control valve

Valve that directs a flowing medium in various directions/ paths, e.g. 3/2-way compressed-air valve, pressure relief valve.

### Fast filler coupling

Coupling used for the fast topping up of lubricant with a drum pump.

### Fittings

For steel and plastic tubing, tube adapters with solderless tube connection and cutting sleeve screw unions as per DIN standard 2353.

### Friction point

Point at which frictional forces are effective.

### Indicator light

Display lamp actuated by electric sensors (pressure, pump operation) for function check.

### Interval time

The period between two actuations of the pump.

### Lubricating cycle of progressive feeders

Period required for a complete cycle of the progressive feeder. Each piston must have executed one double stroke.

### Lubrication point

Point at which lubrication is fed to the friction point.

### Main line

Line connecting the pump to the feeders.

### Metered quantity

Amount of lubricant fed to a lubrication point by the feeder during one application of lubricant.

### Monitoring

Function check with indication of malfunctions.

### NLGI grades

See penetration.

### Outlet valve

A check valve integrated in the piston pump. It opens the main line when the pump is in operation and closes the main line to the pump during the suction stroke.

### Penetration

The plasticity (consistency) of a lubricating grease is designated with the penetration number. The penetration depth of a measuring cone is measured at +25 °C in accordance with DIN standard 51804.

The "consistency index of lubricants" is based on NLGI grades

(National Lubricating Grease Institute).

Fluid grease: NLGI grades 000, 00, 0.

Grease: NLGI grades 1, 2

### Pressure switch

Device that actuates an electric switch when a specified pressure is reached, thereby converting hydraulic information to electrical information.

### Progressive feeders (group VPM, VPKM, VPBM)

Lubricant feeders that supply lubricant to lubrication points in progressive order.

### Progressive systems

Centralized lubrication systems with progressive feeders.

### Pumps

Positive-displacement (piston, gear) pumps used to feed the lubricant.

Piston pumps – manually, pneumatically, hydraulically actuated, electrically operated.

### Safety valve

Valve that limits the pressure in the system to a maximum value. The valve opens if this pressure is exceeded.

### Secondary (lubrication) line

Line connecting the lubricant distributor/ feeder to the lubrication point.

### Work cycle time

Period from the start of one lubrication cycle to the start of the next.



## Systems for grease up to NLGI grade 2

- Electrically driven piston pumps KFA / KFG
- Electrically driven piston pumps KFAS / KFGS with integrated control electronics
- Progressive feeders, groups VPM, VPKM, VPBM

Grease systems consist of a pump, feeders with a network of tubing and a control unit.

Progressive systems reach operating pressures of as much as 300 bars depending on the lubricant used, the ambient temperature, size of the system and bearing back pressure. Predefined amounts of lubricant are supplied to the lubrication points while the pump is running, the full delivery of the piston pump being apportioned via the progressive feeders.

Several pump strokes are required to complete one full lubrication cycle, i.e. until each lubrication point has received the amount of lubricant intended for it.

### Description of units

#### 1. Piston pump,

##### Group KFG / KFGS

The pumps are driven by a DC motor. The reservoir capacity and type of filling vary.

The pumps have a maximum of 3 lubricant outlets. One pump element is required for each outlet. The elements are available for different delivery rates and can be exchanged at a later date.

The grease level is checked by a visual or electrical (W1) inspection of the reservoir.

Group KFG pumps are controlled by an IG502-2-E control unit.

Group KFGS pumps are controlled by a control system integrated in the unit (IG502-I).

##### Group KFA / KFAS

The pumps have a maximum of 2 lubricant outlets for the connection of 2 mutually independent lube circuits. One pump element is required for each outlet. The elements are available for 3 different delivery rates and can be exchanged at a later date.

#### 2. Progressive feeders,

##### Groups VPM, VPKM, VPBM

Progressive feeders are used for grease up to NLGI grade 2. Their design makes it possible to adjust the feeders to the amount of lubricant required by the lubrication points to be connected.

When planning a system, be sure the progressive feeders apportion the entire amount of grease delivered by the pump each running cycle. Thus, the metered quantities only define the proportions and not the absolute quantities.

##### Group VPM

The following metered quantities are available: 0.05; 0.14; 0.19; 0.25; 0.3; 0.35 cm<sup>3</sup> (per cycle and outlet).

Adjacent outlets can be combined externally, outlets opposite each other can be combined internally with the help of S-sections.

##### Group VPKM

The following metered quantities are available: 0.04; 0.08; 0.14; 0.18 cm<sup>3</sup> (per cycle and outlet).

In the case of this series, the adjacent outlets of the finished feeder can still be combined internally without having to dismantle the feeder.

##### Group VPBM

Uniform metered quantity 0.13 cm<sup>3</sup> (per cycle and outlet).

Outlet ports opposite each other can be combined internally; adjacent/parallel outlet ports can be combined externally.

##### Important note:

Do not close outlets that are not required. This would immobilize the feeders and cause damages. The lubricant supplied to these outlets must either be returned to the lubricant reservoir or directed to another lubrication point.

The lines must be connected to the feeders via connection fittings or plug connector fittings.

#### 3. Lines and fittings

In systems for grease up to NLGI grade 2, it is necessary to lay main lines in a high-pressure hose with a 6, 8 or 10 mm diam. connector; in special circumstances, it is also possible to use steel tubing with a diameter of 6, 8 or 10 mm. 6 × 1.5 polyamide tubing is used for secondary lines, or also a 6 mm high-pressure hose or 6 mm steel tubing in the off-road sector.

Main and secondary lines are supplied prefilled with grease

#### 4. Control unit

Electronic control and monitoring unit IG502-2-E for systems with KFG/KFA piston pumps in conjunction with a cycle switch (see page 14).

##### Attention:

For "General operation instructions for progressive systems", see 951-130-186-US.

## Lubricants

The plasticity (consistency) of a grease is designated by its penetration number.

The depth to which a measuring cone penetrates at +25 °C is measured in accordance with DIN 51804.

In the USA, the NATIONAL LUBRICATING GREASE INSTITUTE (NLGI) introduced penetration grades that were adopted by DIN 51818 for the “consistency classification of lubricants”.

| NLGI grade to DIN 51818 | Worked penetration in 0.1 mm |                |
|-------------------------|------------------------------|----------------|
| 000                     | 445 to 475                   | fluid          |
| 00                      | 400 to 430                   | nearly fluid   |
| 0                       | 355 to 385                   | extremely soft |
| 1                       | 310 to 340                   | very soft      |
| 2                       | 265 to 295                   | soft           |
| 3                       | 220 to 250                   | medium         |
| 4                       | 175 to 205                   | medium hard    |

But the feedability of grease in centralized lubrication systems is influenced not only by its penetration but also by other parameters like the flow pressure, additives, type of thickener and viscosity of its base oil, to name only the main ones.

All the system’s components like, for instance, pumps, tubing and distributors/feeders have to be accordingly dimensioned in order to assure good feedability of the grease.

The pressures required to deliver a grease depend on the penetration and aforementioned parameters affecting the feedability. Depending on the type of lubricant, extent of the system and dimensioning of the components, it is possible for delivery pressures of 200 bars or more to occur.

Lubricating greases essentially consist of three phases: the thickener, oil and additives.

The lubricant oil is embedded in the “thickener’s skeleton” as in a sponge. The oil is more or less tightly bound, depending on the grease and percentage (type) of thickening agent.

There are cases in which the oil and soap skeleton are separated in progressive systems due to the influence of physical forces. In that case one also speaks of so-called bleeding. The thickener’s skeleton hardens after separation from the oil. That can clog holes and constricted points, thereby leading to the centralized lubrication system’s failure.

Bleeding can have many causes. For instance, the properties of the grease, the number and extent of pressure and temperature changes, vibrations, the effect of filtration on piston fits, etc. all have an impact. In case of doubt, the tendency of lubricants to separate (bleed) will have to be assessed before they are used.

For this purpose, SKF Lubrication Systems offers to investigate lubricants with its company-developed FTG2 Test.

The lubricant manufacturer should be consulted when choosing a grease that is optimally suited to the application.

If a centralized grease lubrication system is also to run troublefree at temperatures as low as –25 °C, it will be necessary to take into account changes in lubricant parameters that impact its delivery.

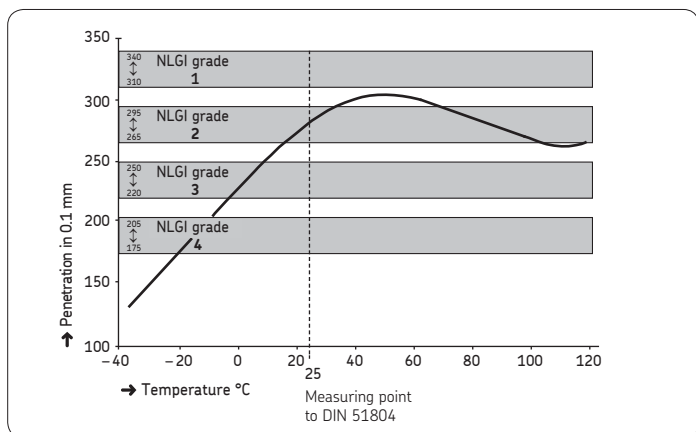
Customary greases recommended by machine, vehicle and lubricant manufacturers can be used. But they must still have adequately good flow properties within the expected temperature range, e.g. a maximum flow pressure of 700 mbars, and their oil-separation tendencies have to be noncritical in the expected operating conditions.

Lubricating grease containing up to 5 % MoS<sub>2</sub> (molybdenum disulfide) as an additive can be delivered with piston pumps and progressive feeders.

NLGI Grade 2 greases containing solids such as graphite and copper (e.g. chisel paste) can be delivered with pumps comprising the KFA, KFAS, KFG and KFGS series. The particle size should be less than 3 µm and not exceed 5 %. In this case the lubricant is distributed directly via the pump elements. Progressive feeders should not be used in this case.

Biodegradable grease can be delivered with progressive systems in the aforementioned conditions.

Please contact us if you have any more questions about the lubricants. We are able to test the lubricants in our own laboratory to determine how they behave (e.g. “bleeding”) when used in progressive systems.



**Penetration curve of a grease belonging to NLGI grade 2 as a function of temperature changes**

### Important note!

**When topping up grease, keep the area clean!**

Contaminants remain in suspension in lubricating greases. They can damage bearings and system components!

Also make sure that systems are only filled with grease that uses the same types of thickener.

Sodium soap greases must not be used in the automotive sector (water-soluble).

Please, see also the important product usage information on the back cover.

### Topping-up pumps for grease of NLGI grade 1 and 2

Delivery rate approx. 40 cm<sup>3</sup>/stroke

with trolley

for 25 kg drum: order No. 169-000-042

for 50 kg drum: order No. 169-000-054

without trolley

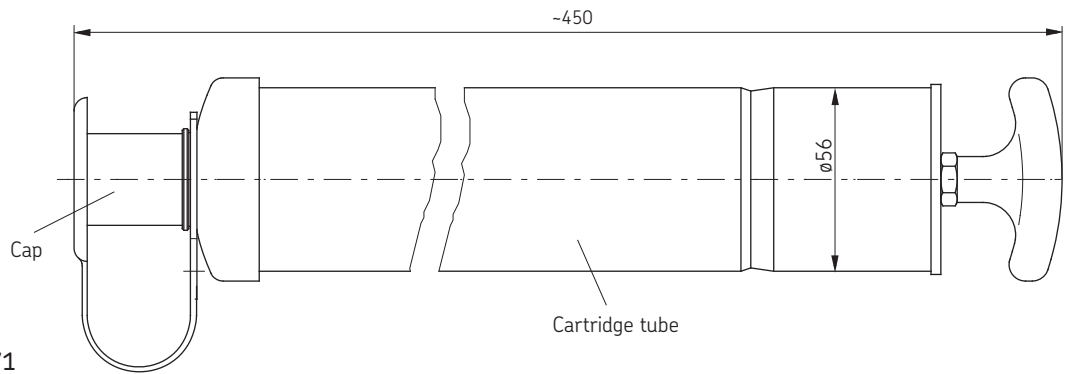
for 25 kg drum: order No. 169-000-342

Associated filler socket order No. 995-000-705, see page 46.



### Filling cylinder, complete

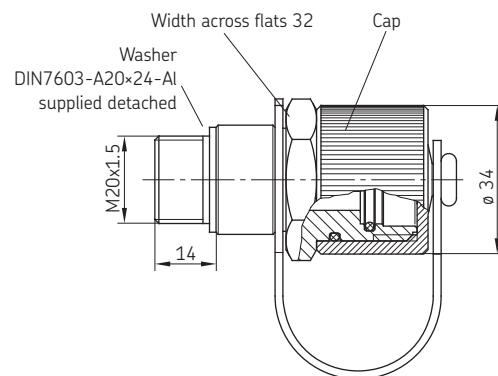
Suitable for cartridges in accordance with DIN 1284 with an effective content of 450 cm<sup>3</sup> and 550 cm<sup>3</sup>.



Order No. 169-000-171

Fits filler nozzle 169-000-174

### Filler nozzle

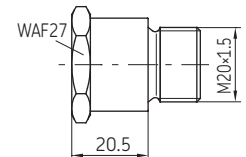


Order No. 169-000-174

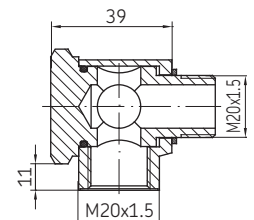
Fits filling cylinder 169-000-171

To change the filling position when the pump is hard to reach:

Adapter for filler nozzle  
Order No. 853-950-010



Banjo fitting  
Order No. 405-541-411



## Piston pumps, electrically operated, group KFG

KFG1-5



The pumps comprising the KFG group have 3 lubricant outlets for the connection of 3 progressive feeder circuits independent of each other. A separate pump element is required for each outlet port.

Four pump elements with varying delivery rates are available so that the quantity of grease can be approximately adjusted to the needs of the individual circuits. This assures that the lubrication points are supplied with an adequate amount of grease in the course of every lubrication cycle.

KFG3-5



The pump elements function even at temperatures of  $-25\text{ }^{\circ}\text{C}$  due to an agitator driven by the gear motor.

The pumps of the KFG group differ in terms of the reservoir capacity and type of grease filling.

The level of lubricant can be easily monitored through the transparent reservoir.

KFG5-5



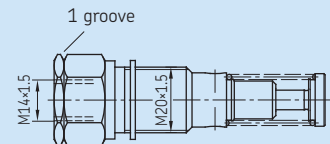
An IG502-2-E control unit can be used to control the pump (page 14 / 15).

See page 16 for piston pumps with integrated control unit, group KFGS.

See page 45 for safety valves.

| Order No  | Reservoir capacity (liters) | Grease filling   |
|-----------|-----------------------------|--|
| KFG1-5    | 2                           | via conical head nipple with topping-up pump   |
| KFG3-5    | 6                           | from the top via hinged lid, or optionally via conical head nipple using a topping-up pump |
| KFG3-5-S3 | 6                           | from the top via hinged lid, or optionally via conical head nipple using a topping-up pump |
| KFG5-5    | 10                          | via conical head nipple with topping-up pump   |

| Pump elements Order No. | Delivery rate <sup>1)</sup> (cm <sup>3</sup> /min) | Number of grooves <sup>2)</sup> |
|-------------------------|--|---------------------------------|
| KFG1.U1                 | 2.5  | 1                               |
| KFG1.U2                 | 1.8  | 2                               |
| KFG1.U3                 | 1.3  | 3                               |
| KFG1.U4                 | 0.8  | 4                               |



Prior to shipment the piston pumps are completed with the pump elements specified in the order.

The order No. must be supplemented with the desired pump elements.

Example:

KFG1-5, equipped with KFG1.U 1, KFG1.U 3, KFG1.U 3

<sup>1)</sup> The indicated delivery rates refer to the delivery of NLGI grade 2 grease at a temperature of  $20\text{ }^{\circ}\text{C}$  and a back pressure of 50 bars. Temperatures and pressures that deviate from these figures lead to a lower delivery rate. The indicated values must be considered when planning a centralized lubrication system.

<sup>2)</sup> The pump elements are marked on the outside with grooves on the flat.

## Progressive Systems for Commercial Vehicles for grease up to NLGI grade 2

### Technical data

#### Motor

|                                |                            |
|--------------------------------|----------------------------|
| Operating voltage              | 12 V DC / 24 V DC          |
| Power consumption (at +20 °C): |                            |
| No-load operation              | 0.58 A / 0.29 A            |
| Full-load operation            | 2.5 A / 1.25 A at 300 bars |
| Starting load                  | 9 A / 4.5 A for 10 ms      |
| Fuse                           | 5 A / 3 A                  |

Number of lubricant outlets . . . . . 3

If only one outlet is required, the M 20×1.5 screw plug must be used instead of the other pump element.

**Lubricant** . . . . . grease up to NLGI grade 2  
flow pressure up to 700 mbars max.

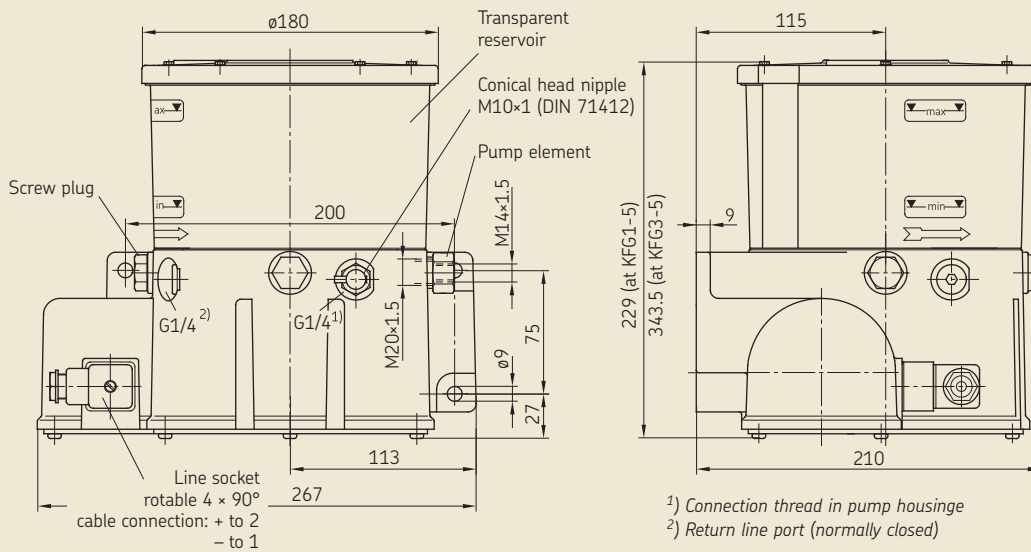
#### Unit

|                                   |                   |
|-----------------------------------|-------------------|
| Max. operating pressure           | 300 bars          |
| Permissible operating temperature | -25 °C to +75 °C  |
| Reservoir capacity                | 2, 6 or 10 liters |
| Type of enclosure                 | IP 5K6K           |

*Conical head nipple DIN71412-AM10×1 for topping up of grease.*

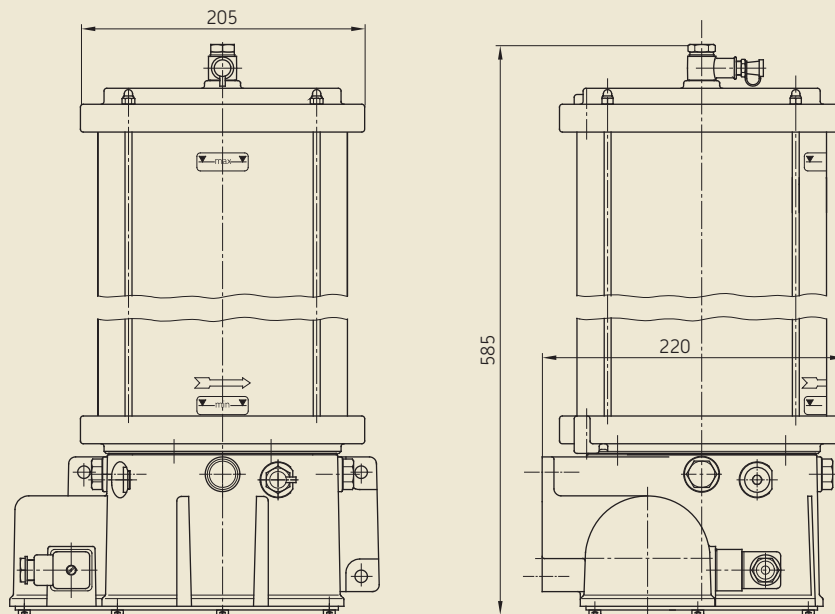
*Topping-up pump: standard grease gun, pneumatically operated, with button-head fitting for conical head nipple conforming to DIN 71412.*

### KFG1-5



### KFG5-5

See above for missing dimensions and data.



