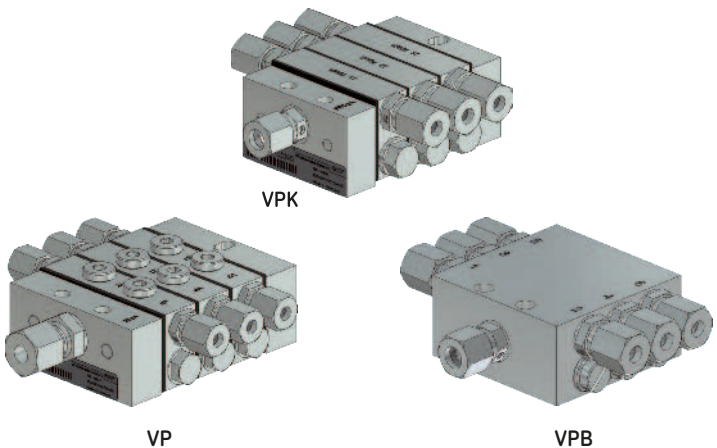
Progressive feeders of the series VP, VPK, VPB

Component Lifecycle Manual
(CLM)

EN



Version 03

Masthead

This component lifecycle manual has been prepared in accordance with the established standards and rules for technical documentation VDI 4500 and EN 292.

Warranty

The instructions do not contain any information on the warranty. This can be found in the general terms and conditions.

Copyright / Integration of instructions

Manufacturer and service address

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Explanation of symbols and signs

You will find these symbols, which warn of specific dangers to persons, material assets, or the environment, next to all safety instructions in these operating instructions.

Please heed these instructions and proceed with special care in such cases. “Please forward all safety instructions to other users.”

Warning level		Consequence	Probability
⚠	DANGER	Death / serious injury	Immediate
⚠	WARNING	Serious injury	Possible
⚠	CAUTION	Minor injury	Possible
	NOTE	Property damage	Possible

Information symbols within the text	
Symbol	**Meaning**
●	Prompts an action
○	Used for itemizing
☞	Refers to other facts, causes, or consequences
→	Provides additional information within procedures

Symbols used	
Symbol	**Meaning**
	Note
	Electrical component hazard, electric shock hazard
	Slipping hazard
	Hazard from hot components Hazard from hot surface
	Risk of being drawn into machinery
	Crushing hazard
	Danger from suspended load
	Pressure injection hazard
	Explosion-proof component
	Electrostatic sensitive components
	Wear personal safety equipment (goggles)
	Secure (lock) the closing device against accidental starting of the machine
	Environmentally sound disposal

Instructions placed on a unit, machine, or equipment, such as:

- rotation arrows
- labels for fluid connections

must be followed and kept in fully legible condition.

Read the component manual thoroughly and follow the safety instructions.

Abbreviations and conversion factors

Abbreviations

re	regarding
approx.	approximately
°C	degrees Celsius
cu.in	cubic inches
dB (A)	sound pressure level
i.e.	that is
etc.	et cetera
poss.	possibly
°F	degrees Fahrenheit
fl.ou	fluid ounces
fpsec	Feet per second
gal.	gallons
hp	horsepower
usually	usually
in.	inch
incl.	including
K	Kelvin
kg	kilograms
kp	kilogram-force
kW	kilowatt
l	liter
lb.	pound
max.	maximum
min.	minimum
min.	minute
ml	milliliter
mm	millimeter
mph	miles per hour
N	Newton
Nm	Newton meter
oz.	ounce
psi	pounds per square inch
rh	relative humidity
s	seconds
sq.in.	square inches
etc.	et cetera
e.g.	for example
>	greater than
<	less than
±	plus or minus
Ø	diameter

Conversion factors

Length	1 mm	0.03937 inch
Area	1 cm^2	0.155 sq.in
Volume	1 ml	0.0352 fl.oz.
	1 l	2.11416 pints (US)
Mass	1 kg	2.205 lbs
	1 g	0.03527 oz.
Density	1 kg/cm^3	8.3454 lb./gal(US)
	1 kg/cm^3	0.03613 lb./cu.in.
Force	1 N	0.10197 kp
Speed	1 m/s	3.28084 fpsec.
	1 m/s	2.23694 mph
Acceleration	1 m/s^2	3.28084 $ft./s^2$
Pressure	1 bar	14.5 psi
Temperature	°C	(°F-32) x 5/9
Power	1 kW	1.34109 hp

1. Safety instructions

1.1 General safety instructions

The operator must ensure that the lifecycle manual is read and understood by all persons tasked with working on the product or who supervise or instruct such persons. The operator must also ensure that the staff fully understands the content of the lifecycle manual.
The described product was manufactured according to the state of the art. Risks may, however, arise from its usage and may result in harm to persons or damage to other material assets.
Any malfunctions which may affect safety must be remedied immediately. In addition to the lifecycle manual, general statutory regulations and other regulations for accident prevention and environmental protection must be observed and applied.

1.2 General behavior when handling the product

- The product may only be used in awareness of the potential dangers, in proper technical condition, and according to the information in this manual.
- Technical personnel must familiarize themselves with the functions and operation of the product. The specified assembly and operating steps and their sequences must be observed.
- Any unclear points regarding proper condition or correct assembly/operation must be clarified. Operation is prohibited until issues have been clarified.
- Unauthorized persons must be kept away from the product.
- All safety regulations and in-house instructions relevant to the particular activity must be observed.
- Responsibilities for different activities must be clearly defined and observed. Uncertainty seriously endangers safety.
- Protective and safety mechanisms cannot be removed, modified, or disabled during operation and must be checked for proper function and completeness at regular intervals.
  If protective and safety mechanisms must be removed, they must be installed immediately following conclusion of work and then checked for proper function.
- Any malfunctions that occur must be resolved according to responsibility. The operator of the system/machine must be notified in case of malfunctions outside the scope of responsibility.
- Wear personal protective equipment

- Observe the particular safety data sheets when handling lubricants.

1.3 Qualified technical personnel

Only qualified technical personnel may install, operate, maintain, and repair the products described in this document.
Qualified technical personnel are persons who have been trained, assigned, and instructed by the operator of the final product into which the described product is incorporated. Such persons are familiar with the relevant standards, rules, accident prevention regulations, and assembly conditions as a result of their training, experience, and instruction. They are qualified to carry out the required activities and in doing so recognize and avoid any potential hazards.
The definition of qualified personnel and the prohibition against employing non-qualified personnel are laid down in DIN VDE 0105 and IEC 364.
Relevant country-specific definitions of qualified technical personnel apply for countries outside the scope of DIN VDE 0105 or IEC 364. The core principles of these country-specific qualification requirements for technical personnel cannot be below those of the two standards mentioned above.
The operator of the final product is responsible for assigning tasks and areas of responsibility and for the responsibility and monitoring of the personnel. These areas must be precisely specified by the operator.
The personnel must be trained and instructed if they do not possess the requisite knowledge.
Product training can also be performed by SKF in exchange for costs incurred.

1.4 Electric shock hazard

Electrical connections for the described product may only be established by qualified and trained personnel authorized to do so by the operator, and in observance of the local conditions for connections and local regulations (e.g., DIN, VDE). Serious injury or death and property damage may result from improperly connected products.

DANGER

Electric shock

Performing work on products that have not been de-energized may result in serious injury or death. Assembly, maintenance, and repair work may only be performed on products that have been de-energized by qualified technical personnel. The supply voltage must be switched off before opening any of the product's components.

1.5 System pressure or hydraulic pressure hazard

DANGER

System pressure
Hydraulic pressure

Lubrication systems are pressurized during operation. Centralized lubrication systems must therefore be depressurized before starting assembly, maintenance, or repair work, or any system modifications or system repairs.

Depending on the model design, the product may be able to be operated hydraulically.

1.6 Operation

The following must be observed during commissioning and operation.

- All information within this manual and the information within the referenced documents
- All laws / regulations that the operator must observe
- The information on explosion protection according to Directive 1999/92/EC (ATEX 137), if necessary

1.7 Assembly/maintenance/malfunction/shutdown/disposal

The following must be observed while working on the product.

- All relevant persons (e.g., operating personnel, supervisors) must be informed of the activity prior to the start of work. Precautionary operational measures / work instructions must be observed.
- Ensure through suitable measures that moving/detached parts are immobilized during the work and that no body parts can be pinched by unintended movements.
- Assemble the product only outside the operating range of moving parts, at an adequate distance from sources of heat or cold.
- Prior to performing work, the product and the machine/system in which the product is or will be integrated must be depressurized and secured against unauthorized activation.
- All work on electrical components may be performed only with voltage-insulated tools.
- Fuses must not be bridged. Always replace fuses with fuses of the same type
- Ensure proper grounding of the product.
- Drill required holes only on non-critical, non-load bearing parts.
- Other units of the machine/the vehicle must not be damaged or impaired in their function by the installation of the centralized lubrication system.
- No parts of the centralized lubrication device may be subjected to torsion, shear, or bending.
- Use suitable lifting gear when working with heavy parts
- Avoid mixing up/incorrectly assembling disassembled parts. Label parts.

1.8 Intended use

The progressive feeders are designed for positively driven distribution of lubricants (oils/greases) in a centralized lubrication system.
The maximum inlet volumetric flow of the progressive feeders is as follows
for series:

VP 1000 cm^3/min
VPK 500 cm^3/min
VPB 400 cm^3/min.

On all series, the maximum permissible operating pressure for oil is 200 bar and 300 bar for grease.
The inlet and outlet screw unions and their connecting lines must be designed for these parameters.
The technical requirements for the installation of the VP, VPK, and VPB progressive feeders are set out in Chapter 4, "Assembly." These requirements must be complied with. The same applies to the technical specifications in Chapter 10, "Technical data."
When designing a progressive feeder, pay attention to the number of cycles (strokes). On VP and VPK progressive feeders, the number of cycles should be kept as low as possible by selecting high-volume feeder sections. A maximum value of 200 cycles/min should not be exceeded. This also reduces pressure losses and noise levels.
In case of an installation on moving machine parts or in case of strong vibrations (e.g., on pressing machines), the piston position of the feeder should not correspond with the direction of movement of the machine part.

VP, VPK, and VPB progressive feeders are classified as a component according to the VDMA Position Paper "Umsetzung der Maschinenrichtlinie 2006/42/EG in Zentralschmiertechnik" (implementation of the Machinery Directive 2006/42/EC in centralized lubrication systems).
Any other or additional usage of VP, VPK, or VPB progressive feeders is deemed non-compliant with the intended use and could result in damage, malfunction, or even injury.

1.9 Foreseeable misuse

- Any usage of the product differing from the aforementioned conditions and stated purpose is strictly prohibited. Particularly prohibited are:
- Use in another, more critical explosion protection zone, if applied as ATEX
- Use to feed / forward / store Group 1 dangerous fluids according to Directive 67/548/EEC
- Use to feed / forward / store gases, liquefied gases, dissolved gases, vapors, or fluids whose vapor pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at their maximum permissible operating temperature

1.10 Disclaimer of liability

SKF shall not be held responsible for damages:

- Caused by contaminated or unsuitable lubricants
- Caused by the installation of non-original SKF components or SKF spare parts
- Caused by inappropriate usage
- Resulting from improper assembly, configuration, or filling
- Resulting from improper response to malfunctions
- Caused by independent modification of system components
- Only media approved for these types of units may be used. Unsuitable media may result in pump unit failure and potentially severe bodily injury and property damage.

1.11 Referenced documents

In addition to this manual, the following documents must be observed by the respective target group:

- The explosion protection document of the operator, if applied
- Operational instructions and approval rules
- Instructions from suppliers of purchased parts
- Manual for the insulation resistance tester
- Safety data sheet of the lubricant used
- Project planning documents and other relevant documents, if provided

The operator must supplement these documents with applicable national regulations for the country of use. This documentation must be included if the product/machine is sold or transferred.

1.12 Residual risks

Residual risk	Remedy
Life cycle: Assembly	
People slipping due to floor contamination with spilled/leaked lubricant	• Exercise caution when connecting the product's hydraulic connections • Promptly apply suitable binding agents and remove the leaked/spilled lubricant. • Follow operational instructions for handling lubricants and contaminated parts
Tearing/damage to lines when installed on moving machine components	• If possible, do not install on moving parts; if this cannot be avoided, use flexible hose lines.
Life cycle: Commissioning/operation	
Lubricating oil spraying out due to faulty component fitting/line connection.	• Tighten all components securely or using the specified torques. Use hydraulic connections and lines suitable for the indicated pressures. These must be checked for proper connection and for damage prior to commissioning.
Life cycle: Setup/retrofit/malfunction/troubleshooting/maintenance, repair/shutdown/disposal	
Environmental contamination by lubricants and wetted parts	•Dispose of contaminated parts according to the applicable legal/company rules
People slipping due to floor contamination with spilled/leaked lubricant	• Exercise caution when disconnecting the product's hydraulic connections • Promptly apply suitable binding agents and remove the leaked/spilled lubricant. • Follow operational instructions for handling lubricants and contaminated parts
Environmental contamination by lubricants and wetted parts	•Dispose of contaminated parts according to the applicable legal/company rules

2. Lubricants

2.1 General information

NOTE

All products from SKF Lubrication Systems may be used only for their intended purpose and in accordance with the life cycle manual.

Intended use is the use of the products for the purpose of providing centralized lubrication/lubrication of bearings and friction points with lubricants within the physical usage limits which can be found in the documentation for the device, e.g., operating instructions and the product descriptions, e.g. technical drawings and catalogs.
Particular attention is called to the fact that hazardous materials of any kind, especially those 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 such systems and components after consulting with and obtaining written approval from SKF Lubrication Systems.
No products manufactured by SKF Lubrication Systems are approved for use in conjunction with gases, liquefied gases, pressurized gases in solution, vapors, or such fluids whose vapor pressure exceeds normal atmospheric pressure (1013 mbar) by more than 0.5 bar at their maximum permissible temperature.
Other media which are neither lubricant nor hazardous substance may only be fed after consultation with and written approval from SKF Lubrication Systems.
SKF Lubrication Systems considers lubricants to be an element of system design and must always be factored into the selection of components and the design of centralized lubrication systems. The lubricating properties of the lubricants are critically important in making these selections.

2.2 Selection of lubricants

NOTE

Observe the instructions from the machine manufacturer regarding the lubricants that are to be used.
The amount of lubricant required at a lubrication point is specified by the bearing or machine manufacturer. It must be ensured that that the required quantity of lubricant is provided to the lubrication point. The lubrication point may otherwise not receive adequate lubrication, which can lead to damage and failure of the bearing.

Selection of a lubricant suitable for the lubrication task is made by the machine/system manufacturer and/or the operator of the machine/system in cooperation with the lubricant supplier.
When selecting a lubricant, the type of bearings/friction points, the expected load during operation, and the anticipated ambient conditions must be taken into account. All economic and environmental aspects must also be considered.

2.3 Approved lubricants

NOTE

If required, SKF Lubrication Systems can help customers to select suitable components for feeding the selected lubricant and to plan and design their centralized lubrication system.

Please contact SKF Lubrication Systems if you have further questions regarding lubricants. It is possible for lubricants to be tested in the company's laboratory for their suitability for pumping in centralized lubrication systems (e.g. "bleeding").
You can request an overview of the lubricant tests offered by SKF Lubrication Systems from the company's Service department.

NOTE

Only lubricants approved for the product may be used. Unsuitable lubricants can lead to failure of the product and to property damage.

NOTE

Different lubricants must not be mixed together. Doing so can cause damage and require costly and complicated cleaning of the product/lubrication system. It is recommended that an indication of the lubricant in use be attached to the lubricant reservoir in order to prevent accidental mixing of lubricants.

The product described here can be operated using lubricants that meet the specifications in the technical data. Depending on the product design, these lubricants may be oils, fluid greases, or greases.
Mineral, synthetic, and/or and rapidly biodegradable oils and base oils can be used. Consistency agents and additives may be added depending on the operating conditions.
Note that in rare cases there may be lubricants whose properties are within permissible limit values but whose other characteristics render them unsuitable for use in centralized lubrication systems. For example, synthetic lubricants may be incompatible with elastomers.

2.4 Lubricants and the environment

NOTE

Lubricants can contaminate soil and waterways. Lubricants must be used and disposed of properly. Observe the local regulations and laws regarding the disposal of lubricants.

It is important to note that lubricants are environmentally hazardous, flammable substances which require special precautionary measures during transport, storage, and processing. Consult the safety data sheet from the lubricant manufacturer for information regarding transport, storage, processing, and environmental hazards of the lubricant that will be used.
The safety data sheet for a lubricant can be requested from the lubricant manufacturer.

2.5 Lubricant hazards

WARNING

Lubricants
Filling pumps must always be free of leaks. Leaking lubricant is hazardous due to the risk of slipping and injury. Beware of any lubricant leaking out during assembly, operation, maintenance, or repair of centralized lubrication systems. Leaks must be sealed off without delay.

Lubricant leaking from centralized lubrication systems is a serious hazard. Leaking lubricant can create risks that may result in physical harm to persons or damage to other material assets.

NOTE

Follow the safety instructions on the lubricant's safety data sheet.

3. Overview/functional description

3.1 Overview of progressive feeders

Types and frame sizes, Fig. 1

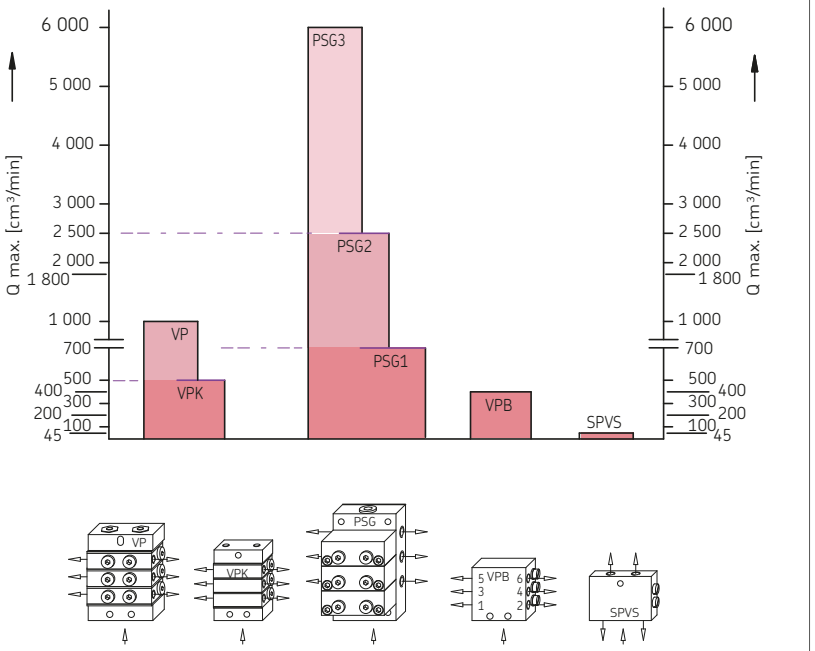


Figure 1 shows the VP, VPK, VPB, PSG1, PSG2, PSG3, SPVS series of SKF progressive feeders with their inlet volumetric flow data. Feeder series PSG1 to PSG3 and feeder series SPVS are not included in this manual; separate lifecycle manuals are available for them.

3.2 Information on volume data

In centralized lubrication systems, the nominal volume is indicated per stroke. This is calculated from the piston diameter and the maximum possible stroke of the particular metering piston, the maximum stroke. The maximum achievable piston capacity is typically used as the nominal volume when configuring a progressive feeder, though the movement of the piston is influenced by various factors such as:

- Differences in back pressures at the outlets, for example due to long tubing lengths or connected roller bearings or shaft bearings.
- Stroke frequency (dynamics)
- Working temperature, viscosity fluctuations due to strong temperature changes

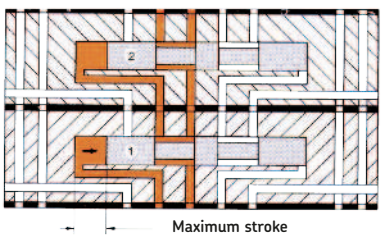
The maximum stroke and thus the piston capacity/metered quantity can reduce due to these factors. The minimum piston stroke, also referred to as the compulsory stroke, is determined by the position of the control borings in the feeder and the control edges on the metering piston. If only the compulsory stroke is performed, the metered quantity at the affected outlet is reduced, which also increasing the effective number of piston strokes. The theoretically determined number of piston strokes can therefore deviate from the actual measured value. This must be considered when evaluating pulses on feeders with a mounted piston detector.