## Electronic control unit IG502-2-E

for systems with group KFG/KFA piston pumps

### Operating and display elements

The IG502 control units come with an operating and display panel that can be used to check, monitor and, if necessary, readjust the parameters as well as programmed functions.

### Modes of operation

#### PAUSE (pump OFF) with timer function

- programmable from **0.1 to 99.9 h**
- digital display after invoking:  
**tPA** (t = timer, PA = PAUSE)

The PAUSE (the interval between two lube cycles) is determined by a clock cycle (timer) generated by the control system and by the value (in hours) programmed for PAUSE (tPA).

#### PAUSE (pump OFF) with counter function

- programmable from **1 to 999 pulses**
- digital display after invoking:  
**cPA** (c = counter, PA = PAUSE)

The PAUSE (the interval between two lube cycles) is determined by the interval between the times signals arrive at the counter input and by the value programmed for PAUSE (cPA).

#### CONTACT (pump ON) with timer function

- programmable from **1 bis 99,9 Minuten**
- digital display after invoking:  
**tCO** (t = timer, CO = CONTACT)

The pump running time (CONTACT) is determined by a clock cycle (timer) generated by the control system and by the value (in minutes) programmed for CONTACT (tCO).

### Monitoring functions

#### PS (Pressure Switch)

This monitoring function is intended for centralized grease lubrication systems designed for NLGI grades 000, 00, 0 in which the pressure in the main line is monitored. Once the monitoring parameter **PS** has been programmed, the pressure switch installed in the main line is monitored for respective signals while the pump is in operation.

#### CS (Cycle Switch)

This monitoring function is intended for centralized grease lubrication systems with progressive feeders in which a piston's motion is monitored with a cycle switch.

Once the monitoring parameter **CS** has been set, the cycle switch installed on the progressive feeder is monitored for the respective signal while the pump is in operation.

The respective monitoring parameter selected (**PS** or **CS**) is displayed by the lighting of the corresponding LED in the PAUSE (interval) mode.

#### Without monitoring (OFF)

The monitoring can be switched off (OFF). The control system then works without direct monitoring of the pressure build-up in the main line or without monitoring of the feeder's operation. The **PS** or **CS** LEDs do not light up.

#### Fault displays

The red FAULT LED shows a group fault signal when it constantly burns. The cause of the fault signal is additionally shown on the digital display to help with troubleshooting. The following messages are provided for:

- FPS** – pressure build-up fault when monitoring is effected with a pressure switch.
- FCS** – cycle-switch fault when a progressive feeder is not working or is blocked (line break).

#### Special functions

Control units comprising the IG502 group have two electronic counters in which times are permanently stored; they cannot be changed by the user.

These counters are used to check the operation of the centralized lubrication system and are read out via the LED display.

#### Fault-hours counter

The amount of time a farm or construction machine has been run with a non-functioning centralized lubrication system (e.g. with no lubricant in the reservoir) is added up by the fault-hours counter.

The counter's contents are automatically updated and cannot be cleared. The current state of the counter can be displayed by invoking function parameter **Fh** on the display and operating panel. The current value is displayed in hours.

The counter has a resolution of 0.1 hour, i.e. the smallest displayable interval amounts to 6 minutes.

#### Elapsed-hours counter

The electronic elapsed-hours counter adds up the time in which power is applied to the control unit.

The counter's contents are automatically updated and cannot be cleared. The current state of the counter can be displayed by invoking function parameter **Oh** on the display and operating panel. The current value is displayed in hours.

The counter has a resolution of 0.1 hour, i.e. the smallest displayable interval amounts to 6 minutes.

The units meet the legal requirements of the applicable EC Directives.

The unit is EC Type Approved (e1).

#### Application

The IG502-2-E universal control unit is used to control and monitor centralized lubrication systems on commercial vehicles. The control unit's functions can be programmed. Its housing dimensions, electrical connection and functions are compatible with those of SKF control units in use to date.

The operating elements are protected by a foil against moisture and dirt. The unit has a voltage-independent data memory. This is where the configuration data and parameters are stored. As a result, the control unit is not dependent on a constant supply of voltage.

If an external indicator light **SL** has been installed in the driver's cab, it will light up for 3 seconds after the unit is switched on.

#### Installation

The unit has to be installed in a closed compartment on the vehicle where it is protected from ambient influences. It is fastened in place with straps.

The IG502-2-E is accommodated in an IP 20 type of enclosure. The plug conforms to safety class IP 00.

If the control unit is installed in a hard-to-reach place, it is advisable to additionally install an illuminated pushbutton on the dashboard to serve as a fault display and function check.





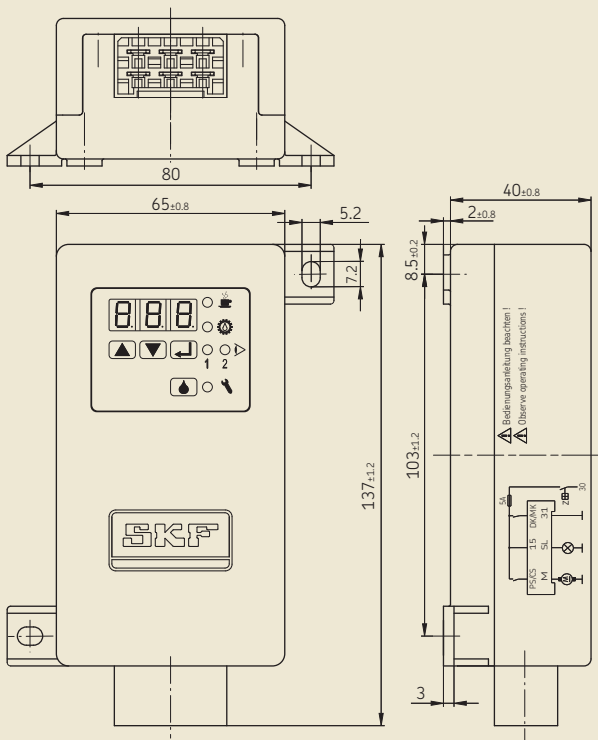
**Technical data**

|  |                  |
|--|------------------|
| Order No. . . . . .                        | IG502-2-E        |
| Associated cable harness . . . . .         | 997-000-185      |
| Control voltage <sup>1)</sup> . . . . .    | 12 or 24 V DC    |
| Max. contact load, terminal M . . . . .    | 10 A             |
| SL-output . . . . .                        | 4 W              |
| Type of enclosure <sup>2)</sup> . . . . .  | IP 40, DIN 40050 |
| Temperature range . . . . .                | -25 to +75 °C    |
| Max. fusing . . . . .                      | 5 A              |
| Programmable interval times . . . . .      | 0,1 to 99,9 h    |
| Programmable pump running time . . . . .   | 0,1 to 99,9 min  |
| Programmable pulses . . . . .              | 1 to 999         |
| Elapsed-time, fault hours memory . . . . . | 0 to 99999,9 h   |

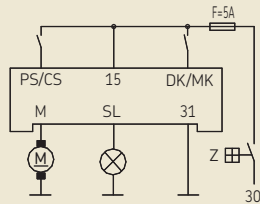
<sup>1)</sup> Please quote control voltage when ordering.

<sup>2)</sup> Warranted for vertical (plug-in connector pointing downward) and horizontal installation.

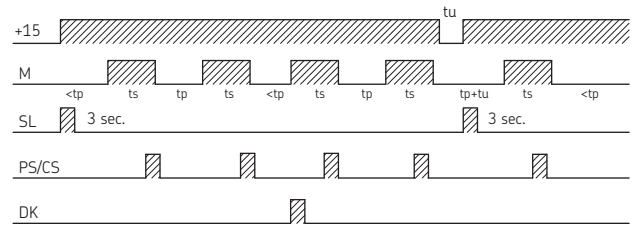
**IG502-2-E**



**Wiring diagram**



**Normal functional sequence**



(time axis not to scale)

- tu = ignition interruption
- ts = contact time
- tp = interval time
- 30 = battery + / vehicle network
- 15 = operating voltage + / after ignition "ON"
- 31 = operating voltage -
- DK/MK = pushbutton / intermediate lubrication or pulse-counter input
- PS/CS = pressure switch / cycle switch
- M = pump motor
- SL = indicator light
- Z = ignition lock
- F = 5 A fuse

LED PAUSE  
lights in intervals

LED CONTACT  
lights when pump running.

LED CS  
lights for monitoring with cycle switch function.

LED PS  
lights for monitoring with pressure switch function.

LED FAULT  
lights for fault monitoring (cycle or pressure switch).

Pushbutton DK

## KFGS Piston Pumps with integrated control unit for progressive systems



Four pump elements with different delivery rates are available so that the amount of grease can be adjusted to the needs of the individual circuits. This assures that the lubrication points are supplied with an adequate amount of grease in the course of every lubrication cycle.

The functioning of the pump elements is assured even at temperatures of  $-25\text{ }^{\circ}\text{C}$  due to an agitator driven by the gear motor.

The transparent reservoir makes it easy to check the level of lubricant. An overflow tube serves as overfill protection and as a vent.

As an optional feature, piston pumps comprising the KFGS series can be equipped with a low level indicator.

Control is provided by an integral IG502-I control and monitoring unit; it can be operated in a time- or load- (pulse) dependent mode, and with or without monitoring.

The control system provides the following advantages:

- Non-volatile memory with PIN-code protection
- Storage of residual interval and lubricating times
- Storage of fault signals (diagnosis memory)
- Data save in event of a power failure
- Connection for external pushbutton
- Connection for inductive cycle switch
- Interval and contact times can be set independent of each other, even with monitored systems
- Electrical connections easy via 7-pole plug connector

The pumps comprising the KFGS Group have 3 lubricant outlets for the connection of 3 progressive feeder circuits independent of each other. A separate pump element is required for each outlet port.

| Order No.  | Reservoir capacity (liters) | Grease filling   |
|------------|-----------------------------|--|
| KFGS1-5    | 2                           | via conical head nipple  |
| KFGS3-5    | 6                           | with topping-up pump   |
| KFGS3-5-S3 | 6                           | from the top via hinged lid, or optionally via conical head nipple using a topping-up pump |
| KFGS5-5    | 10                          | via conical head nipple with topping-up pump   |

Add W1 when ordering a pump unit with low level indicator, example: KFGS5-5W1.

Order example: KFGS1-5, 24 V DC, with KFG1.U1, KFG1.U2 and KFG1.U4

Prior to delivery the piston pumps are completed with the pump elements specified in the order (page 12).

Safety valve, opening pressure  $300 \pm 20$  bars, order No. 161-210-012 (page 45).

The following has to be appended to the pump's order number: operating voltage, order No. for the pump elements.



Progressive Systems for Commercial Vehicles for grease up to NLGI grade 2

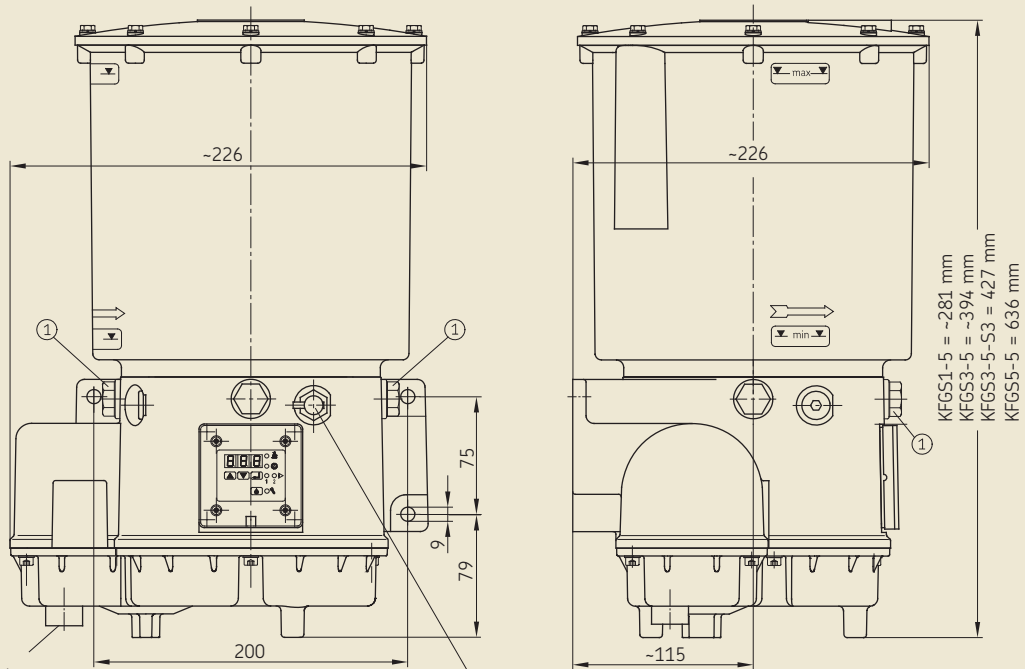
Technical data

Pump

Operating voltage ..... 12 oder 24 V DC  
 (please state when ordering) ..... (230 V AC design is possible)  
 Max. back pressure ..... 300 bars  
 Permissible operating temperature ..... -25 °C to +75 °C  
 Reservoir capacity ..... 2, 6 or 10 Liter  
 Type of enclosure DIN 40050, T9 ..... IP 5K6K  
 Number of outlets ① ..... 3  
 Lubricant ..... grease up to NLGI grade 2  
 Flow pressure up to 700 mbars max.

Cable harness order No. 997-000-630, page 19 and 35.

KFGS3-5 reservoir capacity 6 liters



Connection for cable harness  
(997-000-630)

Filling via conical head nipple (DIN 71412)

## KFA/KFAS Mini-Pump Units with integral control system



Pumps belonging to the KFA(S) series come with a maximum of 2 outlet ports for the connection of 2 independent lube circuits. A separate pump element is required for each outlet.

Three pump elements with different delivery rates are available so that the volume of grease can be adjusted to the needs of the individual circuits. That makes sure every lube point is supplied with an adequate amount of grease in each lubrication cycle.

Control is provided by an integral IG502-I control and monitoring unit; it can be operated in a time- or load- (pulse) dependent mode, and with or without monitoring (page 20).

The control system provides the following advantages:

- Non-volatile memory with PIN-code protection
- Storage of residual interval and lubricating cycle
- Storage of fault signals (diagnosis memory)
- Data save in event of a power failure
- Connection for external pushbutton
- Connection for inductive cycle switch
- Interval and contact times can be set independent of each other, even with monitored systems
- Electrical connections easy via 7-pole plug connector

| Order No.                       | Reservoir capacity (liters) | Grease filling          |
|---------------------------------|-----------------------------|-------------------------|
| KFA1                            | 1                           | via conical head nipple |
| KFAS1<br>(incl. control system) | 1                           | via topping-up pump     |

| Pump element Order No | Delivery rate <sup>1)</sup> [cm <sup>3</sup> /min] |
|-----------------------|--|
| KFA1.U1               | 2.0  |
| KFA1.U2               | 1.5  |
| KFA1.U3               | 1.0  |

A "W" has to be appended to the order No. for pump units with filling level monitoring, order example: KFAS1-W.

The following has to be appended to the pump's order number: operating voltage, order No. for the pump elements.

Order example:  
KFAS1, 12 V DC, with KFA1.U2, KFA1.U3

<sup>1)</sup> The indicated rates refer to the delivery of NLGI grade 2 grease at an operating temperature of 20°C and a back pressure of 50 bars. Temperatures and pressures that deviate from these figures lead to different delivery rates. The indicated values must be taken as a basis in the design of a centralized lubrication system.

Cable harness order No. 997-000-630, pages 19 and 35.

Safety valves, page 45.

Progressive Systems for Commercial Vehicles for grease up to NLGI grade 2

**Technical data**

**Unit**

Operating voltage ..... 12 V DC / 24 V DC  
 (please indicate when ordering)  
 (230 V AC design is possible)

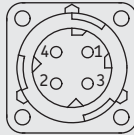
Mode/ON time ..... S3/20% - 50 min.  
 Pay attention to interval and contact time when setting!  
 Max. runtime 10 min., interval time = 4 × runtime

Max. back pressure ..... 300 bars  
 Permissible operating temperature ..... -25 °C to +75 °C  
 Reservoir capacity ..... 1 liters  
 DIN 40050 enclosure, T9 ..... IP 6K9K  
 Max. number of outlets ..... 2  
 Weight (filled with grease) ..... approx. 3.8 kg  
 Lubricant ..... grease up to NLGI grade 2  
 Flow pressure up to 700 mbars max.

**Pin allocation**

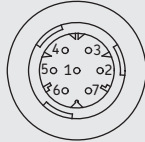
**KFA1 cable harness 997-000-820** (not included in delivery)

| Pin No. | Function           | Core color |
|---------|--------------------|------------|
| 1       | 15 plus potential  | red/black  |
| 2       | 31 minus potential | brown      |

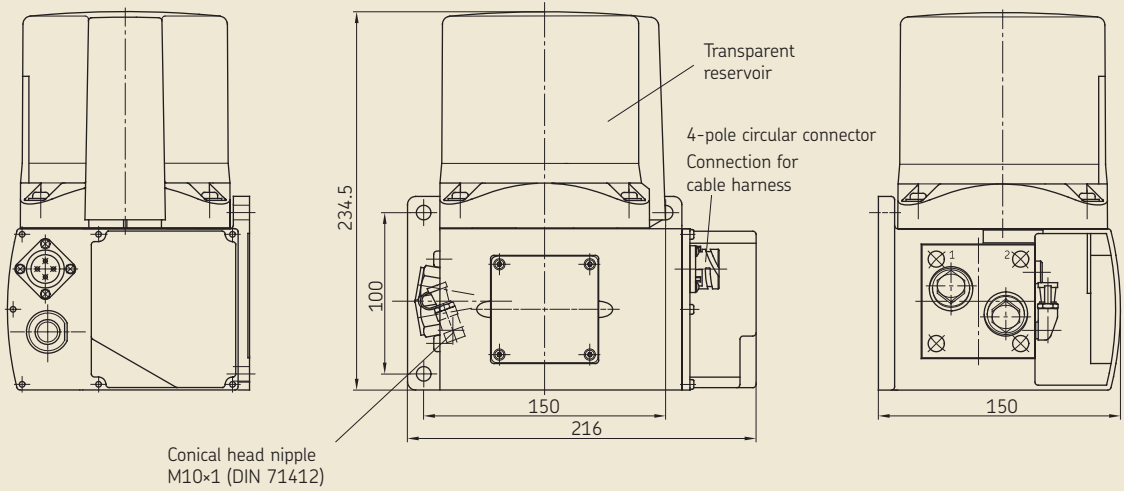


**KFAS1, KFAS1-W cable harness 997-000-630** (not included in delivery)

| Pin No. | Function                   | Core color   |
|---------|----------------------------|--------------|
| 1       | 31 minus potential         | brown        |
| 2       | 15 plus potential          | red/black    |
| 3       | DK manual lubrication      | blue         |
| 4       | SL2 indicator light, ext.  | pink         |
| 5       | ZDS+ cycle switch, +output | black        |
| 6       | ZDS cycle switch, inputg   | black        |
| 7       | SL1 status display light   | purple/green |

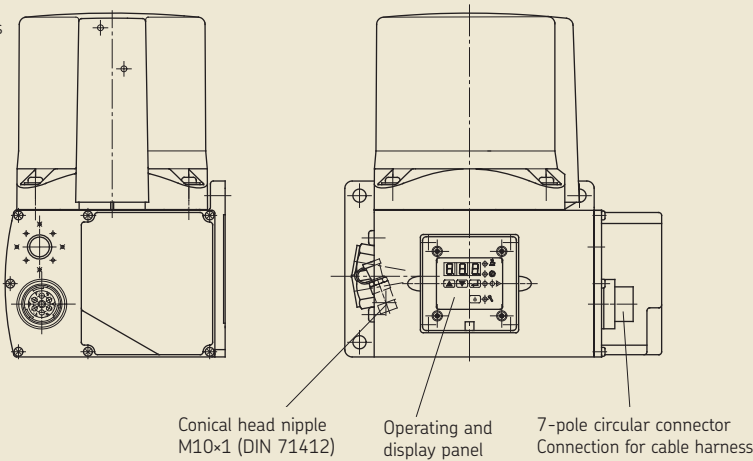


**KFA1** without integral control system



**KFAS1** with integral control system

See above for missing dimensions and data.