The ratio of piston capacity per feeder outlet determines the distribution ratio of the quantity of lubricant supplied to the feeder. This distribution ratio is usually constant under all operating conditions.

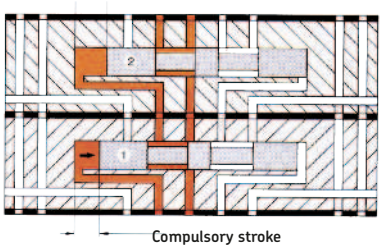
Figure 2 shows the piston positions of a feeder section at maximum stroke and at compulsory stroke (minimum stroke).

Maximum stroke and compulsory stroke, Fig. 2

Shown: Maximum stroke for piston 1 and piston 2

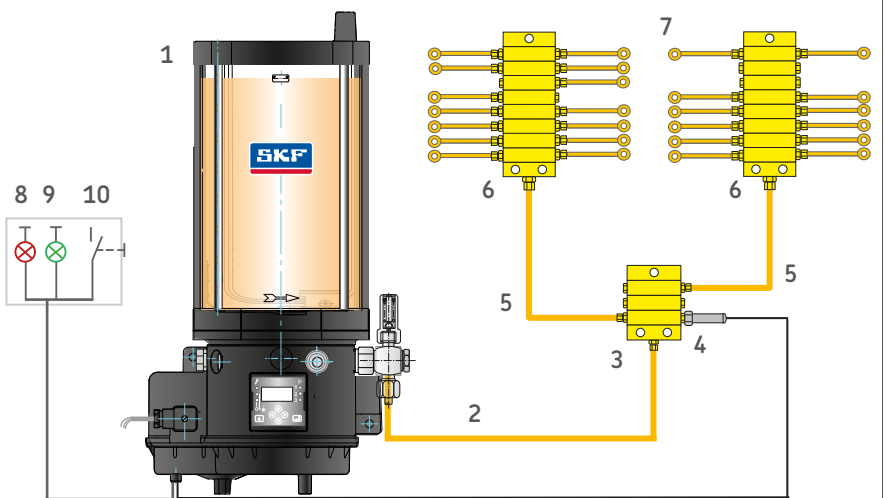


Shown: Compulsory stroke for position of piston 1



3.3 Overview of a general progressive system

Example of progressive system with pump unit, Fig. 3



Legend to Fig. 3

Progressive system with function monitoring

1 Pump unit with:
- Pressure regulating valve
- Control unit
- Fill level control

2 Main lubricant line
3 Master feeder (VP)
4 Function monitoring (piston detector)
5 Lubricant branch lines
6 Secondary feeder (VPK)
7 Lubrication point lines
8 External fault indicator light
9 External pump operation monitoring
10 Pushbutton for interim lubrication

3.3.1 Functional description of a general progressive system

A general progressive feeder system consists of the following components:

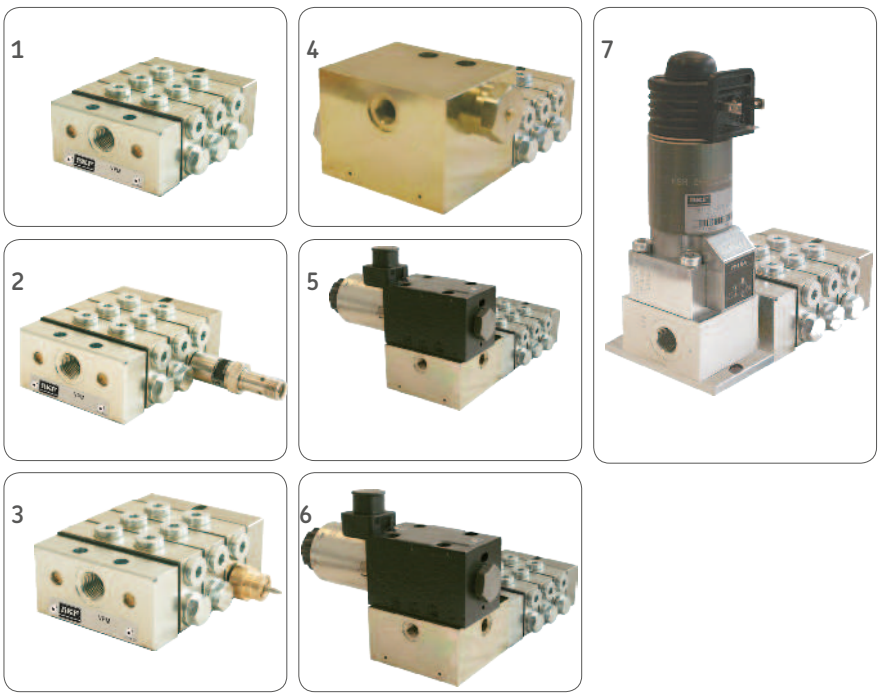
- o Pump unit with pump element and pressure regulating valve
- o Possibly function monitoring (piston detector)
- o Main lubricant line
- o Master and possible secondary feeder
- o Branch and lubricant lines

When the pump motor is turned on, the lubricant pump delivers lubricant from its lubricant reservoir to the lubricant outlet. The pump element attached to the outlet delivers the lubricant further, into the downstream main line. The lubricant flows through the main line to the progressive feeder, where the lubricant is distributed according to the volume required by the lubrication point being supplied.
In progressive systems with a master feeder and secondary feeder, the lubricant coming from the pump unit is delivered to the master feeder. The master feeder distributes the lubricant to the secondary feeders according to their individual volume requirements. From there, the lubricant flows to the lubrication points.
Depending on the pump design with control unit, the following configuration, monitoring, and connections options are available:

- o Interval time and pump cycle time can be adjusted independently, including on monitored systems
- o Recording of remaining intervals and remaining lubrication times
- o Data backup in case of voltage failure
- o Non-volatile memory with PIN code protection
- o Connectivity for inductive piston detector to monitor the feeder function
- o Connectivity for an external fault indicator light
- o Connectivity for external fault pump operation monitoring
- o Connectivity for an external pushbutton to trigger an interim lubrication
- o Internal fill level monitoring; lubrication cycle stops and fault notification is displayed if the level falls below minimum
- o Fault memory

3.4 Overview of VP progressive feeder series

Progressive feeder series VP, Fig. 4



Legend to Fig. 4

1 **VP progressive feeder, basic design**
for oil and grease, without attachments, without monitoring

2 **VP with piston detector**
for oil or grease, monitoring types P2 and P3 (electric monitoring)

3 **VP with cycle indicator**
for oil or grease, monitoring type ZY (visu al monitoring)

4 **VP with flow limiter**
for oil, attachment 07

5 **VPG with 2/2 directional solenoid valve**
for oil, attachment 13 with 2/2 directional control valve, de-energized feeder relieved, only for VPG

6 **VP with 4/2 and 3/2 directional solenoid valve** for oil, attachments 08; 09; 14

7 **VP with 2/2 directional solenoid valve**
for grease, attachment 15 with 2/2 directional control valve, de-energized, continuity to feeder closed

The VP sectional feeder, which belongs to the progressive feeder range, is available in the designs VPM (metric threaded connectors) and VPG (inch threaded connectors). With their metering sections, VPM and VPG cover a nominal volume per outlet and cycle of 0.1 cm^3 (twin section) to 1.2 cm^3 (single section).
The inlet of the feeder is located at an inlet section. The outlets are at the downstream feeder sections. The delivery ducts are sealed by elastic seals (plates). An end section is located downstream of the last feeder section. All sections are interconnected with tie-rods. They seal the feeder assembly.
The volumetric flow fed via a tube is forcibly distributed in a predetermined ratio to the outlets, i.e., to the lubrication points or the downstream progressive feeders. Pistons aligned in series meter the lubricant for two opposite outlets each and control the function of the neighboring piston. This way, the function of the sectional feeder can be checked by monitoring any piston with a cycle indicator or piston detector.

Check valves integrated standard offer high functional reliability (at high or differing back pressures). They also provide accurate metering and safe blocking behavior, even for internal and external combinations.
Progressive feeders distribute a quantity delivered by a pump to multiple outlets at a volumetric ratio determined by the feeder. The different output quantities within a feeder are achieved by using various piston diameters or consolidating two or more outlets.
For the VPM and VPG sectional feeders, sections for two connections (T = twin) or for one connection (S = single) are available. In case of single sections, the two opposite outlets are connected internally, whereby one outlet is closed. Each section is equipped with a lateral and an upper outlet per side. Only one outlet can be connected at a time. The second outlet must be blocked by either a screw plug, a blockage indicator, or a lubricant nipple. If necessary, crossporting bars can also be connected to the upper outlets.

A progressive feeder of the series VP consists of at least 3 to a maximum of 10 metering sections.

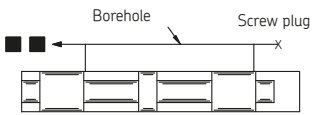
3.4.1 Functioning of a VP progressive feeder

Consolidation of outlets, Fig. 5

T (twin) = two outlets

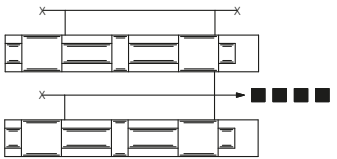
Example: 2T = 0.2 cm³ per outlet
3T = 0.3 cm³ per outlet
6T = 0.6 cm³ per outlet

S (single) = one outlet



Example: 2S = 0.4 cm³ per cycle from one outlet
3S = 0.6 cm³ per cycle from one outlet
6S = 1.2 cm³ per cycle from one outlet

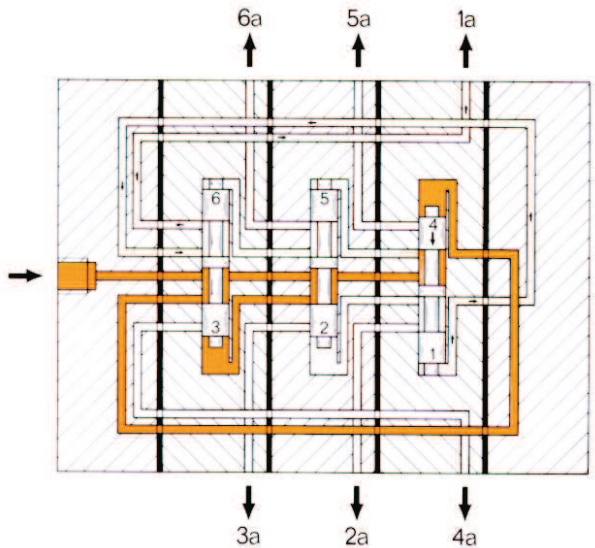
C (crossporting)
Consolidation of the four piston displacements to form one outlet



Example:
2SC = 0.8 cm³ per cycle from one outlet
2SC

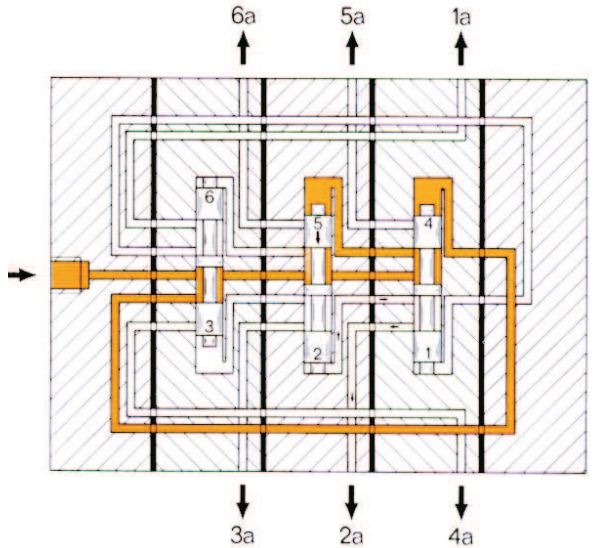
The task of the progressive feeder is to consecutively distribute specified portions of the pressure-fed lubricant (grease or oil) to the connected lubrication points. The lubricant continues to discharge as long as it is pressure-fed to the progressive feeder. The specified portions are generated through the piston movement. Two lubricant outlets on the two end positions of the piston travel are allocated to each piston.
The number of pistons within a feeder is variable. If lubricant is pressure-fed, the pistons of a feeder move sequentially to their end position. The piston movement displaces a portion of the lubricant that is upstream of the piston to the downstream outlet. A piston can start moving only after the upstream piston has been moved to its end position. If all pistons are in their left or right end position, internal connecting bores in the feeder ensure that the pistons continue running reliably as defined. When all pistons have been moved once to the left end position as well as to the right end position, all connected lubrication points have been supplied once with the preset lubricant quantity. The portions for both outlets are determined by the diameter and the travel of the piston. The selection of the required portion is made during the design of the feeder. Retrofitting of the feeder also changes all portions.

Piston lobe under pump pressure, Fig. 6



Piston lobe 4 is under pump pressure; piston lobe 1 has discharged to outlet 1a. The connection of main line to piston lobe 5 has been released due to movement of piston 1/4.

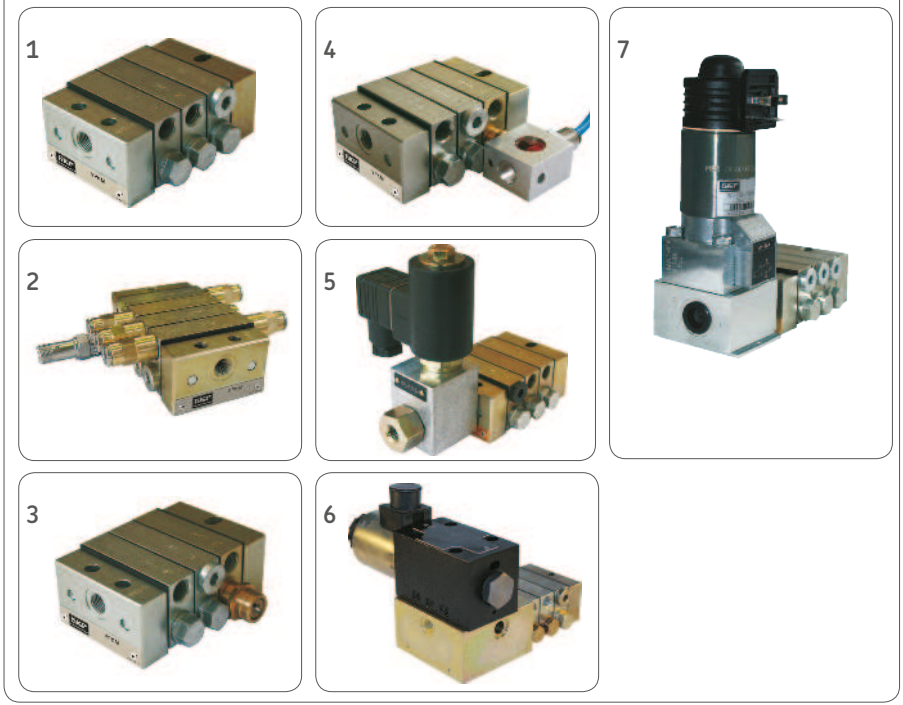
Piston lobe has been actuated, Fig. 7



Piston lobe 5 has been actuated and piston lobe 2 delivers via outlet 2a. Piston lobe 6 is actuated next, etc.

3.5 Overview of VPK progressive feeders

VPK progressive feeder series, Fig. 8



Legend to Fig. 8

1 **VPK progressive feeder, basic design** for oil and grease, without attachments, without monitoring

2 **VPK with piston detector** for oil or grease, monitoring types P2 and P3 (electric)

3 **VPK with cycle indicator** for oil or grease, monitoring type ZY (visu al monitoring)

4 **VPK with proximity switch** for oil and grease, monitoring type ZS (electric monitoring)

5 **VPKG with 2/2 directional solenoid valve** for oil, attachment 13, only for VPG

6 **VPK with 4/2 and 3/2 directional sole noid valve** for oil, attachments 08; 09; 14

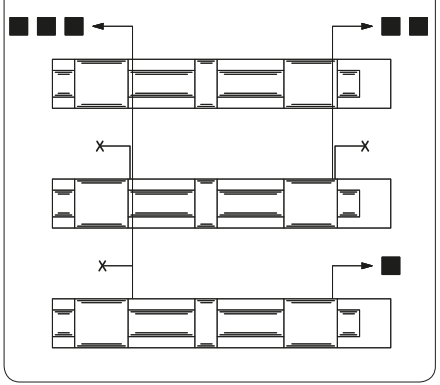
7 **VPK with 2/2 directional solenoid valve** for grease, attachment 15 with 2/2 direc- tional control valve, de-energized, continuity to feeder closed

The VPK sectional feeder, which belongs to the progressive feeder range, is available in the designs VPKM (metric threaded connectors) and VPKG (inch threaded connectors). With their metering sections, VPKM and VPKG cover a nominal volume per outlet and cycle of 0.05 cm^3 (twin section) to 0.6 cm^3 (single section).
The inlet of the feeder is located at an inlet section. The outlets are at the downstream feeder sections. The delivery ducts are sealed by elastic seals (plates). An end section is located downstream of the last feeder section.
All sections are interconnected with tie-rods. They seal the feeder assembly. The volumetric flow fed via a tube is forcibly distributed in a predetermined ratio to the outlets, i.e., to the lubrication points or downstream progressive feeders. Pistons aligned in series meter the lubricant for two opposite outlets each and control the function of the neighboring piston. This way, the function of the sectional feeder can be checked by monitoring any piston with a cycle indicator or piston detector.
Optional integrated check valves integrated offer high functional reliability (at high or differing back pressures). They provide accurate metering and safe blocking behavior even for internal combinations.

Progressive feeders distribute a quantity delivered by a pump to multiple outlets at a volumetric ratio determined by the feeder. The different output quantities within a feeder are achieved by using various metering elements or consolidating two or more outlets.
For master feeder/secondary feeder systems, check valves must be used on the feeder outlets of the master feeder.
For the VPKM and VPKG sectional feeders, sections for two connections (T = twin) or for one connection (S = single) are available. In case of single sections, the two opposite outlets are connected internally, whereby one outlet is closed. For the VPK feeder, it is also possible to consolidate two neighboring outlets after the feeders have been completely installed.
A progressive feeder of the series VPK consists of at least 3 to a maximum of 10 metering sections.