## IG502-I electronic control and monitoring unit

### integrated in KFGS and KFAS pump unit

#### General remarks

The IG502-I control and monitoring unit is an integral component of KFGS and KFAS pump units. Its functions are specially designed for the control and monitoring of centralized lubrication systems on commercial vehicles (traveling machinery).

The control unit can be programmed by the customer to suit the vehicle's or machine's operating conditions and can be set for the following modes of operation:

1. TIMER without monitoring
2. TIMER with monitoring
3. COUNTER without monitoring
4. COUNTER with monitoring

#### Interval (tPA) in the "TIMER" mode

The interval (pause between two lubrications) in the TIMER mode is determined by a clock cycle generated by the control system and by the value programmed as tPA. It can be set for a value between 0.1 and 99.9 h.

#### Interval (cPA) in the "COUNTER" mode

The interval (pause between two lubrication routines) in the COUNTER mode is determined by the interval between pulses arriving at input DK (signal change from 0 V to 24 V) and by the value programmed as cPA. It can be set for a value from 1 to 999 pulses. In this mode, terminal DK leading out of the unit is used as a counter input to trigger lubrication after a defined number of pulses. In this case, it is not possible to press an external pushbutton to trigger intermediate lubrication.

#### Setting the interval and pump running times as well as desired monitoring function

The operations required to set the control unit for the values and functions in line with the vehicles' use can be found in the operating instructions included with the pump unit.

#### Function (standard "TIMER" function without monitoring)

The lubrication periods are repeated on a cyclical basis at the rate of the selected interval (tPA or cPA). The pump running time during a lubrication routine corresponds to the time in minutes set on the control panel as tCO (contact time).

The intervals as well as the pump running times are executed only when the power is on (terminals 15 and 31 connected to 12 VDC or 24 VDC, depending on the unit). If the power is switched off (interruption of the voltage to terminal 15), the currently running residual time is stored and continued after the power is switched on again.

If the monitoring function CS is programmed (this is only done for centralized lubrication systems with cycle switches), the cycle switch mounted on a progressive feeder is queried for the emittance of a signal while the pump is running. At least one signal change (either ON>OFF or OFF>ON) is expected from the control routine at terminal ZDS in the cable harness in order for a new interval to start at the end of the pump's running time and for the sequence of functions to continue normally. If this signal fails to materialize during the preset pump running time (tCO), a monitoring program (block mode) is started at the end of that period. In this program routine the pump unit is additionally switched on at specially defined intervals up to a maximum of two times and the cycle switch is monitored for the emittance of a signal.

When the cycle switch signal arrives at the control unit, the monitoring program is immediately ended and operation with the normal sequence of functions is continued. When the monitoring program elapses, a fault signal is admitted at the end and the functional sequence stopped.

No intermediate lubrication can be triggered while the monitoring program is running.

#### Memory (EEPROM)

The control system comes with a non-volatile memory (EEPROM), so a constant supply of power is not required for the storage of residual times and fault signals. When the power is switched off (ignition), the current value is stored and is available for the further sequence of functions after the power returns.

#### Monitoring and fault displays

##### Function monitoring with cycle switch

Centralized lubrication systems can be monitored with cycle switches. For this to be done, the unit has to be set (programmed) under COP for CS monitoring (cycle switch). The signal emitted by the switch during the lubrication routine is then monitored.

If no signal is emitted during both the lubrication routine and the monitoring program automatically started thereafter, a fault signal is emitted at the end of the monitoring program (terminal SL2 is constantly on) and the functional sequence is interrupted. The FCS error code (Fault Cycle Switch) can be invoked by pressing a button on the control panel.

### Monitoring of filling level

KFGS and KFAS pump units with the identifier "W1" in the order number come from the factory with integrated filling-level monitoring that is always active and does not have to be programmed. Only NLGI Grade 2 greases may be used for these pump units.

When the minimal filling level is reached, a fault display is shown (terminal SL2 is constantly on) and the functional sequence is interrupted. The FLL fault code (Fault Low-Level) can be invoked by pressing a button on the control panel.

### Clearing a fault message

No signal change at ZDS input – this fault signal can be cleared while the power is on by pressing pushbutton DK.

Filling level fault – this fault signal can be cleared when the power is on after the reservoir has been filled by pressing push-button DK.

### Elapsed-hours counter

The control unit comes with a built-in elapsed-hours counter which adds up the time in which power is applied to the control unit. The memory cannot be changed. The stored values can be called up on the control panel and viewed.

### Fault-hours memory

The control unit comes with a fault-hours memory that adds up the time in which the control unit was operated with a pending fault signal. The memory cannot be changed. The stored values can be called up on the control panel and viewed.

### Symbols



LED PAUSE  
lights in intervals



LED CONTACT  
lights when pump running.



LED CS  
lights for monitoring with  
cycle switch function.



LED PS  
lights for monitoring with  
pressure switch function.



LED FAULT  
lights for fault monitoring  
(cycle or pressure switch).



Pushbutton DK

## Progressive feeders, goup VPM, VPKM

In the case of systems for NLGI grade 2 grease, the lubricant is distributed by way of progressive feeders.

Progressive feeders are available for use on commercial vehicles in three groups that differ not only in size but also in design.

A section-type progressive feeder consists of at least three sections to a maximum of ten. In each feeder section there is one piston for the apportioning and delivery of the lubricant. The piston diameter and piston path determine the delivery rate per stroke. Each piston has two tasks, first delivering and second controlling, i.e. it can deliver its lubricant only after the preceding one has discharged its lubricant. This makes it relatively simple to monitor lubricant delivery.

It is sufficient to monitor only the motion of the piston in one single section to be sure that the progressive feeder is still working.

The lubricant quantity supplied by the pump is apportioned in the progressive feeder to the individual lubrication points in keeping with the metered quantity of the individual sections.

The delivery rate in  $\text{cm}^3$  and length of the cycle (pump running time) determine the absolute quantity fed to the individual lubrication points. The pistons of the progressive feeders execute one or more strokes in this connection.

### Important note!

Progressive-feeder outlets that are not required must not be plugged. To avoid damages, these outlets must either be combined with an adjacent outlet, i.e. fed to a lubrication point, or connected to the pump via a return line.

For systems with function-monitoring capability, it is possible to install a cycle switch on the side of the feeder section with the hexagon-head screw plug. If the cycle switch is to be installed on the opposite element side, the delivery piston must first be rotated so that the piston extension points in the direction of the cycle switch.

### Function

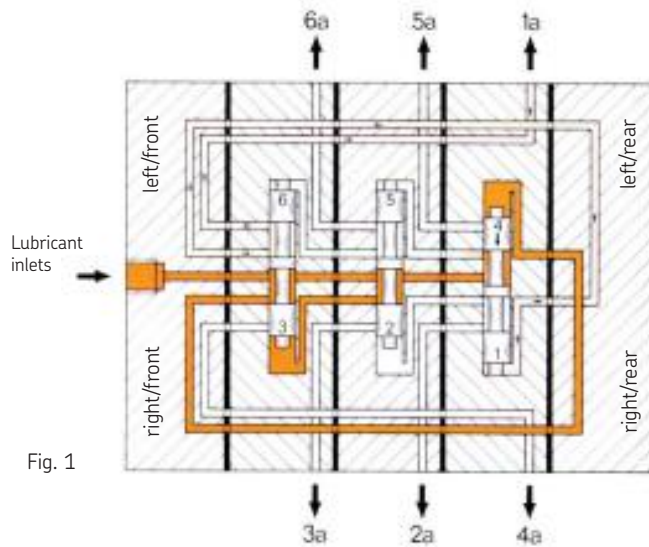


Fig. 1

In Fig. 1 piston side 4 is pressurized by the pump, piston side 1 has delivered lubricant to outlet 1a. The connection between the main line and piston side 5 has become free due to the stroke of piston 1/4

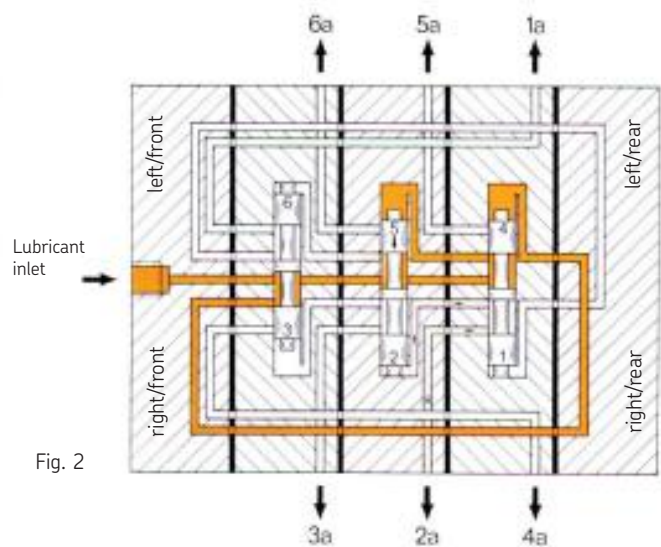


Fig. 2

In Fig. 2 piston side 5 is pressurized and piston side 2 delivers the lubricant via outlet 2a. Piston side 6 is the next to be pressurized, etc.

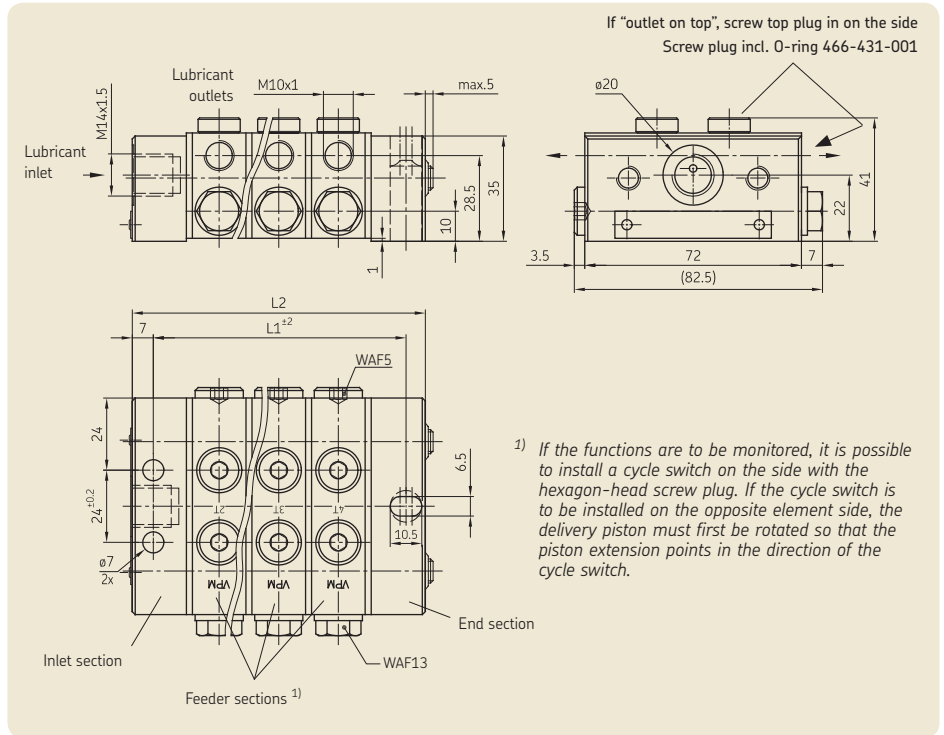
## Progressive feeders, group VPM



In this group, the feeder sections have two outlets on each side, one each on the side and one on top, but only one may be used. The second outlet must always be kept closed. These feeders are supplied with a built-in check valve.

A later combination of two outlets is only possible with a crossporting bar that is screwed into the upper alternative outlets. Any odd number of outlets can be achieved with the help of S-sections without additional crossporting bars.

Operating pressure:  
10 bars min. / 250 bars max.



### Straight connectors

for inlet M14x1,5:  
for 6 mm diam. tube, order No. 406-413  
for 8 mm diam. tube, order No. 408-413  
for 10 mm diam. tube, order No. 410-403

for outlet M10x1:  
for 4 mm diam. tube, order No. 404-006K  
for 6 mm diam. tube, order No. 406-423  
for 8 mm diam. tube, order No. 441-008-511

plug-in connector  
for 6 mm diam. tube, order No. 451-006-518-VS  
corresponding plug-in connectors, see page 30

| Order No. | Number of feeder section | Number of possible outlets | L1 <sup>1)</sup> | L2  |
|-----------|--------------------------|----------------------------|------------------|-----|
| VPM-3     | 3                        | 6                          | 84               | 98  |
| VPM-4     | 4                        | 8                          | 104              | 118 |
| VPM-5     | 5                        | 10                         | 124              | 138 |
| VPM-6     | 6                        | 12                         | 144              | 158 |
| VPM-7     | 7                        | 14                         | 164              | 178 |
| VPM-8     | 8                        | 16                         | 184              | 198 |
| VPM-9     | 9                        | 18                         | 204              | 218 |
| VPM-10    | 10                       | 20                         | 224              | 238 |

<sup>1)</sup> The spacing between holes for attachment of the feeders can deviate from the indicated dimensions due to the individual tolerances of the feeder sections. It is therefore advisable to drill the attachment holes on the mounting surface.

### Apportionment

Selection of feeder sections for the desired lubricant quantity.

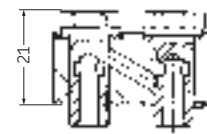
| Amount per cycle and outlet (cm <sup>3</sup> ) | Number of outlets | Designation of sections |
|--|-------------------|-------------------------|
| 0,05   | 2                 | 1T                      |
| 0,14   | 2                 | 2T                      |
| 0,19   | 2                 | 3T                      |
| 0,25   | 2                 | 4T                      |
| 0,3  | 2                 | 5T                      |
| 0,35   | 2                 | 6T                      |
| 0,1  | 1                 | 1S <sup>1)</sup>        |
| 0,28   | 1                 | 2S <sup>1)</sup>        |
| 0,38   | 1                 | 3S <sup>1)</sup>        |
| 0,5  | 1                 | 4S <sup>1)</sup>        |
| 0,6  | 1                 | 5S <sup>1)</sup>        |
| 0,7  | 1                 | 6S <sup>1)</sup>        |

All PS sections can be outfitted with a cycle switch.

<sup>1)</sup> The two outlets of one feeder section are combined here.

### Crossporting bar

The crossporting bar is used to combine the lubricant outputs of two adjacent feeder sections via the alternative outlets on top of the feeder.



Order No VP-C

Model: complete with banjo bolts and washers.



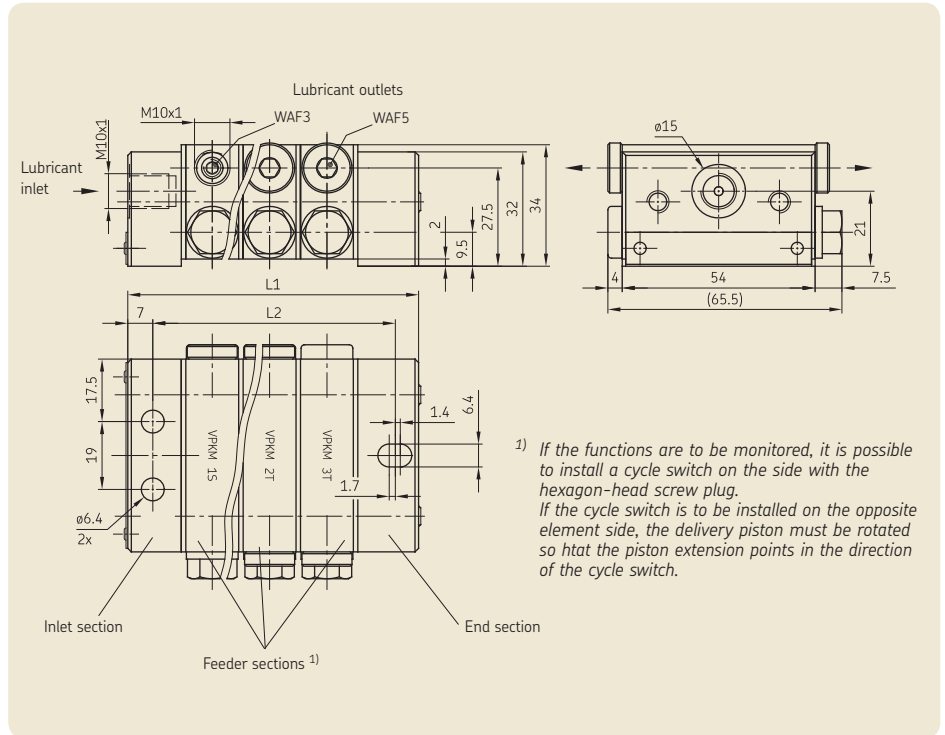
## Progressive feeders, group VPKM



This group has only one outlet on each side of the section and is not equipped with built-in check valves.

Adjacent outlets on one side can be combined by screwing out the plugs installed as a standard feature (see page 25 for examples).

Operating pressure:  
5 bars min. / 250 bars max.



| Order No.            | Number of feeder sections | Number of possible outlets | L2 <sup>1)</sup> | L1    |
|----------------------|---------------------------|----------------------------|------------------|-------|
| VPKM-3 <sup>2)</sup> | 3                         | 6                          | 68.3             | 81.9  |
| VPKM-4               | 4                         | 8                          | 84.6             | 98.1  |
| VPKM-5               | 5                         | 10                         | 100.8            | 114.3 |
| VPKM-6               | 6                         | 12                         | 117              | 130.5 |
| VPKM-7               | 7                         | 14                         | 133.2            | 146.7 |
| VPKM-8               | 8                         | 16                         | 149.4            | 162.9 |
| VPKM-9               | 9                         | 18                         | 165.6            | 179.1 |
| VPKM-10              | 10                        | 20                         | 181.8            | 195.3 |

<sup>1)</sup> The spacing between holes for attachment of the feeders can deviate from the indicated dimensions due to the individual tolerances of the feeder sections. It is therefore advisable to drill the attachment holes on the mounting surface.

<sup>2)</sup> This progressive feeder must in principle be used only with check valves.

### Apportionment

Selection of feeder sections for the desired lubricant quantity.

| Amount per cycle and outlet (cm <sup>3</sup> ) | Number of outlets | Designation of sections |
|--|-------------------|-------------------------|
| 0.04   | 2                 | 05T                     |
| 0.08   | 2                 | 1T                      |
| 0.14   | 2                 | 2T                      |
| 0.18   | 2                 | 3T                      |
| 0.08   | 1                 | 05S                     |
| 0.16   | 1                 | 1S                      |
| 0.28   | 1                 | 2S                      |
| 0.36   | 1                 | 3S                      |

All PS sections can be outfitted with a cycle switch.

### Straight connectors

for inlet M10x1:

for 6 mm diam. tube, order No. 406-423  
for 8 mm diam. tube, order No. 441-008-511  
for 10 mm diam. tube, order No. 410-443

for outlet M10x1:

for 4 mm diam. tube, order No. 404-006K  
for 6 mm diam. tube, order No. 406-423  
for 8 mm diam. tube, order No. 441-008-511

plug-in connector

for 6 mm diam. tube,  
order No. 451-006-518-VS

corresponding plug-in connectors,  
see page 30

check valve

for 6 mm diam. tube, order No. VPKM-RV-VS

The order No. of the feeder must be supplemented with the section designations.

Example of an order for 1 respective 1T, 2T and 3T section starting from the inlet section: VPKM-3-1T-2T-3T

S-sections only have to be used in this group when an odd number of outlets are called for.



## Progressive feeder, group VPKM

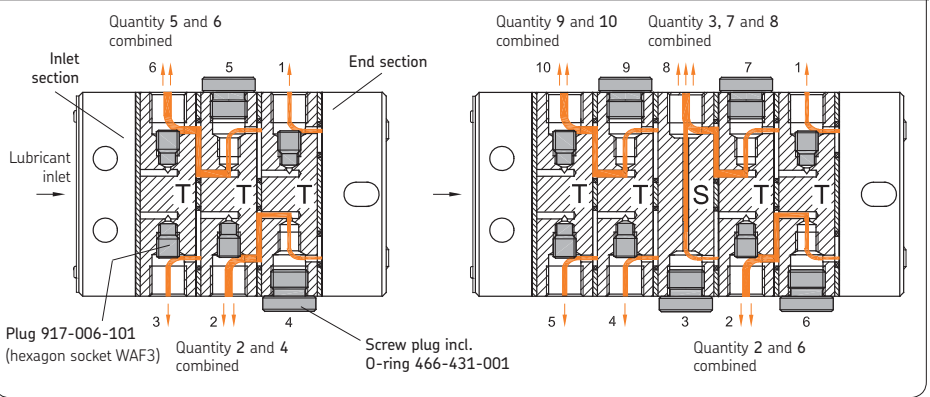
Two adjacent outlets are combined from the end section in the direction of the inlet section, namely by screwing the 917-006-101 plug out of the respective outlet closest to the end section and closing the outlet hole with a screw plug<sup>1)</sup>. The lubricant quantity of both outlets is then discharged from the adjacent outlet in the direction of the inlet section.

The outlets of one whole side of a feeder can be combined in this way provided there is no S-section between them. The S-section terminates a group. A new group can then be formed again behind the S-section.

If it later turns out that the lubricant quantities of two adjacent outlets have to be split up again such as because a lubrication point has been added, this is easy to do. In that case, it is only necessary to screw in a 917-006-101 plug again and connect the hitherto closed outlet to the new lubrication point.

<sup>1)</sup> Screw plug incl. O-ring order No 466-431-001

Examples showing the combination of several adjacent outlets.



### Important notes:

The feeder section behind the inlet section must not be closed!

Remove the 917-006-101 plug before the screw plug is screwed in, as otherwise the feeder will be blocked and this will cause damages.

## Progressive feeder with cycle switch

### group VPM, VPKM

When a cycle switch is screwed into the piston bore of the progressive feeder, it is possible to check the piston's motion and thus monitor the feeder's functioning.

In this case, a proximity switch is screwed directly into the pressure chamber on the side with the hexagon head screw plug and is actuated by the correspondingly shaped piston. Another advantage of this configuration is the fact that there is no need to seal any moving parts. The standard version of the switch is screwed into the rear piston bore on the right, as viewed from the inlet port.

If the cycle switch is to be installed on the opposite element side, the delivery piston must be rotated so that the piston extension points in the direction of the cycle switch.

Order example for a feeder belonging to the VPKM group: VPKM-3-05T-3S-2T installed with 177-300-092, on the right

Cable with screwed plug straight,  
length 5 m, order No. 179-990-600  
length 10 m, order No. 179-990-603

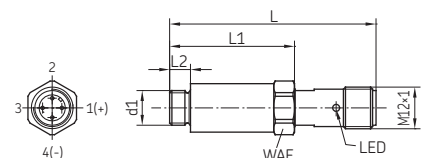
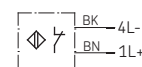
Cable with screwed plug 90° angled,  
length 5 m, order No. 179-990-601

### Technical data

Max. operating pressure. . . . . 350 bars  
Operating voltage . . . . . 10 to 36 VDC  
Permissible current loading . . . . 100 mA max.  
Residual current/  
power consumption . . . . . ≈ 0.8 mA  
Type of enclosure . . . . . IP 67  
Output . . . . . NC contact



Wiring diagram



| Order No.   | Group | d1    | L    | L1 | L2  | WAF |
|-------------|-------|-------|------|----|-----|-----|
| 177-300-091 | VPM   | M12×1 | 61   | 38 | 7.5 | 17  |
| 177-300-092 | VPKM  | M10×1 | 59.5 | 36 | 6   | 14  |

## Progressive feeder, group VPBM

### VPBM-3

shown with outlet ports on top

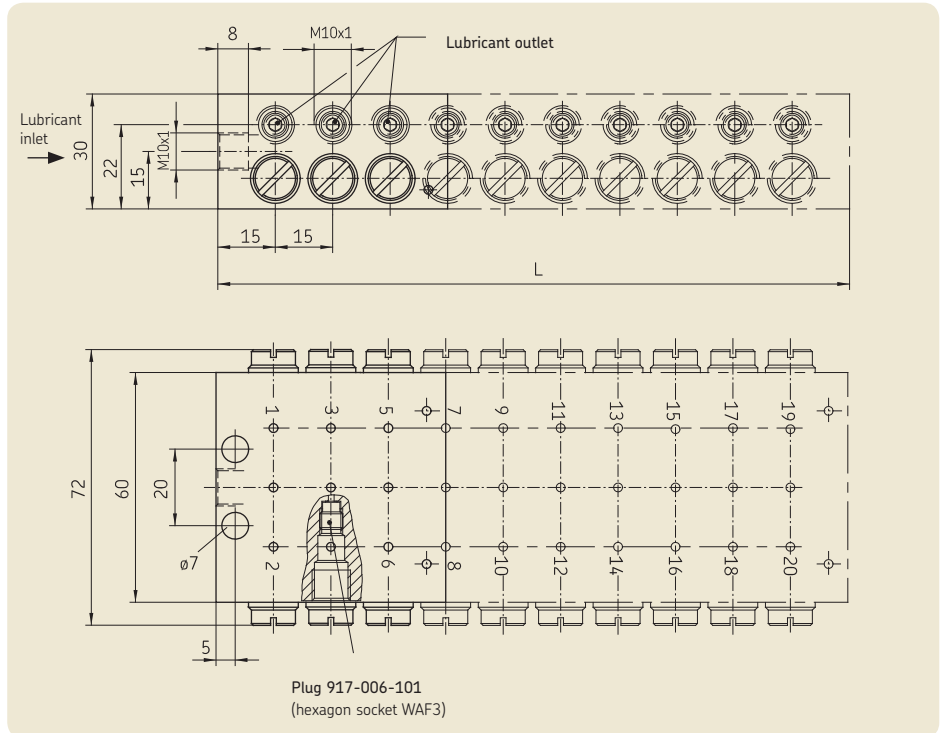


#### Features:

- Block-type design, smallest feeder group, used mainly for grease-lubricated machines and equipment.
- Uniform metering: 0.13 cm<sup>3</sup>.
- Two outlets opposite each other can be connected at a later date by screwing out the plug in the outlet on the right (outlet ports on top as viewed from the lubricant inlet) and closing one of the two outlets.
- Two or more adjacent outlets are combined with external crossporting bars.
- No built-in check valves.
- No alternative outlets.

#### Operating pressure:

5 bars min. / 300 bars max.



#### Straight connectors

##### For inlet M10x1:

for 6 mm diam. tube, order No. 406-423  
 for 8 mm diam. tube, order No. 441-008-511  
 for 10 mm diam. tube, order No. 410-44

##### For outlet M10x1:

for 4 mm diam. tube, order No. 404-006K  
 for 6 mm diam. tube, order No. 406-423  
 for 8 mm diam. tube, order No. 441-008-511

##### plug-in connector

for 6 mm diam. tube,  
 order No. 451-006-518-VS

corresponding plug-in connectors, see page

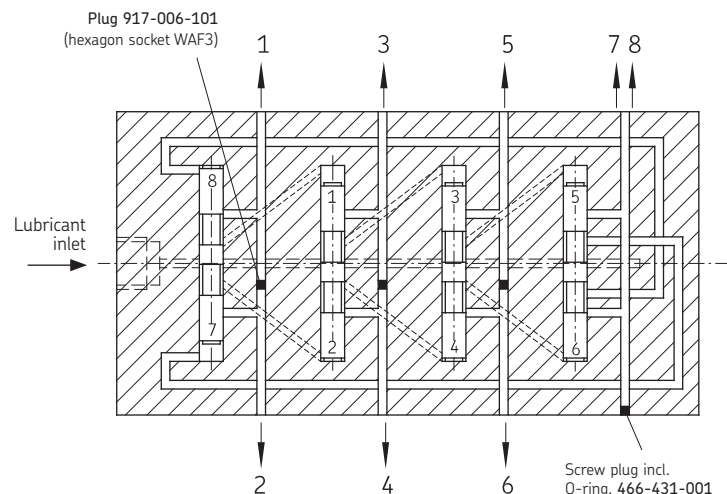
##### Check valve

for 6 mm diam. tube, order No. VPKM-RV-VS

| Order No.            | Number of outlet pairs (pistons) | Number of maximum outlets | L (mm) |
|----------------------|----------------------------------|---------------------------|--------|
| VPBM-3 <sup>1)</sup> | 3                                | 6                         | 60     |
| VPBM-4               | 4                                | 8                         | 75     |
| VPBM-5               | 5                                | 10                        | 90     |
| VPBM-6               | 6                                | 12                        | 105    |
| VPBM-7               | 7                                | 14                        | 120    |
| VPBM-8               | 8                                | 16                        | 135    |
| VPBM-9               | 9                                | 18                        | 150    |
| VPBM-10              | 10                               | 20                        | 165    |

<sup>1)</sup> This progressive feeder must basically be used only with check valve VPKM-RV-S4!

#### Function diagram

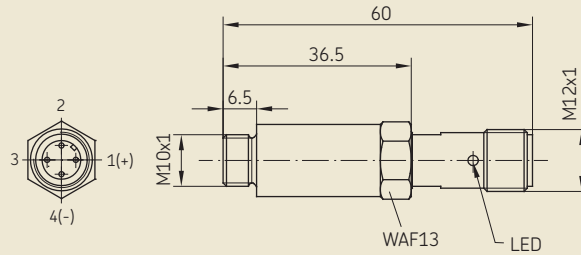


## Progressive feeder, group VPBM

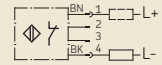
Cycle switch for VPBM in order to monitor the stroke of the piston



177-300-096



Wiring diagram



This switch can be screwed into any cylinder bore since it is actuated directly by the piston.

The cycle switch can be ordered separately for later installation or complete with feeder.

Cycle switch: Order No. 177-300-096

Progressive feeder with cycle switch:

Order example:  
VPBM-3 mounted with 177-300-096, right

The cycle switch is then installed in the rear, right-hand bore of the feeder as viewed from the inlet.

Cable with screwed plug straight,  
length 5 m, order No. 179-990-600  
length 10 m, order No. 179-990-603

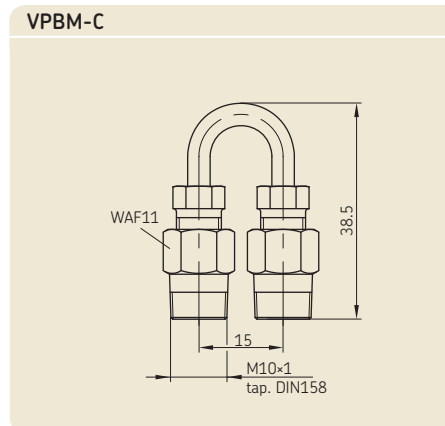
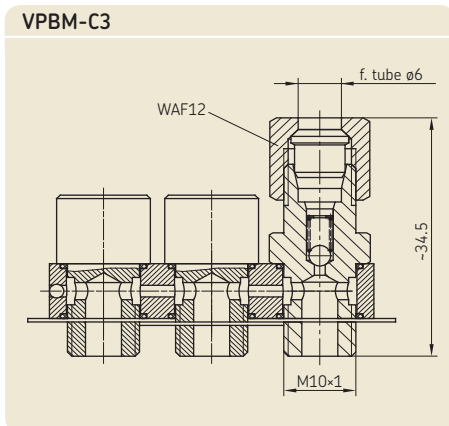
Cable with screwed plug 90° angled,  
length 5 m, order No. 179-990-601

See page 25 for technical data.

## Crossporting bars

for the connection of adjacent outlets

| Number of outlets to be connected | Order No. of complete crossporting bar including banjo bolts and adapter for 6 mm diam. tube and check valve | Order No. of complete crossporting bar including banjo bolts and adapter for 6 mm diam. tube |
|-----------------------------------|--|--|
| 2                                 | VPBM-C2  | VPBM-C   |
| 3                                 | VPBM-C3  | -  |
| 4                                 | VPBM-C4  | -  |

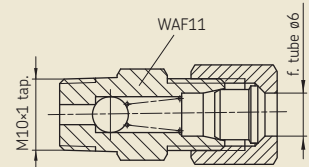


## Check valve

for direct installation in a feeder outlet.

Order No. VPKM-RV-S4

6 mm diam. tube connector

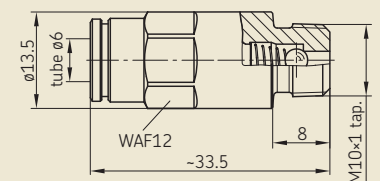


Direction of flow →

for plug-in connector

Order No. VPKM-RV-VS

6 mm diam. tube connector



## Piston pump with block feeder PF-VPBM., manually operated

The piston pumps with a block feeder are used on farm machinery, small stackers and construction machinery as well as motor-vehicle superstructures.

The piston pump has 6 to 12 lubricant outlets depending on the block feeder. 2 cm<sup>3</sup> of lubricant are delivered to the feeder with every stroke of the lever.

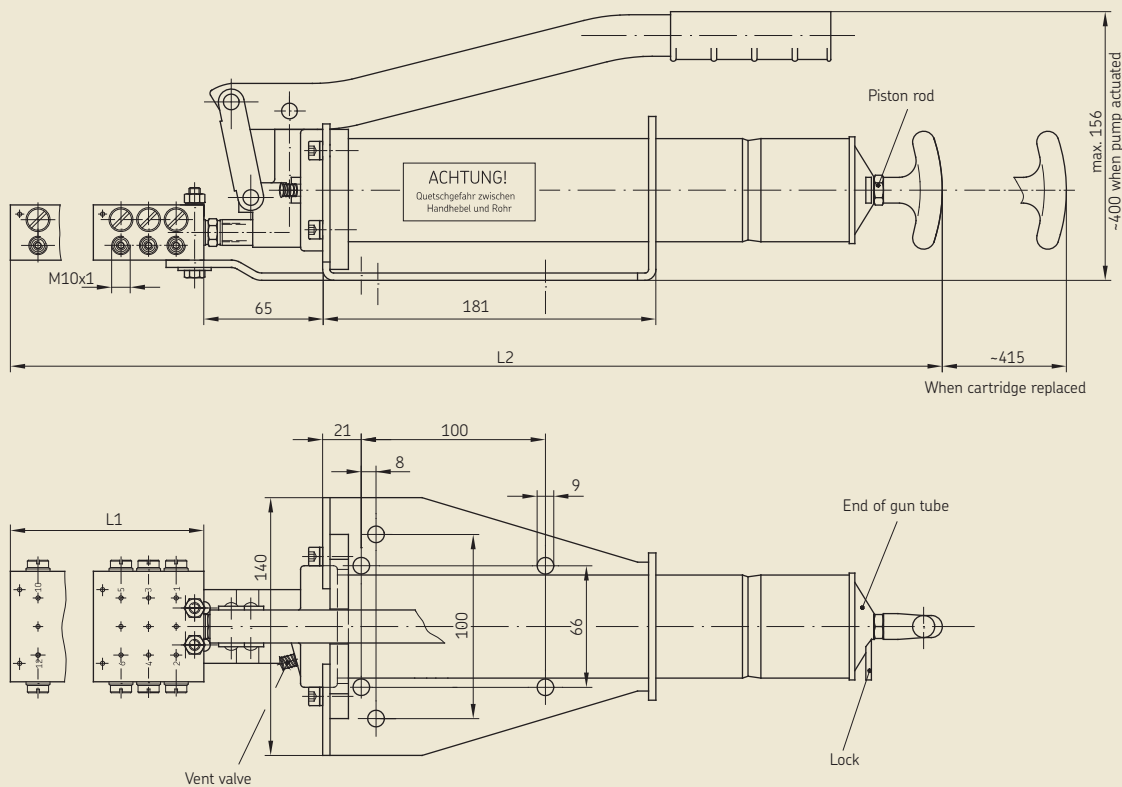
Also available without block feeder with only one M10×1 outlet on the front (order No. 169-000-146).

The level of the lubricant in the cartridge can be checked by pulling out the cartridge until distinct resistance is felt. When the cartridge is full, the piston rod can be pulled out approx. 415 mm.

To avoid damages keep the area clean when changing cartridges. Do the following:

1. Open the toggle-type fastener
2. Unscrew the gun tube
3. Pull piston rod out to the stop
4. Change the cartridge
5. Screw in the gun tube
6. Close the toggle-type fastener
7. Loosen the lock, push in the piston rod up to the stop
8. Actuate the vent valve until grease emerges

Order No. of the cartridge: FK04-2.



| Order No.   | with block feeder <sup>1)</sup> | Number of outlets | Dimensions (mm) |     |
|-------------|---------------------------------|-------------------|-----------------|-----|
|             |                                 |                   | L1              | L2  |
| PF-VPBM-3-2 | VPBM-3                          | 6                 | 60              | 461 |
| PF-VPBM-4-2 | VPBM-4                          | 8                 | 75              | 476 |
| PF-VPBM-5-2 | VPBM-5                          | 10                | 90              | 491 |
| PF-VPBM-6-2 | VPBM-6                          | 12                | 105             | 506 |
| 169-000-146 | –                               | 1                 | –               | 396 |

<sup>1)</sup> cf. page 26

| Technical data               |   |
|------------------------------|---|
| Lubricant . . . . .          | grease up to NLGI grade 2                                 |
| Reservoir capacity . . . . . | 450 cm <sup>3</sup> in 400 g cartridge<br>G or W DIN 1284 |
| Temperature range . . . . .  | –25 to +80 °C   |
| Mounting position . . . . .  | any position  |
| Delivery rate . . . . .      | 2 cm <sup>3</sup> per stroke                              |
| Max. back pressure . . . . . | 400 bars  |

## Lubricating aid with metering distributor



186-096.03

Extremely easy to install and service!

With the lubricating aid, your fleet is lubricated in the twinkling of an eye – simple, clean and fast!

- Easy to install yourself due to prefabricated kit with quick connectors on the lube port!
- No lube point is over looked!
- And none of your valuable shop pits are tied up!

A prefabricated kit for 4 to 10 lube points, the lubricating aid can be put to **universal** use or to use in **combination** with other units – **regardless** of the type of vehicle.

| Number of lube points | Kit Order No. *) |
|-----------------------|------------------|
| 4                     | 186-094.03       |
| 5                     | 186-095.03       |
| 6                     | 186-096.03       |
| 7                     | 186-097.03       |
| 8                     | 186-098.03       |
| 9                     | 186-099.03       |
| 10                    | 186-100.03       |

\*) Complete with lubrication lines, fittings and distributors.

### Flexible, thanks to expandable modular design!

The modular system can be expanded with a compact unit at any later date to form a fully automatic centralized lubrication system!

Compact unit KFAS



### Function

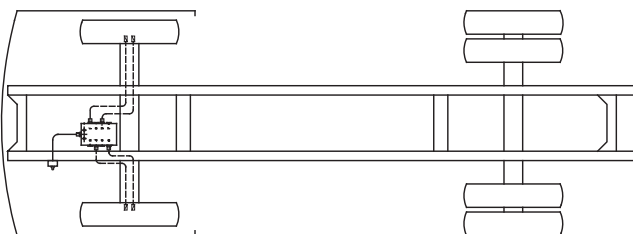
The delivered quantity of lubricant is distributed evenly to every lube point via a metering distributor.