3.5.1 Functioning of a VPK progressive feeder

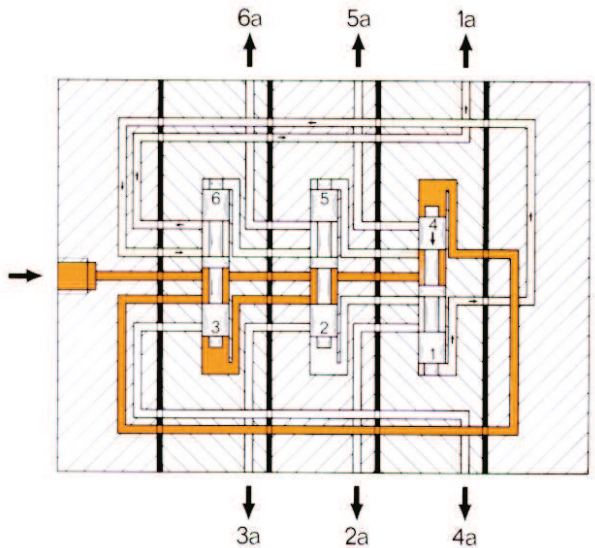
Consolidation of outlets, Fig. 9



Internal connection (crossporting) of the outlets on each side

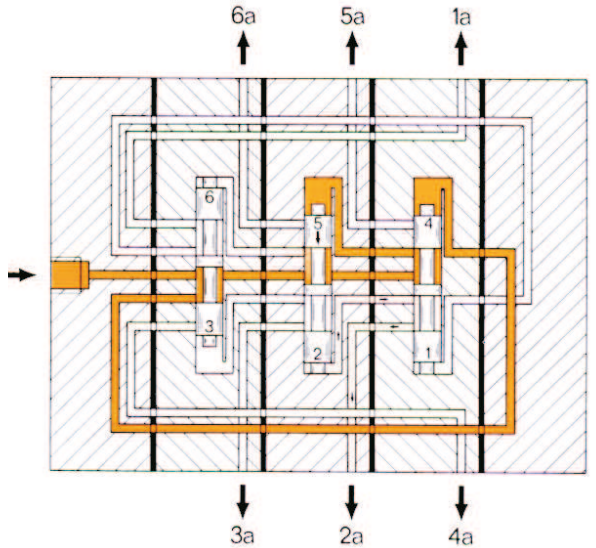
The task of the progressive feeder is to consecutively distribute specified portions of the pressure-fed lubricant (grease or oil) to the connected lubrication points.
The lubricant continues to discharge as long as it is pressure-fed to the progressive feeder. The specified portions are generated through the piston movement. Two lubricant outlets on the two end positions of the piston travel are allocated to each piston. The number of pistons within a feeder is variable. If lubricant is pressure-fed, the pistons of a feeder move sequentially to their end position. The piston movement displaces a portion of the lubricant that is upstream of the piston to the downstream outlet. A piston can start moving only after the upstream piston has been moved to its end position. If all pistons are in their left or right end position, internal connecting bores in the feeder ensure that the pistons continue running reliably as defined. When all pistons have been moved once to the left end position as well as to the right end position, all connected lubrication points have been supplied once with the preset lubricant quantity. The portions for both outlets are determined by the diameter and the travel of the piston. The selection of the required portion is made during the design of the feeder. A subsequent change of the portions is only possible through modification of the feeder.

Piston lobe under pump pressure, Fig. 10



Piston lobe 4 is under pump pressure; piston lobe 1 has discharged to outlet 1a. The connection of main line to piston lobe 5 has been released due to movement of piston 1/4.

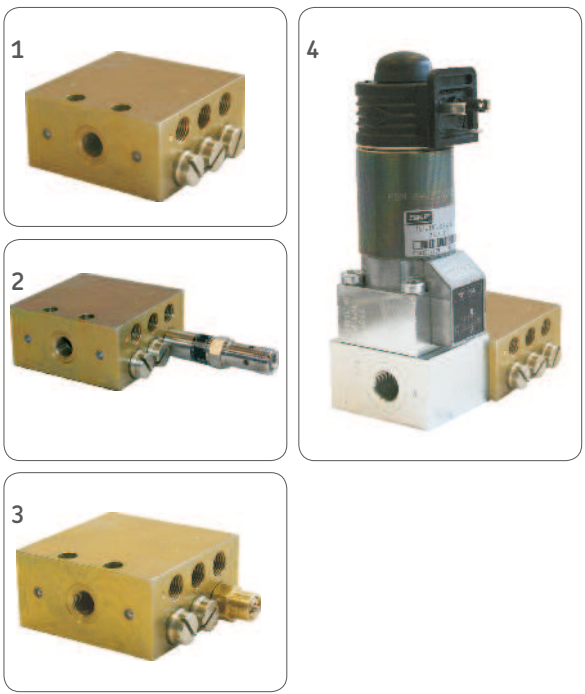
Piston lobe has been actuated, Fig. 11



Piston lobe 5 has been actuated and piston lobe 2 delivers via outlet 2a. Piston lobe 6 is actuated next, etc.

3.6 Overview of VPB progressive feeder series

VPB progressive feeder series, Fig. 12



Legend to Fig. 12

1 **Progressive feeder VPB, basic design**
for oil and grease, without attachments, without monitoring

2 **VPB with piston detector**
for oil or grease, monitoring types P2 and P3 (electric monitoring)

3 **VPB with cycle indicator**
for oil or grease, monitoring type ZY (visual monitoring)

4 **VPB with 2/2 directional solenoid valve**
for grease, attachment 15 with 2/2 directional control valve, de-energized, continuity to feeder closed

The VPB block feeder, which belongs to the progressive feeder range, is available in the designs VPBM (metric threaded connectors) and VPBG (inch threaded connectors).
VPBM and VPBG block feeders are set to a non-adjustable nominal volume per outlet and cycle of 0.20 cm^3. The volumetric flow fed via a tube is forcibly distributed in a predetermined ratio to the outlets, i.e. to the lubrication points or downstream progressive feeders. Pistons aligned in series meter the lubricant for two opposite outlets each and control the function of the neighboring piston. This way, the function of the block feeder can be checked by monitoring any piston with a cycle indicator or piston detector. Attachable check valves offer high functional reliability (at high or differing back pressures such as in grease systems). They provide accurate metering and safe blocking behavior even for internal and external combinations.

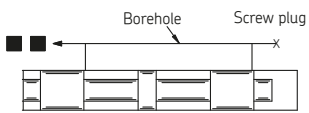
Block feeders distribute a quantity delivered by a pump to multiple outlets at the same volumetric ratio.

Different output quantities within a feeder are achieved by consolidating two or more outlets.
For grease systems with a master feeder and secondary feeder, check valves must be used on the feeder outlets of the master feeder.
Opposite outlets can be consolidated by removing a blind screw. Additionally, optional crossporting bars can be attached to consolidate neighboring outlets.

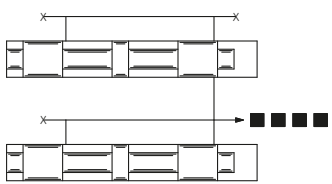
Consolidation of volumes, Fig. 13

T (twin) = two outlets

S (single) = one outlet



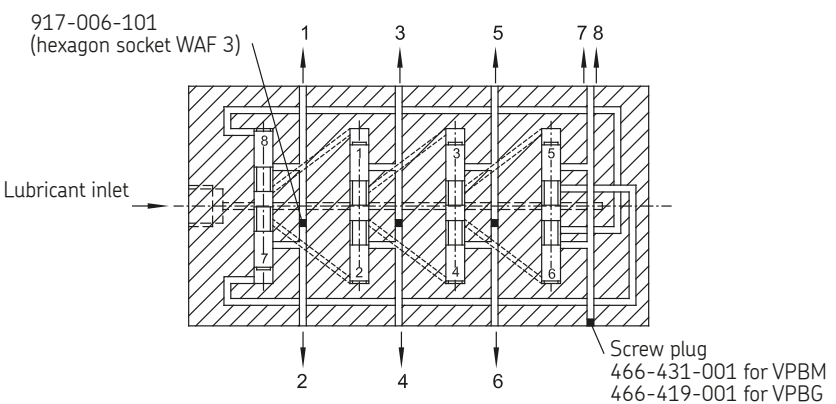
C (crossporting)
Consolidation of the four volumes to form one outlet



3.6.1 Functioning of a VPB progressive feeder

The task of the progressive feeder is to consecutively distribute specified portions of the pressure-fed lubricant (grease or oil) to the connected lubrication points.
The lubricant continues to discharge as long as it is pressure-fed to the progressive feeder. The specified portions are generated through the piston movement. Two lubricant outlets on the two end positions of the piston travel are allocated to each piston. If lubricant is pressure-fed, the pistons of a feeder move sequentially to their end position. The piston movement displaces a portion of the lubricant that is upstream of the piston to the downstream outlet. A piston can start moving only after the upstream piston has been moved to its end position. If all pistons are in their left or right end position, internal connecting bores in the feeder ensure that the pistons continue running reliably as defined. When all pistons have been moved once to the left end position as well as to the right end position, all connected lubrication points have been supplied once with the preset lubricant quantity. The portions for both outlets are determined by the diameter and the travel of the piston. The selection of the required portion is made during the design of the feeder.

Sectional view of a VPB feeder, Fig. 14



4. Technical data

4.1. Volume data for VP feeder sections

Volume data for feeder sections, Table 1

Nominal volume (at maximum stroke)	**Minimum volume** [1] (at compulsory stroke, design value only under difficult conditions)		
Quantity per cycle and outlet [cm³]	Quantity per cycle and outlet [cm³]	Number of outlets	Designation of sections
0.10	0.05	2	1T
0.20	0.14	2	2T
0.30	0.19	2	3T
0.40	0.25	2	4T
0.50	0.30	2	5T
0.60	0.35	2	6T
0.20	0.10	1	1S
0.40	0.28	1	2S
0.60	0.38	1	3S
0.80	0.50	1	4S
1.00	0.60	1	5S
1.20	0.70	1	6S

1) See explanation in Chapter 3.2, Information on volume data.

4.1.1 Basic design of VP progressive feeder

VP progressive feeder, basic design, Table 2

Type	Hydraulically controlled
Mounting position	Any
Ambient temperature range	-25 to + 90 °C
- with cycle indicator	15 to + 75 °C
Feeder sections	see Table 1
Used outlets, internal connection	3 to 20
Used outlets, external connection	1 to 19
Inlet thread	
VPM (metric thread)	M14x1.5
VPG (inch thread)	G1/4
Outlet thread	
VPM (metric thread)	M10x1
VPG (inch thread)	G1/8
Material	
Inlet plate, separator plate, and end plate	Steel, galvanized, NBR
Sections	Steel, galvanized
Hydraulic system	
Operating pressure max.:	Oil 200 bar, grease 300 bar
Volume per outlet and cycle	see Table 1
Lubricant	Mineral oils, greases based on mineral oil, environmentally friendly and synthetic oils and greases
Operating viscosity	> 12 mm2/s
Worked penetration	≥ 265 x 0.1 mm (up to NLGI Grade 2)

4.1.2 VP progressive feeder with piston detector

VP with piston detector, Table 3

VP progressive feeder
For further technical data, see the VP basic design
Electrical system
Piston detector, 2-pin (P2)
(short-circuit protection, intermittent and protected against polarity reversal, NC contact)

Internal thread	M12x1
Design	With 4-point LED, 2-pin connection
Ambient temperature range	- 25 to + 80 °C
Rated voltage	10 to 36 V DC
Residual ripple	3% to 15%
Load current	Max. 100 mA
Protection class	IP 67
Outlet function	NC contact, DC 2-wire
Minimum load current	4 mA

Piston detector, 3-pin (P3)
(short-circuit protection, intermittent and protected against polarity reversal, NC contact PNP)

Internal thread	M12x1
Design	With 4-point LED, 3-pin connection
Ambient temperature range	- 25 to + 80 °C
Rated voltage	10 to 36 V DC
Residual ripple	≤ 10%
Load current	Max. 100 mA
Protection class	IP 67
Outlet function	PNP NC contact

Note
The piston detector is designed for a service life of approx. 10-15 million cycles. This value may be significantly exceeded depending on the application, external environmental influences, medium, pressure, and cycle speed.