Practical example: king pin



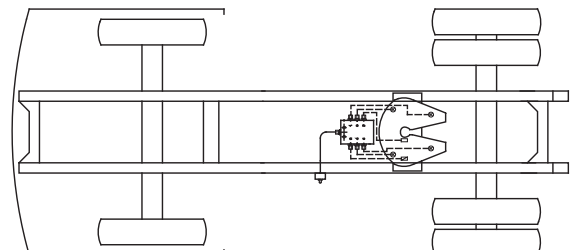
usually 4 lube points



Practical example: fifth well support plate



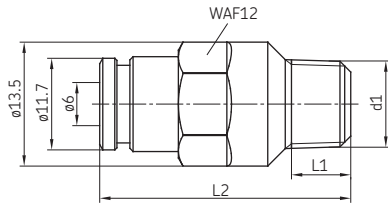
usually 6 lube points



## Fittings and auxiliary equipment

(see brochure 1-0103-EN for further fittings and accessories)

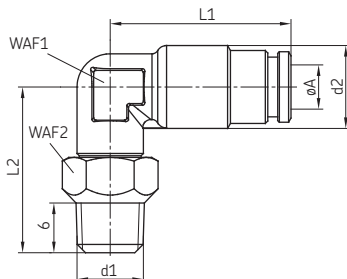
### Plug-in connectors, detachable



#### Adapters

tube diam.

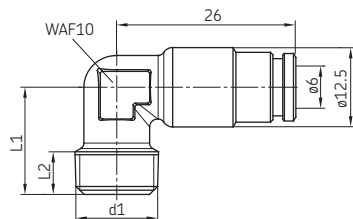
| A | Order No.      | d1          | L1  | L2   |
|---|----------------|-------------|-----|------|
| 6 | 451-006-468-VS | M 6 tap.    | 5.5 | 30   |
| 6 | 451-006-498-VS | M 8×1 tap.  | 5.5 | 29.5 |
| 6 | 451-006-518-VS | M 10×1 tap. | 5.5 | 27   |
| 6 | 406-423W-VS    | R 1/8 tap.  | 6.5 | 28.5 |



#### Banjo fittings

tube diam.

| A | Order No.      | d1         | d2   | L1   | L2   | WAF1 | WAF2 |
|---|----------------|------------|------|------|------|------|------|
| 4 | 455-546-048-VS | M6 tap.    | 10   | 21.8 | 20   | 9    | 10   |
| 6 | 455-529-068-VS | M8×1 tap.  | 12.5 | 26   | 20.5 | 10   | 10   |
| 6 | 455-531-068-VS | M10×1 tap. | 12.5 | 26   | 20.5 | 10   | 12   |
| 6 | 506-108-VS     | G 0 1/8    | 12.5 | 26   | 21   | 10   | 12   |



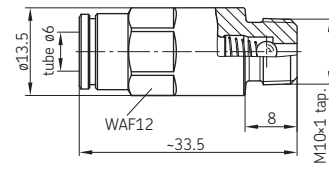
#### Elbows

tube diam.

| A | Order No.      | d1          | L1  | L2   |
|---|----------------|-------------|-----|------|
| 6 | 453-006-468-VS | M 6 tap.    | 6   | 15   |
| 6 | 506-508-VS     | M 8×1 tap.  | 6.5 | 14   |
| 6 | 506-510-VS     | M 10×1 tap. | 6   | 14   |
| 6 | 506-511-VS     | R 1/8 tap   | 8.5 | 16.5 |

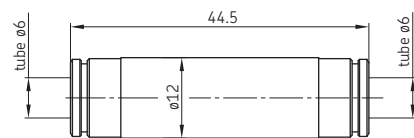
Protective cap for quick connectors, 6 mm diam. tubing, order No. 898-110-082

### Check valve for plug-in connectors



| tube diam. | Order No.  | Opening pressure [bars] |
|------------|------------|-------------------------|
| 6          | VPKM-RV-VS | 3 <sup>+2</sup>         |

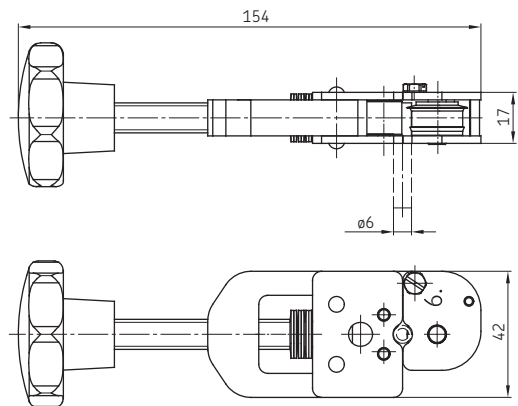
### Tube-to-tube connector, detachable



| tube diam. | Order No   |
|------------|------------|
| 6          | 406-426-VS |

### Tube cutter

with formation of claw groove for 6 mm diam. quick tube connectors



Order No. 169-000-337

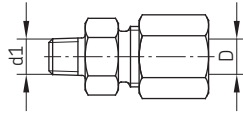
Cutting wheel order No. 844-330-007

## Fittings and auxiliary equipment

Progressive feeder systems for greases of NLGI grades 1 and 2 require fittings for higher pressures.

The cutting sleeve screw unions conform to the L-series, with the exception of the small and compact fittings marked with an asterisk, where the LL-series should be used.

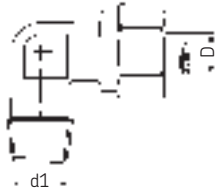
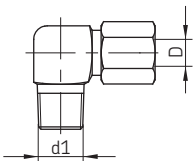
### Male connectors



| D (outer tube diam.) | Order No.                | d1             |
|----------------------|--------------------------|----------------|
| 6                    | 406-443 *                | M 6 tap.       |
| 6                    | 406-433                  | M 8×1 tap.     |
| 6                    | 406-423 *                | M 10×1 tap.    |
| 6                    | VPKM-RV-S4 <sup>1)</sup> | M 10×1 tap.    |
| 6                    | 406-403                  | M 10×1         |
| 6                    | 406-413                  | M 14×1.5       |
| 6                    | 406-423W *               | R 1/8 tap.     |
| 6                    | 406-446                  | M 6 tap. short |
| 6                    | 406-513W                 | R 1/4 tap.     |
| 8                    | 441-008-511 *            | M 10×1 tap.    |
| 8                    | 408-433                  | M 10×1         |
| 8                    | 408-423W *               | R 1/8 tap.     |
| 8                    | 408-403W                 | G 1/4 A        |
| 8                    | 408-413W                 | G 3/8 A        |
| 8                    | 408-453W                 | G 1/2 A        |
| 10                   | 410-443                  | M 10×1 tap.    |
| 10                   | 410-403                  | M 14×1.5       |
| 10                   | 410-403W                 | G 1/4 A        |

<sup>1)</sup> with check valve

### Elbow screw-in connectors



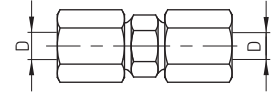
| (outer tube diam.) |            |             | (outer tube diam.) |           |               |
|--------------------|------------|-------------|--------------------|-----------|---------------|
| D                  | Order No.  | d1          | D                  | Order No. | d1            |
| 6                  | 406-445 *  | M 6 tap.    | 6                  | 406-415W  | R 1/4 tap.    |
| 6                  | 406-435 *  | M 8×1 tap.  | 8                  | 408-425W  | R 1/8 tap.    |
| 6                  | 406-425 *  | M 10×1 tap. | 8                  | 408-405W  | R 1/4 tap.    |
| 6                  | 406-455W * | R 1/8 tap.  | 10                 | 410-405   | M 14×1.5 tap. |

Steel parts, galvanized surface

<sup>\*)</sup> especially small and compact

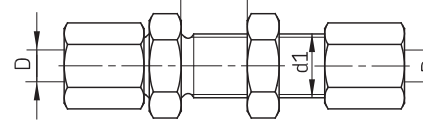
### Straight connectors

| D (outer tube diam.) | Order No. |
|----------------------|-----------|
| 6                    | 406-426 * |
| 6                    | 406-406   |
| 8                    | 408-408   |
| 10                   | 410-410   |



### Straight bulkhead connectors

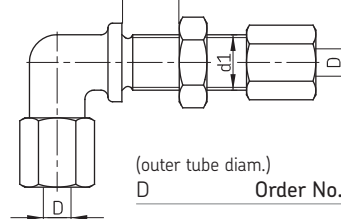
max. wall thickness 16 mm



| (outer tube diam.) |           |          |
|--------------------|-----------|----------|
| D                  | Order No. | d1       |
| 6                  | 406-416   | M 12×1.5 |
| 8                  | 408-416   | M 14×1.5 |
| 10                 | 410-416   | M 16×1.5 |

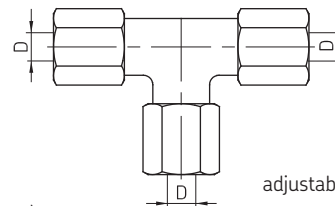
### Elbow bulkhead connectors

max. wall thickness 16 mm



| (outer tube diam.) |           |          |
|--------------------|-----------|----------|
| D                  | Order No. | d1       |
| 6                  | 406-409   | M 12×1.5 |
| 8                  | 408-409   | M 14×1.5 |
| 10                 | 410-409   | M 16×1.5 |

### Tee-pieces

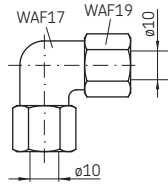


| (outer tube diam.) |           | adjustable (outer tube diam.) |                      |
|--------------------|-----------|-------------------------------|----------------------|
| D                  | Order No. | D                             | Order No.            |
| 6                  | 406-407   | 6                             | 443-406-061 L series |
| 8                  | 408-407   | 6                             | 443-406-351 S series |
| 10                 | 410-407   | 8                             | 445-808-351          |
|                    |           | 10                            | 443-410-101          |

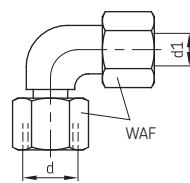


## Fittings and auxiliary equipment

### Elbow connectors



adjustable



| for outer tube diam. | Order No. | for outer tube diam. d1 | Order No.   | d        | WAF |
|----------------------|-----------|-------------------------|-------------|----------|-----|
| 10                   | 410-404   | 6                       | 443-306-341 | M 12×1,5 | 14  |
|                      |           | 8                       | 443-308-351 | M 14×1,5 | 17  |
|                      |           | 10                      | 443-310-372 | M 16×1,5 | 19  |

### Elbows

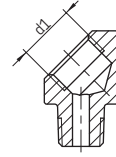


Fig. 1

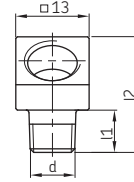


Fig. 2

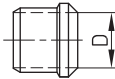
| Order NO. | d          | d1    | l1  | l2 | Fig. |
|-----------|------------|-------|-----|----|------|
| 406-145K  | M 8×1 keg  | M10×1 | 7.5 | 21 | 1    |
| 406-045K  | M 10×1 keg | M10×1 | 7.5 | 21 | 1    |
| 406-089K  | M 8×1 keg  | M10×1 | 11  | 24 | 2    |
| 406-090K  | M 10×1 keg | M10×1 | 11  | 24 | 2    |
| 406-091K  | R 1/8 keg  | R 1/8 | 11  | 24 | 2    |
| 406-092K  | M10×1 keg  | M10×1 | 17  | 30 | 2    |
| 406-093K  | R 1/8 keg  | M10×1 | 11  | 24 | 2    |

Material: steel, galvanized surface

### Cutting sleeves

D (outer tube diam.) Order No.

|    |            |
|----|------------|
| 6  | 406-301    |
| 6  | 406-331 *) |
| 8  | 408-301    |
| 10 | 410-301    |



\*) For the "especially small" fittings marked thus \* on page 31.

### Plug

D (outer tube diam.) Order No. d1

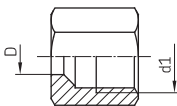
|    |             |          |
|----|-------------|----------|
| 6  | 430-706-001 | M 12×1.5 |
| 10 | 430-710-001 | M 16×1.5 |



### Union nuts

D (outer tube diam.) Order No. d1

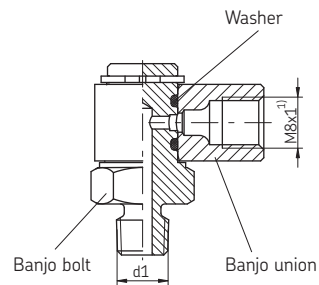
|    |            |          |
|----|------------|----------|
| 6  | 406-302    | M 12×1.5 |
| 6  | 406-332 *) | M 10×1   |
| 8  | 408-302    | M 14×1.5 |
| 10 | 410-302    | M 16×1.5 |



Material: steel, galvanized surface

\*) For the "especially small" fittings marked thus \* on page 31.

### Banjo fittings, freely movable



(outer tube diam.)

D Order No. d1

|   |             |             |
|---|-------------|-------------|
| 4 | 405-549-049 | M 8×1 tap.  |
| 4 | 405-551-049 | M 10×1 tap. |

Swing angle: 360°

Frequency: approx. 1 movement/min at max. swing angle

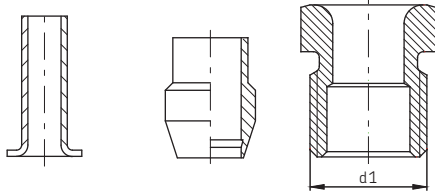
1) Port tapped for solderless tube connection.



## Fittings and auxiliary equipment

### Screw unions for steel and plastic tubing

(use reinforcing socket for plastic tubing)

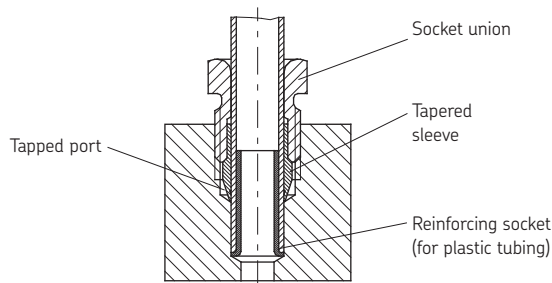


| outer tube diam. | Order No. | Order No. | Order No.  | d1     |
|------------------|-----------|-----------|------------|--------|
| 4                | 404-603   | 404-611   | 404-612-MS | M 8×1  |
| 6×1.25           | 406-613   | 406-611   | 406-612-MS | M 10×1 |

Material: brass

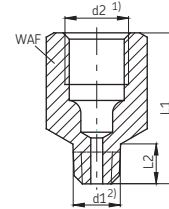
#### Assembly

Slide socket union and tapered sleeve onto end of the tube. In the case of plastic tubing, first insert the reinforcing socket. Insert end of tube into tapped port up to the stop. First tighten the socket union finger-tight and then turn it another 1½ turns.



### Adapters with tapered thread

for screwing into lubrication ports without sealing face



| outer tube diam. | Order No.   | d1            | d2                   | L1   | L2  | WAF |
|------------------|-------------|---------------|----------------------|------|-----|-----|
| 4                | 404-662K    | M 6 tap.      | M 8×1 <sup>1)</sup>  | 19   | 5   | 11  |
| 4                | 404-663K    | M 6 tap.      | M 8×1 <sup>1)</sup>  | 20   | 6   | 11  |
| 4                | 404-673K    | M 6×0.75 tap. | M 8×1 <sup>1)</sup>  | 20   | 6   | 11  |
| 4                | 404-047K    | M 7 tap.      | M 8×1 <sup>1)</sup>  | 20   | 6   | 11  |
| 4                | 404-003K    | M 8×1 tap.    | M 8×1 <sup>1)</sup>  | 17   | 7.4 | 11  |
| 4                | 404-045     | M 8×1 tap.    | M 8×1 <sup>1)</sup>  | 62.5 | 7.4 | 11  |
| 4                | 404-006K    | M 10×1 tap.   | M 8×1 <sup>1)</sup>  | 16   | 7.4 | 11  |
| 4                | 401-004-512 | M 10×1 tap.   | M 8×1                | 25   | 7.4 | 11  |
| 4                | 404-050     | *)            | M 8×1 <sup>1)</sup>  | 18   | 5.2 | 11  |
| 4                | 853-460-000 | *)            | M 8×1 <sup>1)</sup>  | 46   | 5.2 | 11  |
| 4                | 404-040K    | R 1/8 tap.    | M 8×1 <sup>1)</sup>  | 16   | 6   | 11  |
| 4                | 404-040K-US | 1/8 NPTF      | M 8×1                | 20   | 6.7 | 11  |
| 4                | 404-054K    | R 1/4 tap.    | M 8×1 <sup>1)</sup>  | 14   | 9   | 14  |
| 4                | 404-072     | 1/4-28 UNF    | M 8×1                | 20   | 5.6 | 11  |
| 4                | 401-004-903 | 1/4 BSF       | M 8×1                | 20   | 5   | 11  |
| 4                | 401-004-904 | 3/16 BSF      | M 8×1                | 18   | 5   | 11  |
| 6                | 406-004K-S2 | M 10×1 tap.   | M 10×1               | 18   | 7   | 13  |
| 6                | 456-004K-S2 | R 1/8 tap.    | M 10×1               | 18   | 6   | 13  |
| 6                | 406-004K    | M 10×1 tap.   | M 10×1 <sup>1)</sup> | 23   | 7.4 | 14  |
| 6                | 406-035K    | M 10×1 tap.   | M 10×1               | 40   | 8   | 14  |

Material: steel, galvanized surface

Adapters with tapered threads are used without washers, since tapered threads are self-sealing. Therefore, the ports do not have to be provided with sealing faces.

<sup>1)</sup> Ports tapped for solderless tube connection

<sup>2)</sup> Tapered thread according to DIN 158, tapered, short, or as per DIN 2999

\*) Self-forming thread for 7.6 mm diam. borehole

### Adapters

| for outer diam. | Order No.  | d1       | d2       | L1 | L2  | WAF | Respective washers Order No. |
|-----------------|------------|----------|----------|----|-----|-----|------------------------------|
| 4               | 404-044 *) | M 8×1    | M 8×1    | 46 | 6   | 11  | DIN7603-A8×11.5-CU           |
| 4               | 404-003    | M 8×1    | M 8×1    | 24 | 14  | 11  | DIN7603-A8×11.5-CU           |
| 4               | 404-005    | M 8×1    | M 8×1    | 32 | 22  | 11  | DIN7603-A8×11.5-CU           |
| 4               | 404-006    | M 10×1   | M 8×1    | 18 | 7.5 | 14  | 504-019                      |
| 4               | 404-164    | M 14×1.5 | M 8×1    | 18 | 9   | 17  | DIN7603-A14×18-CU            |
| 6               | 406-004    | M 10×1   | M 10×1   | 18 | 7.5 | 14  | 504-019                      |
| 6               | 406-166    | M 16×1.5 | M 10×1   | 19 | 9   | 19  | DIN7603-A16×20-CU            |
| 6               | 406-054    | G 1/4 A  | M 10×1   | 20 | 10  | 17  | 508-108                      |
| 8               | 408-004    | M 10×1   | M 14×1.5 | 28 | 7.5 | 17  | 504-019                      |
| 8               | 408-005    | M 16×1.5 | M 14×1.5 | 22 | 9   | 19  | DIN7603-A16×20-CU            |
| 8               | 301-020    | G 1/4 A  | M 14×1.5 | 23 | 10  | 17  | 508-108                      |

#### Material

Adapters: steel, galvanized surface  
Washers: copper

#### Please note!

Order washers separately!

<sup>1)</sup> Ports tapped for solderless tube connection

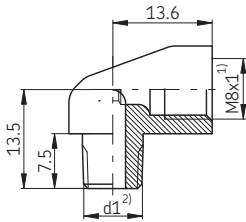
\*) extra long

## Fittings and auxiliary equipment

### Elbows with tapered threads

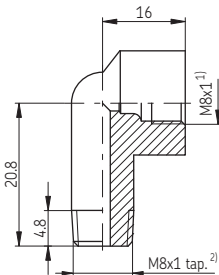
for screwing into lubrication ports without sealing face.