4.1.3 VPG progressive feeder with 2/2 directional solenoid valve for oil, attachment 13

VP with 2/2 directional solenoid valve, attachment 13, Table 4

VP progressive feeder
For further technical data, see the VP basic design

Thread connection:	Inlet: **VPG** G1/4"
Ambient temperature range	- 15 to + 75 °C

Hydraulic system

Operating pressure max.	Oil 150 bar
Lubricant	Mineral oils and synthetic oils
Operating viscosity	20-1000 mm^2/s

Electrical system
Directional solenoid valve
General

Valve function	2/2 directional solenoid valve
Type/operation	Slider/solenoid
Basic position	De-energized open

Electrics
(When ordering, please state voltage, type of current, and frequency)

Voltages	24 V DC
Rated current	1.3 A at 24 V DC [1])
ON-time	100%
Protection class /	IP 65
Electrical connection	Plug / DIN 43650

1) Other operating voltage on request

4.1.4 VPG progressive feeder with 4/2 or 3/2 directional solenoid valve for oil, attachments 08; 09; 14

VP with 4/2 and 3/2 directional solenoid valve, attachments 08; 09; 14, Table 5

VP progressive feeder
For further technical data, see the VP basic design
Thread connection: . . . . . Inlet: **VPG** G1/4"
Ambient temperature range . . . . . - 15 to + 75 °C

Hydraulic system
Operating pressure max. . . . . Oil 150 bar
Lubricant . . . . . Mineral oils and synthetic oils
Operating viscosity 20-1000 mm2/s

Electrical system
Directional solenoid valve

General
Valve function . . . . . 2/2 directional solenoid valve
Type/operation . . . . . Slider/solenoid
Basic position . . . . . De-energized open

Electrics
(When ordering, please state voltage, type of current, and frequency)
Voltages . . . . . 24 V DC
Rated current . . . . . 1.3 A at 24 V DC [1])
ON-time 100%
Protection class / . . . . . IP 65
Electrical connection . . . . . Plug / DIN 43650

1) *Other operating voltage on request*

4.1.5 VPG progressive feeder with 2/2 directional solenoid valve for grease, attachment 15

VP with 2/2 directional solenoid valve, attachment 15, Table 6

VP progressive feeder
For further technical data, see the VP basic design

Thread connection: . . . . . Inlet: G1/4"
Ambient temperature range . . . . . - 25 to + 80 °C
Hydraulic system
Operating pressure max. . . . . Grease 300 bar
Lubricant . . . . . Greases up to NLGI Grade 2

Electrical system
Directional solenoid valve

General
Valve function . . . . . 2/2 directional solenoid valve
Type/operation . . . . . Ball seat valve
Basic position . . . . . De-energized closed
Manual actuation . . . . . Yes
Electrics
Voltage . . . . . 24 V DC
Rated current . . . . . 0.67 A
Rated output . . . . . 16 W
ON-time . . . . . 100% ON-time
. . . . (at max. +35°C)
Protection class / . . . . . IP 65
Electrical connection . . . . . Plug / DIN 43650-AF3

4.1.6 VP progressive feeder with flow limiter

VP with flow limiter, Table 7

VP progressive feeder
For further technical data, see the VP basic design
Type. . . . . 2-way flow control valve
Mounting position . . . . . any
Ambient and lubricant
temperature range . . . . . 0 to 100 °C
Material . . . . . Galvanized steel
Weight. . . . . 0.26 kg
Hydraulic system
Viscosity. . . . . 20 - 600 mm^2/s
Nominal volumetric flow . . . . . see plug-in nozzles table
Operating pressure . . . . . 5 to 200 bar
Required differential pressure between
inlet p_1 and outlet p_3 . . . . . ≥ 5 bar

1) The values in the table are based on a differential pressure of 20 bar and viscosity of 300 mm^2/s. Other differential pressures or viscosities result in slightly different delivery rates. These can be determined precisely using the charts for delivery rates and correction factors for the pressure (see brochure 1-3028).

Accessories – Table of plug-in nozzles for flow limiters, Table 8

Rated volumetric flow 1) [l/min]	Plug-in nozzle Ø mm	Order No.
0.081	0.50	24-0455-2574
0.115	0.55	24-0455-2575
0.150	0.60	24-0455-2576
0.207	0.65	24-0455-2577
0.252	0.70	24-0455-2578
0.290	0.75	24-0455-2579
0.345	0.80	24-0455-2580
0.411	0.85	24-0455-2581
0.468	0.90	24-0455-2582
0.559	0.95	24-0455-2583
0.650	1.00	24-0455-2584
0.730	1.05	24-0455-2585
0.794	1.10	24-0455-2586
0.884	1.15	24-0455-2587
0.978	1.20	24-0455-2588
1.087	1.25	24-0455-2589

1) At an operating viscosity of 300 mm^2/s and 20 bar differential pressure; see brochure 1-3028-EN

4.2. Volume data for VPK feeder sections

Volume data for VPK feeder sections, Table 9

Nominal volume (at maximum stroke)	**Minimum volume** [1] (at compulsory stroke, design value only under difficult conditions)		
Quantity per cycle and outlet [cm³]	Quantity per cycle and outlet [cm³]	Number of outlets	Designation of sections
0.05	0.04	2	05T
0.10	0.08	2	1T
0.20	0.14	2	2T
0.30	0.18	2	3T
0.10	0.08	1	05S
0.20	0.16	1	1S
0.40	0.28	1	2S
0.60	0.36	1	3S

1) See explanation in Chapter 3.2, Information on volume data.

4.2.1 Basic design of VPK progressive feeder

Basic design of VPK progressive feeder, Table 10

Type . . . . . Hydraulically controlled
Mounting position . . . . . any

Inlet and outlet threads
VPKM (metric thread) M10x1
VPKG (inch thread) G1/8

Ambient temperature range . . . . . - 25 to + 90 °C
- with cycle switch . . . . . -15 to + 75 °C
Feeder sections . . . . . see Table 10
Used outlets with internal connection 1 to 19

Material
Inlet plate, separator plate and end plate Steel, galvanized/NBR
Sections (piston plates) . . . . . Steel, galvanized

Hydraulic system
Operating pressure max.: . . . . . Oil 200 bar, grease 300 bar
Volume per outlet and cycle . . . . . see Table 9
Lubricant . . . . . Mineral oils, greases based on mineral oil, environmentally friendly and synthetic oils and greases
Operating viscosity . . . . . > 12 mm2/s
Worked penetration . . . . . ≥ 265 x 0.1 mm (up to NLGI Grade 2)

4.2.2 VPK progressive feeder with piston detector

VPK with piston detector, Table 11

VPK progressive feeder
For further technical data, see VPK basic design
Electrical system
Piston detector, 2-pin (P2)
(short-circuit protection, intermittent and protected against polarity reversal, NC contact)

Internal thread	M12x1
Design	with 4-point LED, 2-pin connection
Ambient temperature range	- 25 to + 80 °C
Rated voltage	10 to 36 V DC
Residual ripple	3% to 15%
Load current	Max. 100 mA
Protection class	IP 67
Outlet	NC contact
Minimum load current	4 mA

Piston detector, 3-pin (P3)
(short-circuit protection, intermittent and protected against polarity reversal, NC contact PNP)

Internal thread	M12x1
Design	With 4-point LED, 3-pin connection
Ambient temperature range	- 25 to + 80 °C
Rated voltage	10 to 36 V DC
Residual ripple	≤ 10%
Load current	Max. 100 mA
Protection class	IP 67
Outlet function	PNP NC contact

Note
The piston detector is designed for a service life of approx. 10-15 million cycles. This value may be significantly exceeded depending on the application, external environmental influences, medium, pressure, and cycle speed.

4.2.3 VPK progressive feeder with proximity switch

VPK with proximity switch, Table 12

VPK progressive feeder
For further technical data, see VPK basic design

Note!
Proximity switch can only be used with a (NAMUR) switching amplifier!

Internal thread	M12x1
Design	PVC, with 2 m cable, 2x 0.34 mm^2
Rated voltage	8.2 V DC
Power consumption	Conducting > 2.2 mA
	Blocking < 1.0 mA
Protection class	IP 67
Output function	Contact normally closed (NC)

4.2.4 VPKG progressive feeder with 2/2 directional solenoid valve for oil, attachment 13

VPKG with 2/2 directional solenoid valve, attachment 13, Table 13

VPG progressive feeder
For further technical data, see VPK basic design
Thread connection: . . . . . Inlet: **VPKG** G1/8”
Ambient temperature range. . . - 15 to + 75 °C
Hydraulic system
Operating pressure max. . . . . Oil 150 bar
Lubricant . . . . . Mineral oils and synthetic oils
Operating viscosity 20-1000 mm2/s

Directional solenoid valve

General
Valve function . . . . . 2/2 directional solenoid valve
Type/operation . . . . . Slider/solenoid
Basic position . . . . . De-energized open
Electrics
(When ordering, please state voltage, type of current, and frequency)
Voltages . . . . . 24 V DC
Rated current . . . . . 1.3 A at 24 V DC 1)
ON-time 100%
Protection class / . . . . . IP 65
Electrical connection. . . . . Plug / DIN 43650

4.2.5 VPK progressive feeder with 4/2 and 3/2 directional solenoid valve for oil, attachments 08; 09; 14

VPK with 4/2 and 3/2 directional solenoid valve, attachments 08; 09; 14, Table 14

VPK progressive feeder
For further technical data, see VPK basic design
Thread connection: . . . . . Inlet: **VPKM** 10x1
. . . . . **VPKG** G1/8
Ambient temperature range . . . . . - 15 to + 75 °C
Hydraulic system
Operating pressure max. . . . . Oil 150 bar
Lubricant . . . . . Mineral oils and synthetic oils
Operating viscosity 20-1000 mm2/s
Directional solenoid valve