Elbows with tapered threads are used without washers, since tapered threads are self-sealing. Therefore, the ports do not have to be provided with sealing faces.



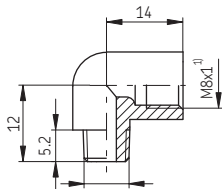
| D (outer tube diam.) | Order No. | d1          |
|----------------------|-----------|-------------|
| 4                    | 504-200K  | M 6 tap.    |
| 4                    | 504-201K  | M 8×1 tap.  |
| 4                    | 504-202K  | M 10×1 tap. |

Material: brass



| D (outer tube diam.) | Order No. |
|----------------------|-----------|
| 4                    | 504-211K  |

Material: brass



Self-forming thread for 7.6 mm diam. borehole

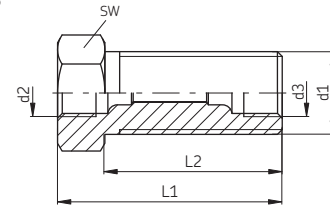
| D (outer tube diam.) | Order No. |
|----------------------|-----------|
| 4                    | 504-050   |

Material: steel, galvanized surfacet

<sup>1)</sup> Ports tapped for solderless tube connection

<sup>2)</sup> Tapered thread to DIN 158, short

### Connectors

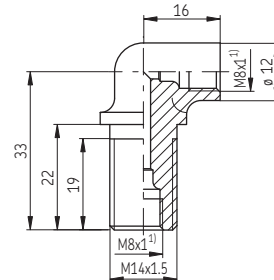


| (outer tube diam.) D | Order No.             | d1       | d2 <sup>1)</sup> | d3 <sup>1)</sup> | L1 | L2 | WAF |
|----------------------|-----------------------|----------|------------------|------------------|----|----|-----|
| 4                    | 404-008               | M 14×1.5 | M 8×1            | M 8×1            | 27 | 19 | 17  |
| 4                    | 404-009 <sup>2)</sup> | M 14×1.5 | M 8×1            | M 8×1            | 38 | 30 | 17  |

Material; steel, galvanized surface

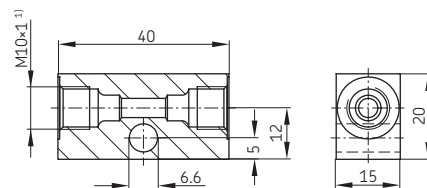
<sup>1)</sup> Ports tapped for solderless tube connection

<sup>2)</sup> Especially long connector for double chassis



| D (outer tube diam.) | Order No. |
|----------------------|-----------|
| 4                    | 504-103   |

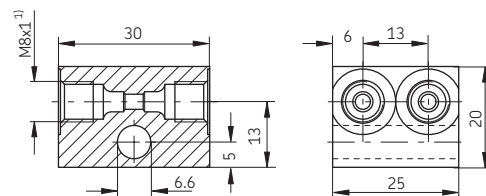
Material: brass



| D (outer tube diam.) | Order No. |
|----------------------|-----------|
| 6                    | DAR506    |

Material: aluminum

### Double connector



| D (outer tube diam.) | Order No. |
|----------------------|-----------|
| 4                    | DAR524    |

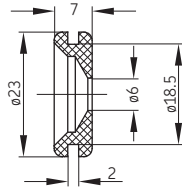
Material: steel, galvanized surface

## Fittings and auxiliary equipment

### Rubber grommet

Order No. 898-210-119

Material: soft PVC, black



### Stranded wire

Order No. 981-900-031 (Please indicate length when ordering.)

Description: Core insulation 1 brown  
1 black-lilac  
heavily powdered  
Core material: bare copper  
Core structure: 30×0.25

Outer ø: 6.1<sup>+0.2</sup> mm  
Cable code: LIYYÖ 2×1.5 mm<sup>2</sup>  
Sheath: black RAL 9005  
full encapsulation,  
oil-proof

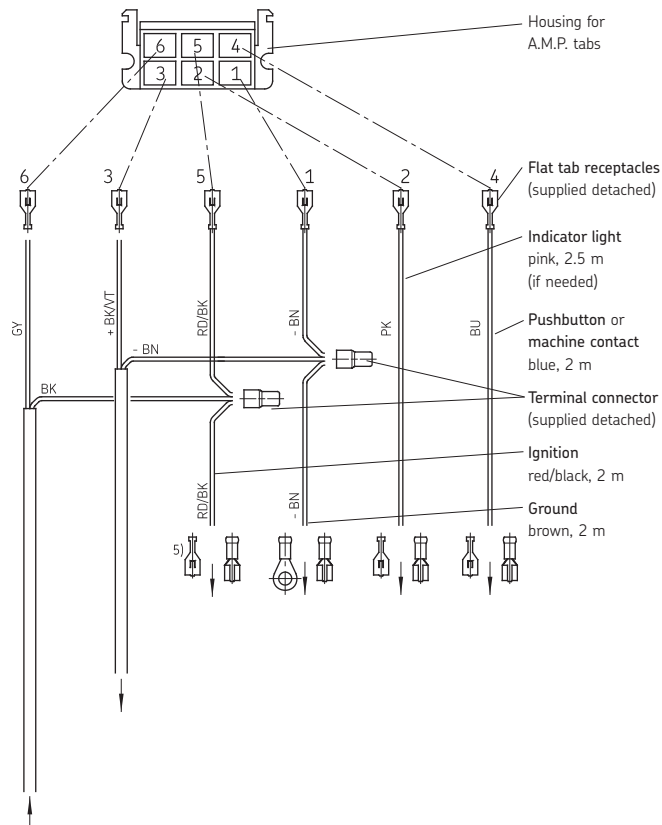
### Cable harness

for systems with group KFG piston pumps

Order No. 997-000-185

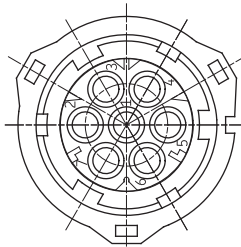
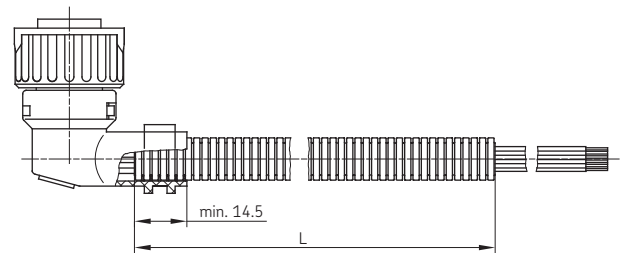
Connection terminals for the control unit IG502-2-E

|       |    |       |
|-------|----|-------|
| PS/CS | 15 | DK/MK |
| M     | SL | 31    |



### Cable harness

for systems with KFGS/KFAS piston pumps



| Pin allocation (7 conductors) |          |             |
|-------------------------------|----------|-------------|
| Pin No.                       | Function | Core color  |
| 1                             | - 31     | brown       |
| 2                             | + 15     | red/black   |
| 3                             | DK       | blue        |
| 4                             | SL2      | pink        |
| 5                             | ZDS+     | black       |
| 6                             | ZDS      | black       |
| 7                             | SL1      | lilac/green |

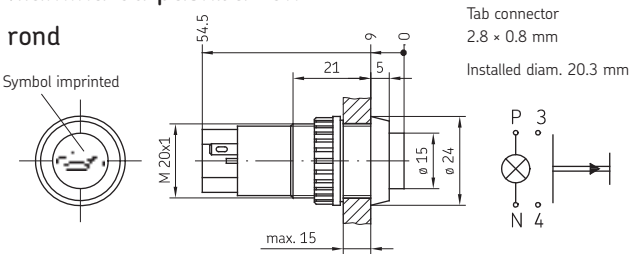
| Order No.             | L (m) |              |
|-----------------------|-------|--------------|
| 997-000-630 (drawing) | 12    | 7 conductors |
| 997-000-650           | 16    |              |
| 997-000-760           | 8     | 3 conductors |

## Fittings and auxiliary equipment

### Illuminated pushbutton

round

Symbol imprinted



Tab connector  
2.8 x 0.8 mm

Installed diam. 20.3 mm

| Order No.   | Pushbutton | Voltage   | Power |
|-------------|------------|-----------|-------|
| 177-100-062 | green      | max. 24 V | 2 W   |
| 177-100-065 | yellow     |           |       |

Filament lamp (please order separately)

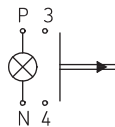
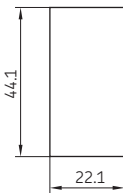
|             |            |     |
|-------------|------------|-----|
| 179-100-043 | 12 or 24 V | 2 W |
|-------------|------------|-----|

Please indicate 12 V or 24 V voltage when ordering.

cornered



Installation opening

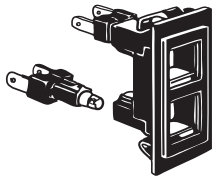


| Order No.   | Voltage |
|-------------|---------|
| 177-100-063 | 24 V    |
| 177-100-064 | 12 V    |

Respective plug order No. 24-1882-2166

### Control light

for illuminated pushbutton, cornered



| Order No.       | Pushbutton | Voltage |
|-----------------|------------|---------|
| 179-100-078+924 | green      | 24 V    |
| 179-100-088+912 | yellow     | 12 V    |

### Symbol insert Centralized lubrication

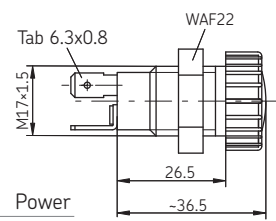
for illuminated pushbutton 177-100-063/-064  
and control light 179-100-078/-088

| Order No.   | Pushbutton |
|-------------|------------|
| 951-110-991 | yellow     |
| 951-110-992 | green      |



### Indicator light

fitted with filament lamp



| Order No.    | Face   | Voltage    | Power |
|--------------|--------|------------|-------|
| P-66.60GRUEN | green  | 12 or 24 V | 2 W   |
| P-66.60ROT   | red    |            |       |
| P-66.60GELB  | yellow |            |       |

Spare filament lamp

|         |            |     |
|---------|------------|-----|
| P-66.62 | 12 or 24 V | 2 W |
|---------|------------|-----|

Please indicate 12 V or 24 V voltage when ordering.

### Nameplate

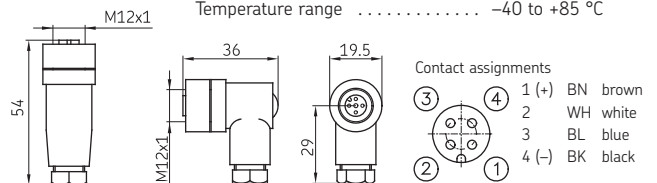
| Order No.   |   |
|-------------|---|
| 760-048     | (for indicator light P-66.60)                 |
| 951-120-025 | (for illuminated pushbutton 177-100-062/-065) |



Material: PVC and thermoplastic, acid- and base-resistant, 0.5 mm thick

### Screw plug for cycle switch, 4-pole type

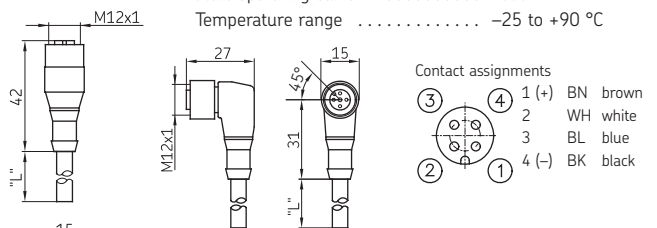
Max. operating voltage ..... 0 to 30 V AC/DC  
Max. operating current ..... 3 A  
Temperature range ..... -40 to +85 °C



without cable

| Order No.   | Version  |
|-------------|----------|
| 179-990-371 | straight |
| 179-990-372 | angled   |

Max. operating voltage ..... 10 to 30 V AC/DC  
Max. operating current ..... 4 A  
Temperature range ..... -25 to +90 °C

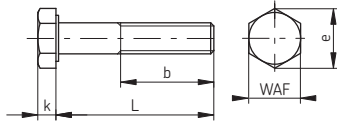


with 4-core cable

| Order No.   | Version  | Length (m) |
|-------------|----------|------------|
| 179-990-600 | straight | 5          |
| 179-990-601 | angled   | 5          |
| 179-990-603 | straight | 10         |

## Fittings and auxiliary equipment

### Fixing bolts



#### Hexagonal head bolts

| Order No.        | L  | b  | k   | WAF | e    |
|------------------|----|----|-----|-----|------|
| DIN933-M6×20-8.8 | 20 | 20 | 4   | 10  | 11.1 |
| DIN933-M6×25-8.8 | 25 | 25 | 4   | 10  | 11.1 |
| DIN931-M6×30-8.8 | 30 | 18 | 4   | 10  | 11.1 |
| DIN933-M6×35-8.8 | 35 | 35 | 4   | 10  | 11.1 |
| DIN931-M6×40-8.8 | 40 | 18 | 4   | 10  | 11.1 |
| DIN933-M6×45-8.8 | 45 | 45 | 4   | 10  | 11.1 |
| DIN931-M6×55-8.8 | 55 | 18 | 4   | 10  | 11.1 |
| DIN933-M8×25-8.8 | 25 | 25 | 5.5 | 13  | 14.4 |
| DIN933-M8×35-8.8 | 35 | 35 | 5.5 | 13  | 14.4 |

Material: steel, galvanized surface

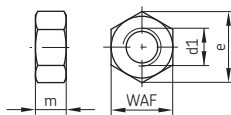


#### Self-tapping screws

| Order No.         | L   | d1  | d2  |
|-------------------|-----|-----|-----|
| DIN7981-B4.2×9.5  | 9.5 | 4.2 | 8.2 |
| DIN7981-BZ4.8×9.5 | 9.5 | 4.8 | 9.5 |
| DIN7981-BZ4.8×13  | 13  | 4.8 | 9.5 |

Material: steel, galvanized surface

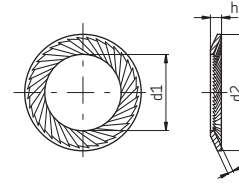
### Nuts



| Order No.        | d1       | m   | WAF | e    |
|------------------|----------|-----|-----|------|
| DIN934-M6-8      | M 6      | 5   | 10  | 11.5 |
| DIN934-M8-8      | M 8      | 6.5 | 13  | 14.4 |
| DIN936-M14×1.5-5 | M 14×1.5 | 8   | 22  | 25.4 |
| DIN936-M16×1.5-5 | M 16×1.5 | 8   | 24  | 27.7 |
| DIN936-M20×1.5-5 | M 20×1.5 | 9   | 30  | 34.6 |

Material: steel, galvanized surface

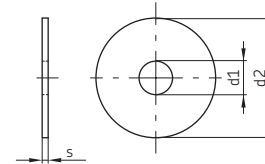
### Lock washers



| Order No. | for bolt | d1  | d2 | s   | h   |
|-----------|----------|-----|----|-----|-----|
| 650-060   | M 6      | 6.4 | 10 | 0.7 | 0.9 |
| 650-080   | M 8      | 8.4 | 13 | 0.8 | 1.2 |
| 650-140   | M 14     | 15  | 22 | 1.2 | 1.8 |
| 650-160   | M 16     | 17  | 24 | 1.3 | 1.9 |
| 650-200   | M 20     | 21  | 30 | 1.5 | 2.2 |

Material: spring steel

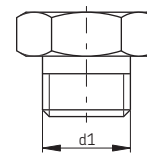
### Body washers



| Order No.   | d1   | d2 | s   |
|-------------|------|----|-----|
| 821-400-006 | 6.6  | 28 | 2   |
| 821-400-010 | 8.4  | 30 | 1.5 |
| 821-400-012 | 10.5 | 30 | 2.5 |

Material: steel, galvanized surface

### Screw plugs



| Order No. | d1       | Respective flat washers Order No |
|-----------|----------|----------------------------------|
| 404-011   | M 8×1    | DIN7603-A8×11.5-CU               |
| 406-011   | M 10×1   | 504-019                          |
| 408-011   | M 14×1.5 | DIN7603-A14×18-CU                |

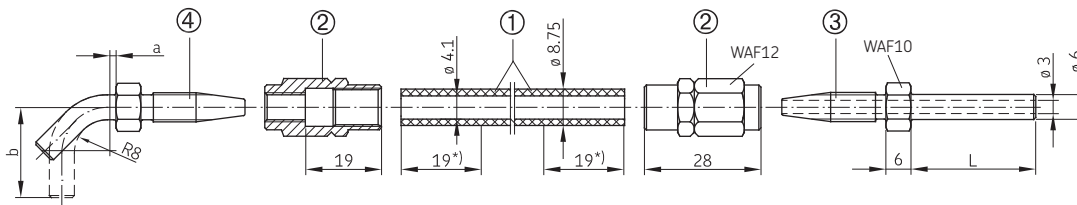
Material: steel, galvanized surface

Material: copper  
Please note!  
Order flat washers separately!

## Fittings and auxiliary equipment

### Hoses for self-installation

for main line for tube diam. 6 (NW4) (connection: pump – feeder)  
and secondary lines (connection: feeder – lubrication point)



\*) Take length of engaged thread and double it when determining the length of the hose.

| Designation   | Order No.       | L (mm) | a (mm) | b (mm) |
|---|-----------------|--------|--------|--------|
| ① High-pressure hose, max. length supplied 50 m                               | 982-750-091     |        |        |        |
| High-pressure hose, max. length supplied 50 m filled with NLGI grade 2 grease | 982-750-091+AF2 |        |        |        |
| High-pressure hose, max. length supplied 50 m steel-sheathed                  | 982-750-092+AF2 |        |        |        |
| (associated clip, order No. 941-514-101)                                      |                 |        |        |        |
| ② Sleeve  | 853-540-010     |        |        |        |
| ③ Tube stub, straight   | 853-370-002     | 20     |        |        |
|   | 853-380-002     | 30     |        |        |
|   | 853-390-002     | 69     |        |        |
| with claw groove for plug-in connector  | 853-370-002-VS  | 26     |        |        |
|   | 853-380-002-VS  | 33     |        |        |
| ④ Tube stub, 45° angle  | 853-380-004     |        | 2      |        |
| with claw groove for plug-in connector  | 853-380-004-VS  |        | 6      |        |
| Tube stub, 90° angle  | 853-380-003     |        | 2      | 21     |
|   | 853-390-003     |        | 13     | 47     |
|   | 853-390-004     |        | 13     | 36     |
| with claw groove for plug-in connector  | 853-380-003-VS  |        | 2      | 34.7   |

#### Technical data

Hose:  
Rupture pressure . . . . . 800 bars  
Min. bending radius . . . . . 35 mm

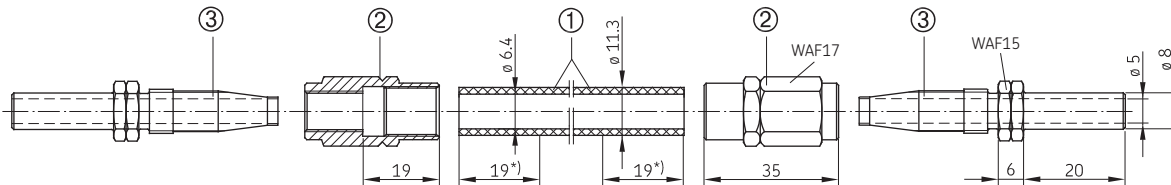
#### Materials:

Hose: Inner lining . . . . . unplasticized polyester  
Inner layer . . . . . braided synthetic fibers  
Outer cover . . . . . weatherproof polyurethane, black  
Sleeve, tube stub . . . . . steel, galvanized