General
Valve function . . . . . 4/2 (3/2) directional solenoid valve
Type/operation . . . . . Slider/solenoid
Basic position . . . . . 4/2 open P > A
. . . . . 3/2 open B > T
Electrics
(When ordering, please state voltage, type of current, and frequency)
Voltages . . . . . 24 V DC 1)
ON-time 100%
Protection class / . . . . IP 65
Electrical connection. . Plug / DIN 43650

1) Other operating voltage on request

4.2.6 VPKG progressive feeder with 2/2 directional solenoid valve for grease, attachment 15

VPK with 2/2 directional solenoid valve, attachment 15, Table 15

VPK progressive feeder
For further technical data, see the VP basic design

Thread connection: . . . . . Inlet: VPKG G1/4"
Ambient temperature range . . - 25 to + 80 °C
Hydraulic system
Operating pressure max. . . . . Grease 300 bar
Lubricant . . . . . Greases up to NLGI Grade 2

Electrical system
Directional solenoid valve

General
Valve function . . . . . 2/2 directional solenoid valve
Type/operation . . . . . Ball seat valve
Basic position . . . . . De-energized closed
Manual actuation . . . . . Yes
Electrics
Voltage . . . . . 24 V DC
Rated current . . . . . 0.67 A
Rated output . . . . . 16 W
ON-time . . . . . 100% ON-time (at max. +35°C)
Protection class / . . . . . IP 65
Electrical connection . . . . . Plug / DIN 43650-AF3

4.3. VPB volume data for feeder outlets

Volume data for VPB feeder outlets, Table 16

Nominal volume (at maximum stroke) design value only Quantity per cycle and outlet [cm^3]	**Minimum volume** [1] (at compulsory stroke, under difficult conditions) Quantity per cycle and outlet [cm^3]
0.20	0.13

1) See explanation in Chapter 3.2, Information on volume data.

4.3.1 Basic design of VPB progressive feeder

Progressive feeder VPB, basic design, Table 17

Type . . . . . .Hydraulically controlled
Mounting position . . . . . .Any

Inlet and outlet threads
VPBM (metric thread) M10x1
VPBG (inch thread) G1/8

Ambient temperature range . . . . . .- 25 to + 110 °C
- with cycle switch . . . . . .-15 to + 75 °C

Material
. . . . . .Steel, galvanized, optional stainless

Hydraulic system
Operating pressure max.: . . . . . .Oil 200 bar, grease 300 bar
Volume per outlet and cycle . . . . . .see Table 16
Lubricant . . . . . .Mineral oils, greases based on mineral oil, environmentally friendly and synthetic oils and greases
Operating viscosity . . . . . .> 12 mm^2/s
Worked penetration . . . . . .≥ 265 x 0.1 mm
. . . . . .(up to NLGI Grade 2)

4.3.2 VPB progressive feeder with piston detector

VPB with piston detector, Table 18

VPB progressive feeder
For further technical data, see VPB basic design
Electrical system
Piston detector, 2-pin (P2)
(short-circuit protection, intermittent and protected against polarity reversal, NC contact)

Internal thread	M12x1
Design	with 4-point LED, 2-pin connection
Ambient temperature range	- 25 to + 80 °C
Rated voltage	10 to 36 V DC
Residual ripple	3% to 15%
Load current	Max. 100 mA
Protection class	IP 67
Outlet	NC contact
Minimum load current	4 mA

Piston detector, 3-pin (P3)
(short-circuit protection, intermittent and protected against polarity reversal, NC contact PNP)

Internal thread	M12x1
Design	With 4-point LED, 3-pin connection
Ambient temperature range	- 25 to + 80 °C
Rated voltage	10 to 36 V DC
Residual ripple	≤ 10%
Load current	Max. 100 mA
Protection class	IP 67
Outlet function	PNP NC contact

Note: The piston detector is designed for a service life of approx. 10-15 million cycles. This value may be significantly exceeded depending on the application, external environmental influences, medium, pressure, and cycle speed.

4.3.3 VPB progressive feeder with 2/2 directional solenoid valve for grease, attachment 15

VPB with 2/2 directional solenoid valve, attachment 15, Table 19

VPB progressive feeder
For further technical data, see VB basic design

Thread connection:	**Inlet:** G1/4"
Ambient temperature range	- 25 to + 80 °C
Hydraulic system	
Operating pressure max.	Grease 300 bar
Lubricant	Greases up to NLGI Grade 2

Electrical system
Directional solenoid valve

General

Valve function	2/2 directional solenoid valve
Type/operation	Ball seat valve
Basic position	De-energized open
Manual actuation	Yes
Electrics	
Voltage	24 V DC
Rated current	0.67 A
Rated output	16 W
ON-time	100% ON-time (at max. +35°C)
Protection class /	IP 65
Electrical connection	Plug / DIN 43650-AF3

5. Delivery, returns, and storage

SKF Lubrication Systems Germany GmbH products are packaged in accordance with standard commercial practice according to the regulations of the recipient's country and DIN ISO 9001. During transport, safe handling must be ensured and the product must be protected from mechanical effects such as impacts. The transport packaging must be marked "Do not drop!"

CAUTION

Tilting/dropping hazard
Do not tilt or drop the product.

There are no restrictions for land, air, or sea transport.
After receipt of the shipment, the product(s) must be inspected for damage and for completeness according to the shipping documents. The packaging material must be preserved until any discrepancies are resolved.

SKF Lubrication Systems Germany GmbH products are subject to the following storage conditions:

5.1 Lubrication units

- Ambient conditions: dry and dust-free surroundings, storage in well ventilated dry area
- Storage time:
  - Unfilled max. 24 months
  - Filled max. 12 months
- Permissible humidity: < 65%
- Storage temperature: + 10 to +40°C
  Light: Avoid direct sun or UV exposure and shield nearby sources of heat

5.2 General notes

- The product(s) can be enveloped in plastic film to provide low-dust storage.
- Protect against ground moisture by storing on a shelf or wooden pallet.
- Bright-finished metallic surfaces, especially wearing parts and assembly surfaces, must be protected using long-term anti-corrosive agents before storage.
- At approx. 6-month intervals:
- Check for corrosion. If there are signs of corrosion, reapply anti-corrosive agents.
- Drives must be protected from mechanical damage.

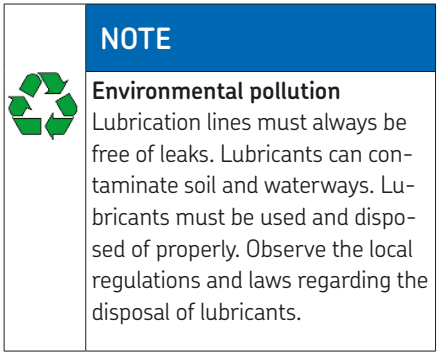
6. Assembly

6.1 General information

Only qualified technical personnel may install, operate, maintain, and repair the progressive feeders described in the lifecycle manual. Qualified technical personnel are persons who have been trained, assigned, and instructed by the operator of the final product into which the progressive feeders are incorporated.
Such persons are familiar with the relevant standards, rules, accident prevention regulations, and operating conditions as a result of their training, experience, and instruction. They are qualified to carry out the required activities and in doing so recognize and avoid potential hazards.

The definition of qualified personnel and the prohibition against employing non-qualified personnel are laid down in DIN VDE 0105 and IEC 364.
Before assembling/setting up the product, the packaging material and any shipping braces (e.g., plugs) must be removed.

The packaging material must be preserved until any discrepancies are resolved.



6.2 Installation information

Progressive feeders of the series VP, VPK, and VPB are designed for positively driven distribution of lubricants (oils/greases) in a centralized lubrication system. The feeders can be used in the context of the technical specifications given in the chapter “Technical data.” They can be mounted in any alignment. In case of installation on moving machine parts or in case of strong vibrations (e.g., on pressing machines), the piston position of the feeder must not correspond with the direction of movement of the machine part.
To prevent flow resistance, ensure that both the customer's supply line and the output lines are sufficiently large.
Changing the number of sections and/or metering rate of individual sections while retaining the same quantity of grease supply changes all lubrication quantities of the outlets.
The feeder should be protected from humidity and vibration and should be installed in an easily accessible position.

The minimum installation dimensions should be adhered to so that all other components can be connected later without problems.

During assembly and during any drilling work, always pay attention to the following:

- Before installing the progressive feeder, ensure that all holes, screw unions, and connecting lines in contact with the feeder are clean and free of metal chips.
- Existing supply lines must not be damaged by assembly work.
- Other units must not be damaged by assembly work.
- The feeder must not be installed within range of moving parts.
- The feeder must be installed at an adequate distance from sources of heat.
- Maintain safety clearances and comply with local regulations for assembly and accident prevention.

WARNING

Supply lines or moving parts
When drilling the assembly holes, you must be careful of any supply lines or other units, as well as of other hazards such as moving components.
Maintain safety clearances and comply with local regulations for assembly and accident prevention

NOTE

Follow the safety instructions on the lubricant's safety data sheet.

NOTE

Observe technical data (Chapter 4).

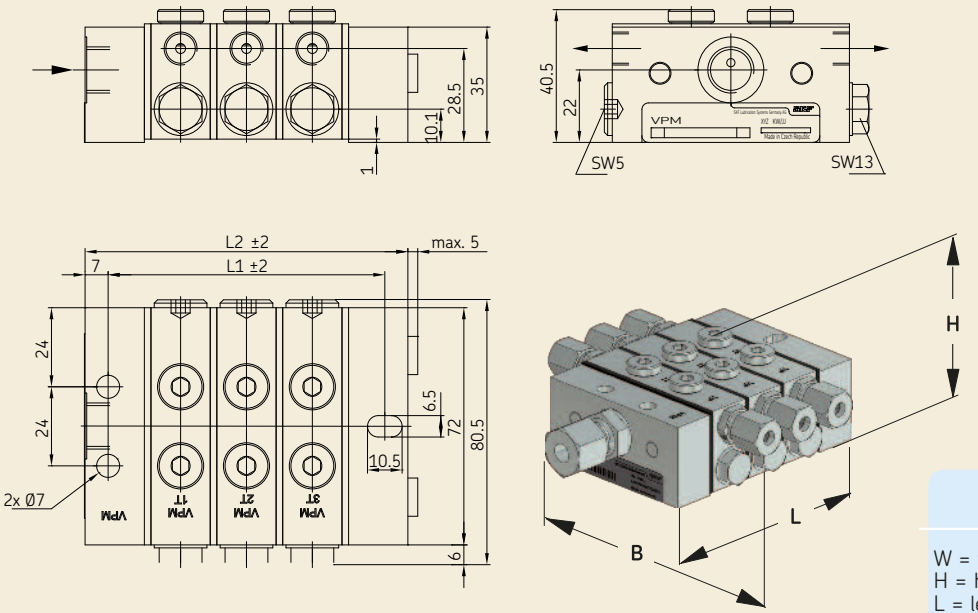
6.2.1 Minimum mounting dimensions

To ensure enough space for maintenance work and for any disassembly of the product, ensure that the minimum mounting dimensions listed below (Figs. 14 and 30) are maintained.