## Fittings and auxiliary equipment

### Hoses for self-installation

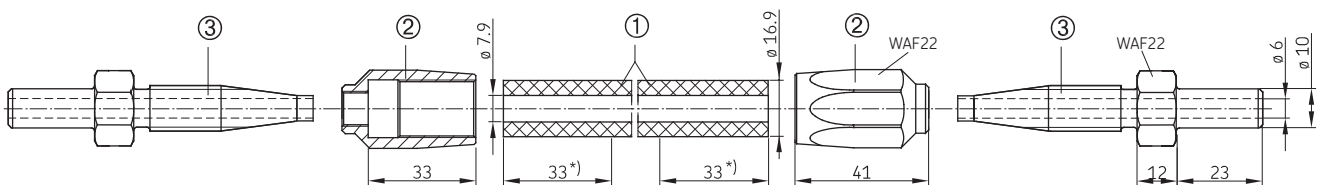
for main lines for tube diam. 8 (NW6) (connection: pump – feeder)  
and secondary lines (connection: feeder – lubrication point)



\*) Take length of engaged thread and double it when determining the length of the hose.

| Designation   | Order No.                      | Technical data  |
|---|--------------------------------|---|
| ① High-pressure hose, max. length supplied 50 m<br>High-pressure hose, max. length supplied 50 m<br>filled with NLGI grade 2 grease | 982-750-111<br>982-750-111+AF2 | Hose:<br>Rupture pressure ..... 840 bars<br>Min. bending radius ..... 50 mm   |
| ② Sleeve  | 406-808-005                    | Materials:<br>Hose: Inner lining ..... unplasticized polyamide<br>Inner layer ..... braided synthetic fibers<br>Outer cover ..... weatherproof<br>polyurethane, black |
| ③ Tube stub, straight   | 406-708-005                    | Sleeve, tube stub ..... steel, galvanized   |

for main lines for tube diam. 10 (NW8) (connection: pump – feeder)

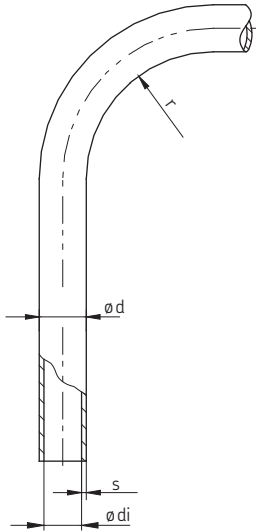


\*) Take length of engaged thread and double it when determining the length of the hose.

| Designation  | Order No.                  | Technical data  |
|--|----------------------------|---|
| ① High-pressure hose, max. length supplied 100 m<br>High-pressure hose, max. length supplied 50 m<br>filled with NLGI grade 2 grease | WVN711-10<br>WVN711-10+AF2 | Hose:<br>Rupture pressure ..... 315 bars<br>Min. bending radius ..... 55 mm   |
| ② Sleeve   | 406-810-002                | Materials:<br>Hose: Inner lining ..... Perbunan<br>Inner layer ..... diagonally wovens<br>synthetic fibers<br>Outer cover ..... weatherproof neoprene |
| ③ Tube stub, straight  | 406-710-002                | Sleeve, tube stub ..... steel, galvanized   |

## Fittings and auxiliary equipment

### Tubing



#### Steel tubing, galvanized

| Order No.             | ø da | s   | ø di | Minimum bending radius r |                        |
|-----------------------|------|-----|------|--------------------------|------------------------|
|                       |      |     |      | bent with mandrel        | bent with grooved disk |
| WV-R04×0.7VERZI       | 4    | 0.7 | 2.6  | 6                        | –                      |
| WV-R06×0.7VERZI       | 6    | 0.7 | 4.6  | 22                       | 16                     |
| WV-R08×0.7VERZI       | 8    | 0.7 | 6.6  | 42                       | 22                     |
| WV-R010×0.7VERZI      | 10   | 0.7 | 8.6  | 76                       | 27                     |
| Diesel injection pipe |      |     |      |                          |                        |
| DIN73000A2-6ST30AL    | 6    | 2.0 | 2.0  | 22                       | 16                     |

#### Plastic tubing WVN715, unplasticized/semi-rigid as per DIN 73378

| Order No.           | Code | ø da | s    | ø di | Minimum bending radius r |
|---------------------|------|------|------|------|--------------------------|
| WVN715-R04×0.85+A89 |      | 4    | 0.85 | 2.3  | 38                       |
| WVN715-R06×1.25+A89 |      | 6    | 1.25 | 3.5  | 63                       |
| WVN715-R06×1.5 +A89 |      | 6    | 1.5  | 3.0  | 65                       |

color: black

The plastic tubing can also be supplied filled with NLGI grade 2, code AF5.

The respective code and tubing length must be added to the order No.

Order example: Plastic tubing WVN715-R04×0.85, black color, 5 m long:

Order No. WVN715-R04×0.85+A89×5m

Plastic tubing WVN715-R04×0.85, black color, filled with grease, 8 m long:

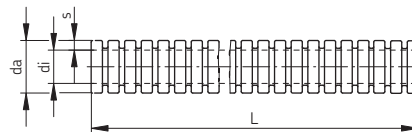
Order No. WVN715-R04×0.85+AF5×8m

**Important note:** To avoid damages, for screwed tubing joints, only use unions with reinforcing sockets!

### Corrugated hose

| Order No.   | Rated width | da × s     | di   | L                     |
|-------------|-------------|------------|------|-----------------------|
| 982-760-070 | 4           | 7 × 1.25   | 4    | up to max of 100 m *) |
| 982-760-120 | 8           | 11.7 × 1.6 | 8.4  |                       |
| 982-760-130 | 10          | 12.9 × 1.5 | 10   | up to max. of 50 m *) |
| 982-760-160 | 12          | 15.7 × 1.7 | 12.3 |                       |

Material: polyamide 6, black color \*) please indicate when ordering



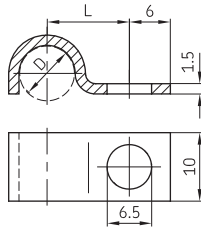


## Fittings and auxiliary equipment

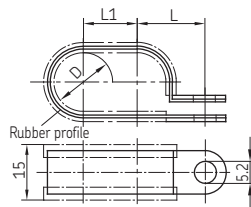
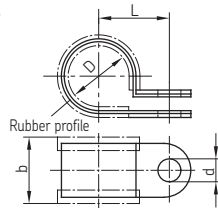
### Clips

| for outer tube diam. D | Order No. | L  | Number of tubes |
|------------------------|-----------|----|-----------------|
| 4                      | 604-001-A | 9  | 1               |
| 4                      | 604-002-A | 9  | 2               |
| 6                      | 606-010-A | 10 | 1               |
| 8                      | 608-001-A | 12 | 1               |

Material: mild steel, galvanized surface



| for outer tube diam. D | Order No.   | d    | b    | L    |
|------------------------|-------------|------|------|------|
| 4                      | 941-204-104 | 5.2  | 15   | 10   |
| 6                      | 941-206-104 | 5.2  | 15   | 11   |
| 6                      | 941-206-108 | 6.4  | 18.5 | 14.2 |
| 8                      | 941-208-104 | 6.4  | 18.5 | 15.2 |
| 9                      | 941-209-104 | 5.2  | 15   | 12.5 |
| 9                      | 941-209-105 | 6.4  | 18.5 | 15.7 |
| 10                     | 941-210-104 | 6.4  | 18.5 | 16.2 |
| 12                     | 941-212-104 | 6.4  | 18.5 | 17.2 |
| 13                     | 941-213-104 | 6.4  | 18.5 | 17.7 |
| 15                     | 941-215-104 | 6.4  | 18.5 | 18.7 |
| 17                     | 941-217-104 | 5.2  | 15   | 16.5 |
| 17                     | 941-217-105 | 6.4  | 18.5 | 19.7 |
| 18                     | 941-218-101 | 6.4  | 18.5 | 20.1 |
| 20                     | 941-220-104 | 6.4  | 18.5 | 21.2 |
| 22                     | 941-222-100 | 6.4  | 18.5 | 22.2 |
| 25                     | 941-225-104 | 6.4  | 18.5 | 23.7 |
| 27                     | 941-227-104 | 10.2 | 31   | 31   |



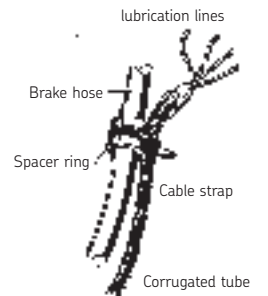
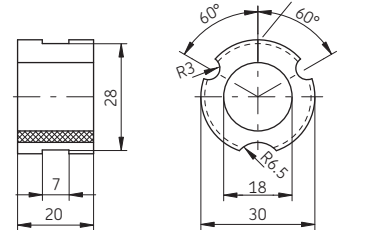
| for outer tube diam. D | Order No.   | L    | L1 |
|------------------------|-------------|------|----|
| 9                      | 941-309-204 | 12.5 | 9  |
| 17                     | 941-317-204 | 16.5 | 17 |

### Spacer ring

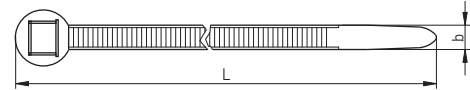
Order No. 898-210-061

Material: CR (chloroprene rubber)

Material: CR (chloroprene rubber)



### Cable strap



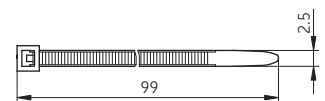
| Order No.   | L   | b   |
|-------------|-----|-----|
| 898-610-000 | 197 | 4.9 |
| 898-710-000 | 302 | 4.9 |
| 898-710-001 | 360 | 7.5 |

Material: polyamide

For automatic pincers:

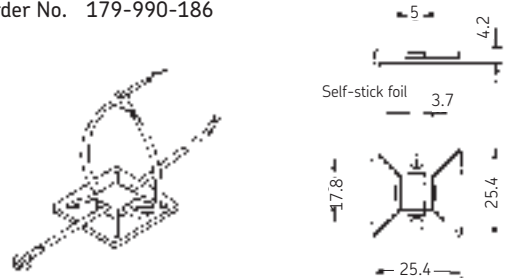
Order No. 898-510-002

Material: polyamide



### Mounting base

Order No. 179-990-186

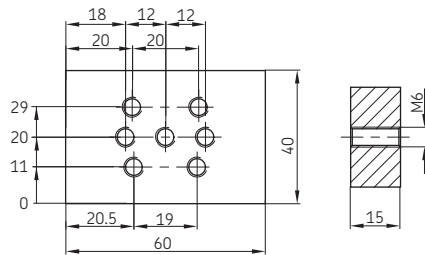


## Fittings and auxiliary equipment

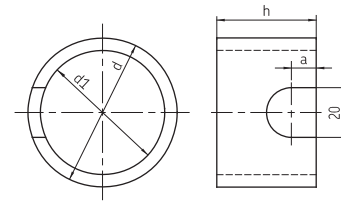
### Mounting plate for VPM, VPKM, VPBM feeders

Order No. 871-770-006

Material: steel



### Guard ring



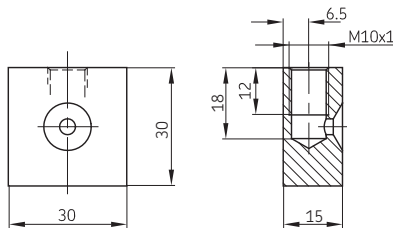
| Order No.   | a  | d  | d1 | h  |
|-------------|----|----|----|----|
| 821-730-010 | 20 | 60 | 50 | 20 |
| 821-750-010 | 10 | 60 | 50 | 40 |
| 821-950-010 | 13 | 90 | 78 | 40 |

Material: steel

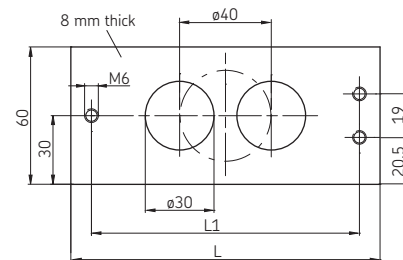
### Welding flange for connection of grease nipple

Order No. 871-530-010

Material: steel



### Welding plates for VPKM feeder



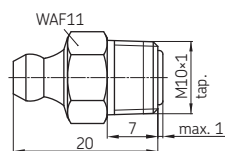
| Order No.                | L1    | L   | for feeder |
|--------------------------|-------|-----|------------|
| 1 hole $\varnothing$ 40  |       |     |            |
| 871-990-083              | 68.3  | 85  | VPKM-3     |
| 871-990-084              | 84.6  | 100 | VPKM-4     |
| 871-990-073              | 100.8 | 117 | VPKM-5     |
| 2 holes $\varnothing$ 30 |       |     |            |
| 871-990-086              | 117   | 135 | VPKM-6     |
| 871-990-087              | 133.2 | 150 | VPKM-7     |
| 871-990-088              | 149.4 | 165 | VPKM-8     |
| 871-990-089              | 165.6 | 182 | VPKM-9     |
| 871-990-065              | 181.8 | 199 | VPKM-10    |

### Conical head nipple with valve

Order No. 996-001-890

Material: steel, galvanized surface

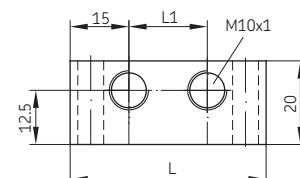
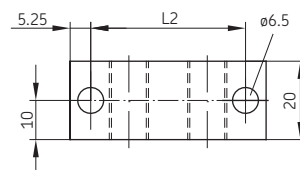
associated cap, order No. 898-210-050



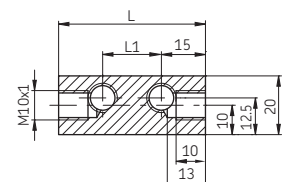
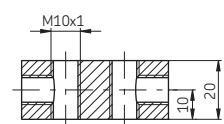
### Manifold block

| Order No.   | L   | L1 | L2    | Number of threaded holes |             |
|-------------|-----|----|-------|--------------------------|-------------|
| 871-340-008 | 30  | -  | 19.5  | 1                        | nipple port |
| 871-360-006 | 50  | 20 | 39.5  | 2                        |             |
| 871-360-008 | 50  | 20 | 39.5  | 2                        | nipple port |
| 871-380-006 | 70  | 40 | 59.5  | 3                        |             |
| 871-390-020 | 210 | 20 | 199.5 | 10                       |             |
| 871-390-023 | 270 | 20 | 200   | 13                       |             |

Material: steel, galvanized surface

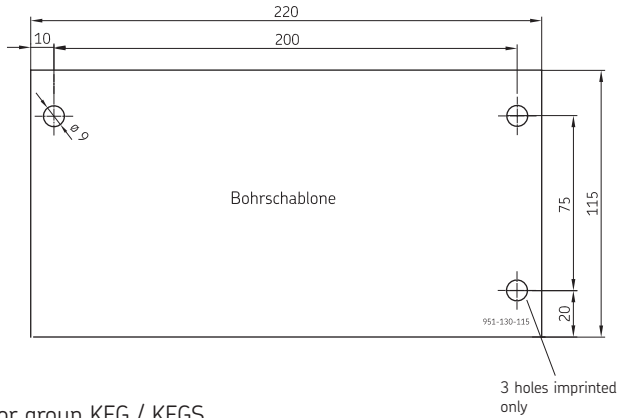


### Nipple port



## Fittings and auxiliary equipment

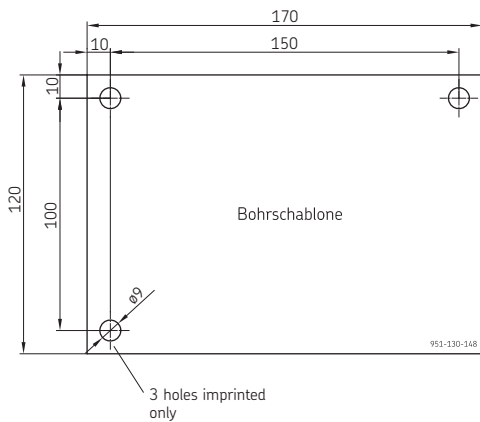
### Drilling template for piston pumps



for group KFG / KFGS

Order No. 951-130-115

Material: self-stick paper



for group KFA

Order No. 951-130-148

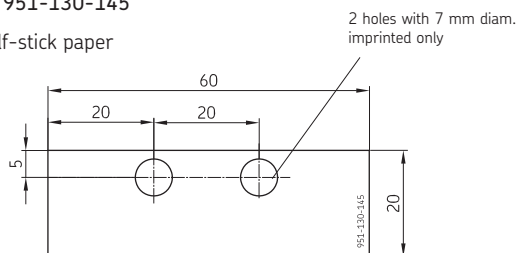
Material: self-stick paper

### Drilling template

for progressive feeder, type VPBM

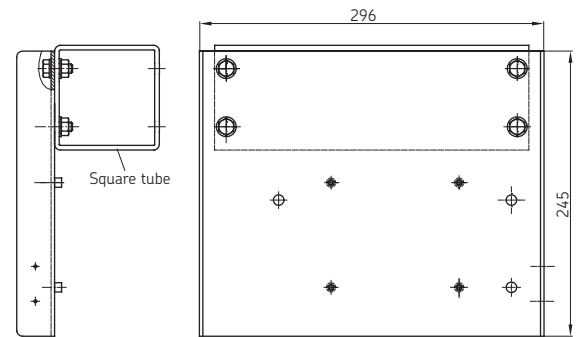
Order No. 951-130-145

Material: self-stick paper



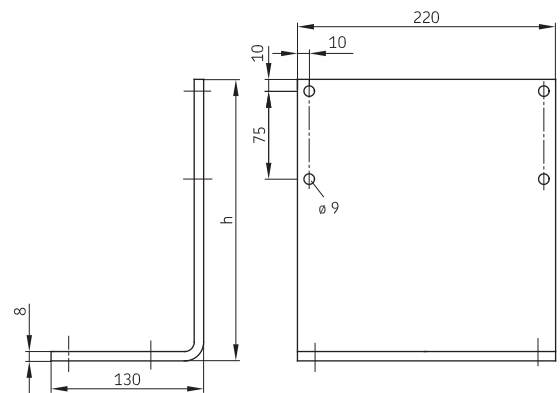
### Pump fastening plate

for systems with group KFG/KFGS piston pumps



Order No.

KFG1.U16 (drawing)  
KFG1.U17 without square tube



Order No.

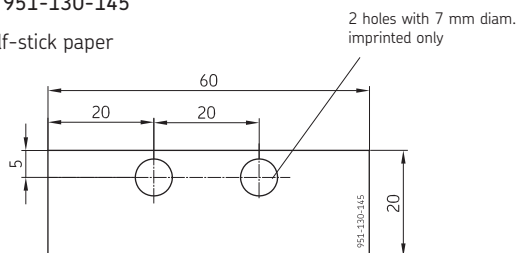
| Order No.   | h   |
|-------------|-----|
| 881-290-430 | 240 |
| 881-490-007 | 280 |

### Drilling template

for progressive feeder, type VPBM

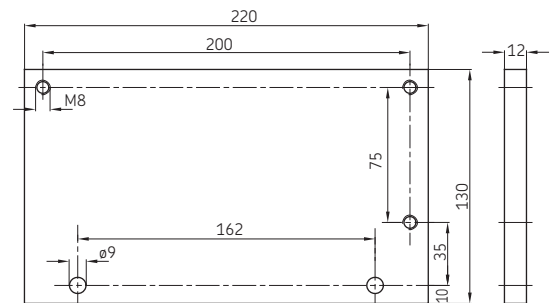
Order No. 951-130-145

Material: self-stick paper



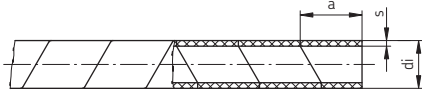
### Adapter plate

Order No. KFG1.45



## Fittings and auxiliary equipment

### Protective helix

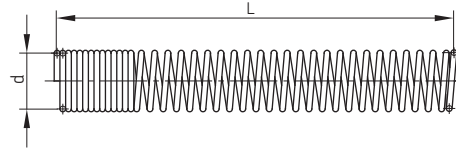


Max. length of 25 m, please indicate when ordering

| Order No.   | Segment width<br>a | Wall thickness<br>s | Inside<br>di |
|-------------|--------------------|---------------------|--------------|
| 982-760-061 | 9                  | 1                   | 4            |
| 982-760-121 | 10                 | 1.5                 | 9            |
| 982-760-141 | 16                 | 1.5                 | 11.5         |
| 982-760-171 | 22                 | 2                   | 13           |

Material: polyethylene, black color

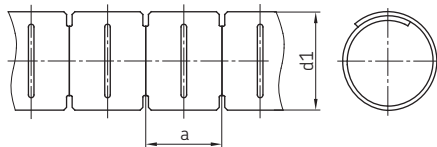
### Anti-kink coil for high-pressure hose



| Order No.   | L    | d    | for hose    |
|-------------|------|------|-------------|
| 804-920-010 | 85   | 10.6 |             |
| 804-920-011 | 200  | 10.6 | 982-750-091 |
| 982-760-132 | 5000 | 10.6 |             |
| 982-760-224 | 2000 | 14   | 982-750-111 |
| 982-760-320 | 2000 | 20   | WVN711-10   |

Material: stainless steel

### Spiral hose



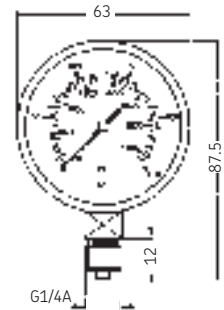
| Order No.   | d1   | a  | Wall thickness | Number of bundable lines |
|-------------|------|----|----------------|--------------------------|
| 982-760-102 | 10.4 | 10 | 0.8            | 6 - 9                    |
| 982-760-172 | 17.4 | 14 | 0.8            | 10 - 16                  |
| 982-760-222 | 22.7 | 17 | 0.9            | 17 - 21                  |
| 982-760-272 | 28   | 20 | 1.0            | 21 - 28                  |
| 982-760-302 | 32   | 22 | 1.3            | 27 - 32                  |

### Pressure gauge

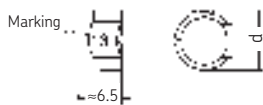
| Order No.   | Indicating ranges              |
|-------------|--------------------------------|
| 169-125-000 | 0 to 250 bars<br>0 to 3600 psi |
| 169-140-001 | 0 to 400 bars                  |

Mounting position: standing upright.

Please order washer 248-610.02 separately



### Marking clip for secondary lines



| Order No.   | Marking | d                     | Order No.   | Marking | d                     |
|-------------|---------|-----------------------|-------------|---------|-----------------------|
| 808-110-010 | 0       |                       | 808-220-010 | 0       |                       |
| 808-110-011 | 1       |                       | 808-220-011 | 1       |                       |
| 808-110-012 | 2       |                       | 808-220-012 | 2       |                       |
| 808-110-013 | 3       |                       | 808-220-013 | 3       |                       |
| 808-110-014 | 4       |                       | 808-220-014 | 4       |                       |
| 808-110-015 | 5       | 7.5                   | 808-220-015 | 5       | 10.5                  |
| 808-110-016 | 6       |                       | 808-220-016 | 6       |                       |
| 808-110-017 | 7       | appropriate clip-     | 808-220-017 | 7       | appropriate clip-     |
| 808-110-018 | 8       | installation rod      | 808-220-018 | 8       | installation rod      |
| 808-110-019 | 9       | order No. 808-110-020 | 808-220-019 | 9       | order No. 808-220-020 |

External line diam. 5.9 - 8.5

External line diam. 8.6 - 11.1

Material: nylon, heat-resistant, self-extinguishing, yellow color

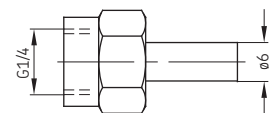
### Adapter for pressure gauge

| Order No. | d1      |
|-----------|---------|
| 301-134   | M10×1   |
| 301-034   | M14×1.5 |

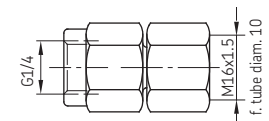


### Adapter for pressure gauge with washer

Order No. 248-610.01



Order No. 441-110-163



## Fittings and auxiliary equipment

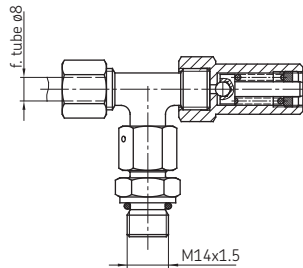
### Safety valve

without lubricant nipple

| Order No.          | tube diam. |
|--------------------|------------|
| 161-210-012        | 6          |
| 161-210-016        | 10         |
| 161-210-018 (Fig.) | 8          |

Opening pressure  $300 \pm 20$  bars

Material: steel, galvanized surface

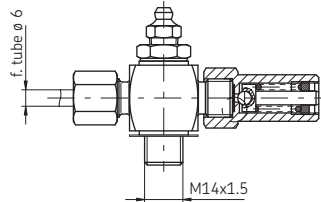


with lubricant nipple

| Order No.   | tube diam. |
|-------------|------------|
| 161-210-014 | 6          |
| 161-210-025 | 8          |

Opening pressure  $300 \pm 20$  bars

Material: steel, galvanized surface



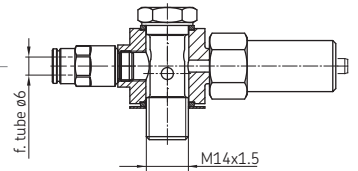
### Safety valve with plug-in connector

without lubricant nipple

Order No. 161-210-021

Opening pressure  $300 \pm 20$  bars

Material:  
brass; steel, galvanized surface

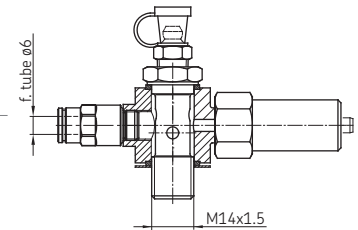


with lubricant nipple

Order No. 161-210-020

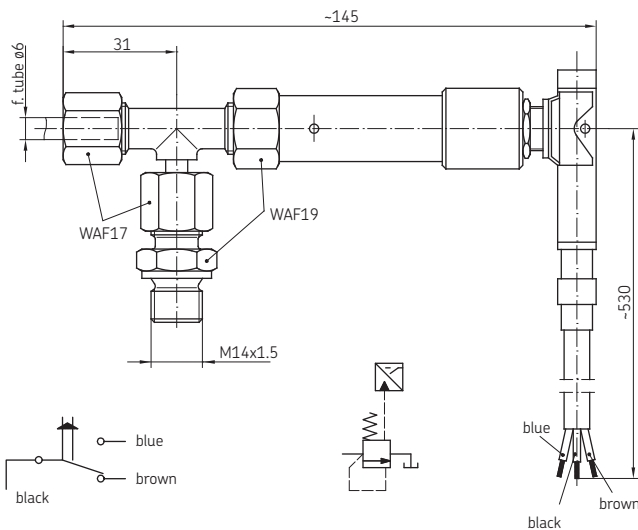
Opening pressure  $300 \pm 20$  bars

Material:  
brass; steel, galvanized surface



Tube cutter with formation of claw groove for quick connectors,  
order No. 169-000-337

### Safety valve with switch



Rated operating voltage . . . . . 1A (220 V AC)  
Operating temperature range . . . . -30 to +80 °C

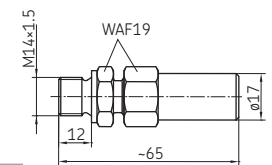
| Order No.   | Opening pressure (bars) | Material                  |
|-------------|-------------------------|---------------------------|
| 169-200-130 | $250 \pm 20$            | steel, galvanized surface |

### Safety valve

Order No.                      Opening pressure (bars)

161-210-008                       $300 \pm 20$

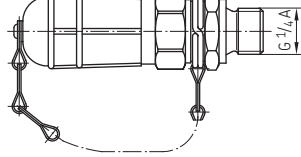
Material: steel, galvanized surface



## Fittings and auxiliary equipment

### Filler socket

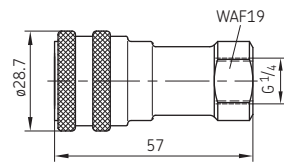
Order No. 995-000-705



Respective coupling socket order No. 995-001-500

### Coupling socket for topping-up port

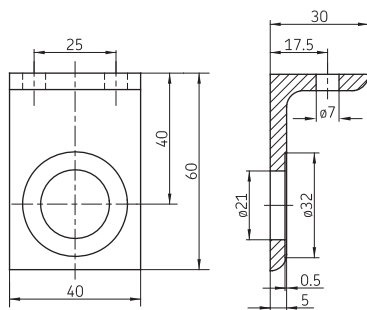
Order No. 995-001-500



Respective plug order No. 833-370-001

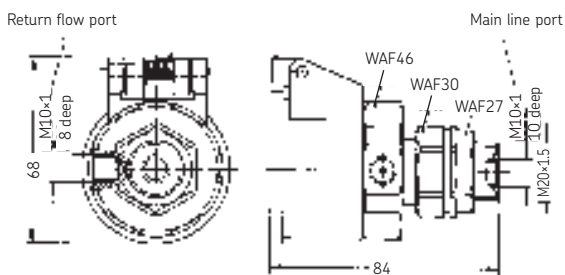
### Mounting angle bracket for coupling socket

Order No. 881-430-000



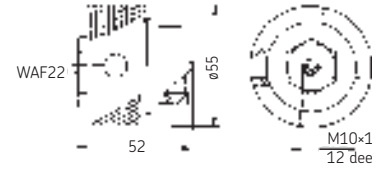
### Coupling socket with return flow port

Order No. 995-001-620



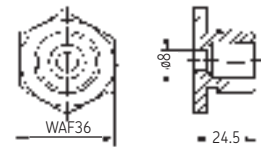
### Coupling plug

Order No. 995-001-621



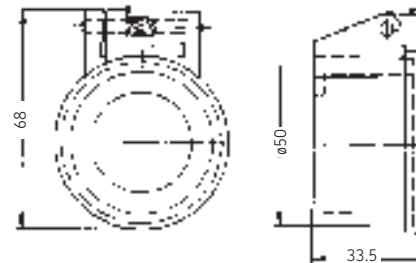
### Stub for coupling plug

Order No. 995-001-622



### Dust cover for stub

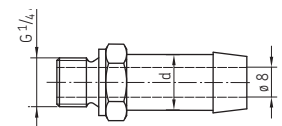
Order No. 995-001-623



### Hose nozzle

| Order No.   | d  |
|-------------|----|
| 857-760-007 | 13 |
| 857-870-002 | 16 |

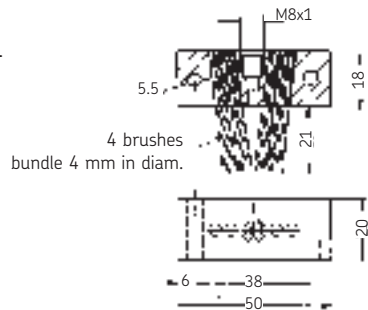
Material: brass



## Fittings and auxiliary equipment

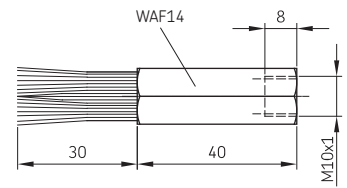
### Brush

Order No. 992-000-171  
Horsehair



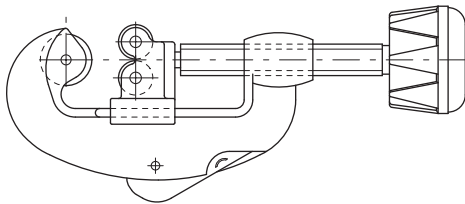
### Brush

Order No. 992-000-289  
Soft Perlon



### Tube cutter

Order No. 169-000-301  
Spare cutting wheel  
Order No. 844-300-001

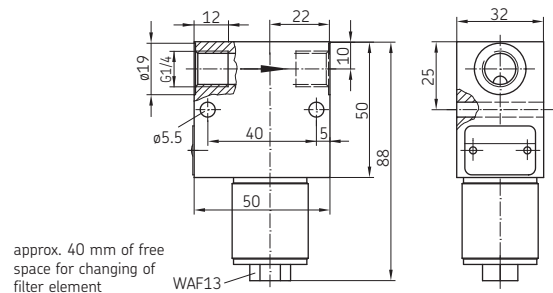


### Screen filter

for systems with grease up to NLGI grade 000, 00

#### Cleaning tips:

To clean the screen filter, first unscrew the size 13 hexagon nut. The filter element can then be pulled out and cleaned without loosening the tubing.



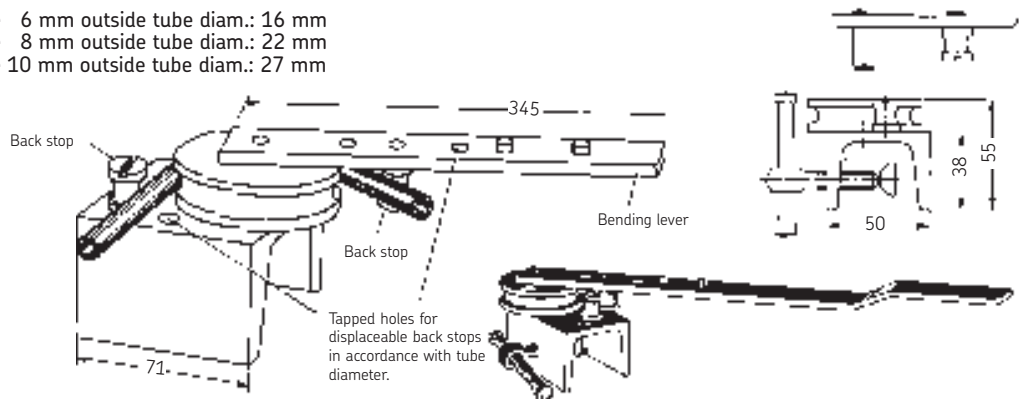
| Order No. | Max. operating pressure (bar) | Mash opening width (mm) | Screen area (cm <sup>2</sup> ) |
|-----------|-------------------------------|-------------------------|--------------------------------|
| 213-870F  | 60                            | 0.160                   | 20                             |

Preferable mounting position shown above

### Tube bending device

This device can be used to bend tubes with a 6, 8 and 10 mm outside diameter. A special grooved disk is available for every tube diameter. Thin-walled steel tubes with a 10 mm outside diam. may be slightly flattened at the outer bend, but that is not essential with regard to strength or reduction of cross section.

Inner bending radius  
tube 6 mm outside tube diam.: 16 mm  
tube 8 mm outside tube diam.: 22 mm  
tube 10 mm outside tube diam.: 27 mm



Order No. 248-803.20

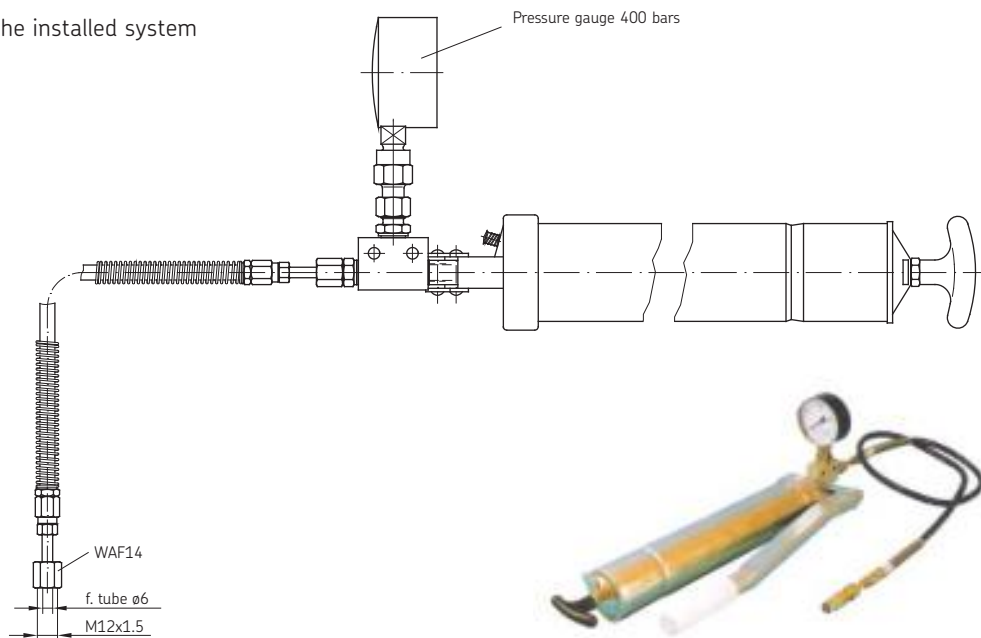
There is a special grooved disk available for the bending tube with 12 mm o.d, order No. 248-803.17

## Fittings and auxiliary equipment

### Lever-type grease gun

for checking of feeders in the installed system

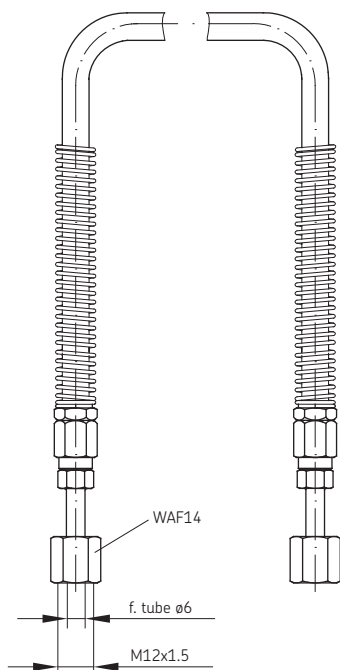
Order No. 169-000-143



### Hose line, 2 m long

with cutting-sleeve screw unions

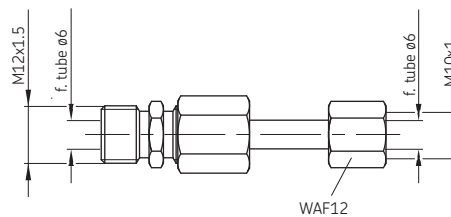
Order No. 167-002-001



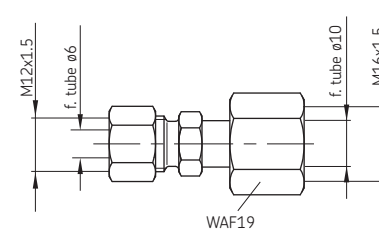
### Reducing coupling

with cutting-sleeve screw union

Order No. 441-006-347



Order No. 444-510-062

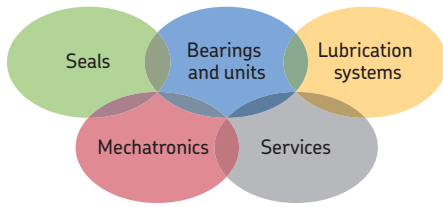












## The Power of Knowledge Engineering

Drawing on five areas of competence and application-specific expertise amassed over more than 100 years, SKF brings innovative solutions to OEMs and production facilities in every major industry worldwide. These five competence areas include bearings and units, seals, lubrication systems, mechatronics (combining mechanics and electronics into intelligent systems), and a wide range of services, from 3-D computer modelling to advanced condition monitoring and reliability and asset management systems. A global presence provides SKF customers uniform quality standards and worldwide product availability.

### ! Important information on product usage

All products from SKF may be used only for their intended purpose as described in this brochure and the operating instructions. If operating instructions are supplied together with the products, they must be read and followed.

Not all lubricants can be fed using centralized lubrication systems. SKF can, on request, inspect the feedability of the lubricant selected by the user in centralized lubrication systems. Lubrication systems and their components manufactured by SKF are not approved for use in conjunction with gases, liquefied gases, pressurized gases in solution, vapors or such fluids whose vapor pressure exceeds normal atmospheric pressure (1 013 mbar) by more than 0,5 bar at their maximum permissible temperature.

In particular, we call your attention to the fact that hazardous materials of any kind, especially the materials classified as hazardous by EC Directive 67/548/EEC, Article 2, Para. 2, may only be filled into SKF centralized lubrication systems and components and delivered and/or distributed with the same after consultation with and written approval from SKF.

### Further brochures:

1-9201-EN *Transport of Lubricants in Centralized Lubrication Systems*  
 1-9420-EN *Single-line Systems for Commercial Vehicles*

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1-9430-EN · July 2014