6.3 VP port dimensions, assembly holes, and minimum mounting dimensions

6.3.1 VP in basic design

VP progressive feeder in basic design, Fig. 15



Minimum mounting dimensions

W = width:	100 mm
H = height	45 mm
L = length	L2 +10 mm

VP thread connection/dimensions

Thread connection
Inlet: VPM = M14×1.5 Outlet: VPM = M10×1
VPG = G1/4" VPG = G1/8"

Type	Number of Feeder sections	Number of possible outlets	L1 [mm]	L2 [mm]
VPM-3 / VPG-3	3	6	84	98
VPM-4 / VPG-4	4	8	104	118
VPM-5 / VPG-5	5	10	124	138
VPM-6 / VPG-6	6	12	144	158
VPM-7 / VPG-7	7	14	164	178
VPM-8 / VPG-8	8	16	184	198
VPM-9 / VPG-9	9	18	204	218
VPM-10/VPG-10	10	20	224	238

VP accessories

Straight connectors

Designation		Order No.
Inlet	for tube ø 6	406-413
M14×1.5:	for tube ø 8	408-413
	for tube ø 10	410-403
Inlet	for tube ø 6	406-413W
G1/4":	for tube ø 8	408-403W
	for tube ø 10	410-403W
Outlets	for tube ø 4	404-403
M10×1:	for tube ø 6	406-403
	for tube ø 8	441-008-511
Outlets	for tube ø 4	404-403W
G1/8":	for tube ø 6	406-403W
	for tube ø 8	408-423W
VPM plug connector for tube ø 6, M		451-006-518-VS
VPM plug connector for tube ø 6, G		406-423W-VS

Screw plug for unused outlets

VPM (M10×1)	466-431-001
VPG (G1/8")	466-419-001

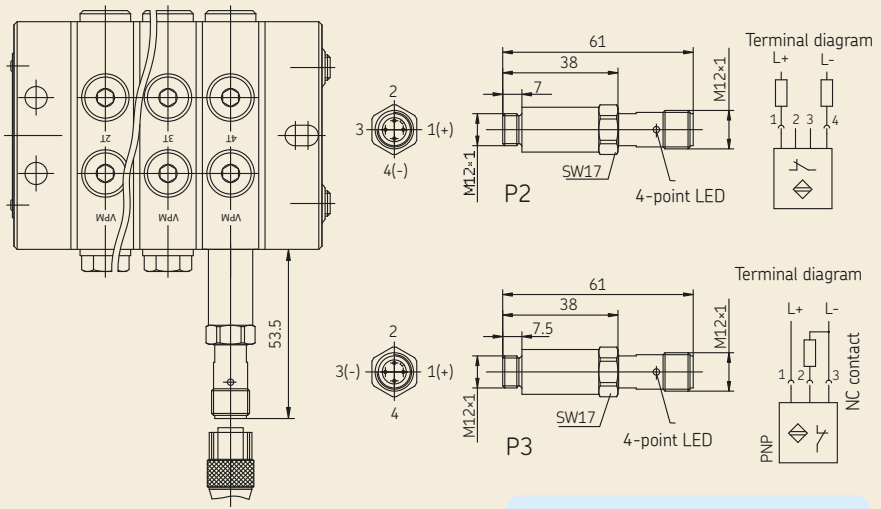
Outlet screw union with check valve

M10×1:	for tube ø 6	VPM-RV
	for tube ø 8	VPM-RV8
Outlets	for tube ø 6	VPG-RV6
G1/8":	for tube ø 8	VPG-RV8
Crossporting bars:		
Crossporting bars for two sections		VP-C

6.3.2 VP with piston detector for oil or grease

Monitoring types P2 and P3 (electric monitoring)

VP progressive feeder with piston detector, Fig. 16



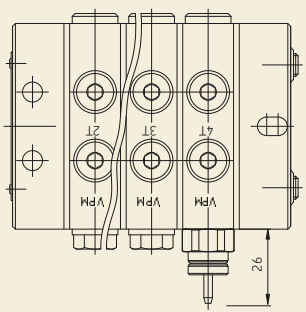
Note!
You can find additional technical data on the cable sockets in the brochure “Electrical Plug and Socket Connectors,” brochure No. 1-1730-EN.

Minimum mounting dimensions	
W = width:	160 mm
H = height	45 mm
L = length	L2+10 mm

6.3.3 VP progressive feeder with cycle switch

for oil or grease, monitoring type ZY

VP progressive feeder with cycle indicator, Observe technical data (Chapter 4), **Fig. 17**

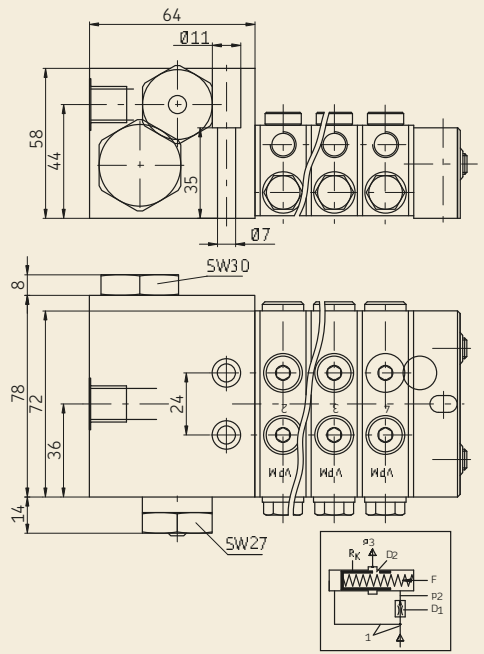


Minimum mounting dimensions	
W = width:	130 mm
H = height	45 mm
L = length	L2+10 mm

6.3.4 VP progressive feeder with flow limiter

for oil, attachment 07

VP progressive feeder with flow limiter, Fig. 18



p1	Pressure upstream of nozzle D1
p2	Pressure downstream of nozzle D1
D1	Nonadjustable restrictor (plug-in nozzle)
D2	Adjustable restrictor
RK	Control piston
F	Spring force
p3	Pressure downstream of D2 (outlet pressure)

Minimum mounting dimensions

W = width:	160 mm
H = height	65 mm
L = length	L2+80 mm

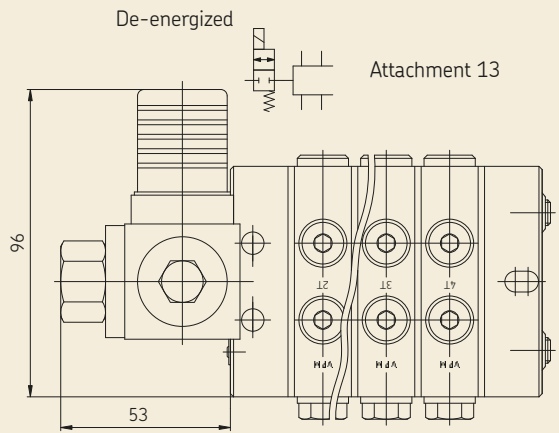
Functioning of the flow limiter

The flow limiter installed on the VP feeder has two restrictors installed in series (**D_1**, **D_2**). Restrictor **D_1** is an interchangeable plug-in nozzle which, as a nonadjustable restrictor, determines the rated volumetric flow. The nonadjustable restrictor **D_1** is available in different nozzle sizes (see table). Restrictor **D_2**, on the other hand, is adjustable and has a variable nozzle size depending on the position of control piston **RK**. Displacement of the control piston (**RK**) against the spring force (**F**) automatically changes the flow resistance of restrictor **D_2** in such a way that the differential pressure at nonadjustable restrictor **D_1** remains constant, as does the volumetric flow as a result.

6.3.5 VPG progressive feeder with 2/2 directional solenoid valve

for oil, attachment 13, 2/2 directional solenoid valve, de-energized, feeder relieved, only design VPG

VPG progressive feeder with 2/2 directional solenoid valve, Fig. 19

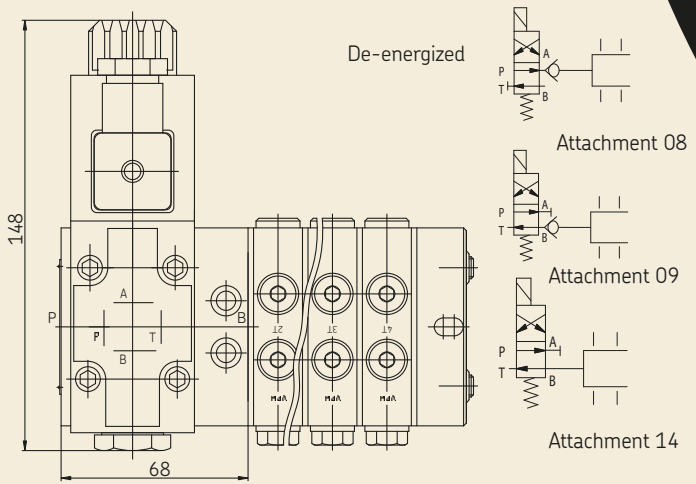


Minimum mounting dimensions	
W = width:	110 mm
H = height	135 mm
L = length	L2+80 mm

6.3.6 VP progressive feeder with 4/2 or 3/2 directional solenoid valve

for oil, attachments 08; 09; 14

VP progressive feeder with 4/2 and 3/2 directional solenoid valve, Fig



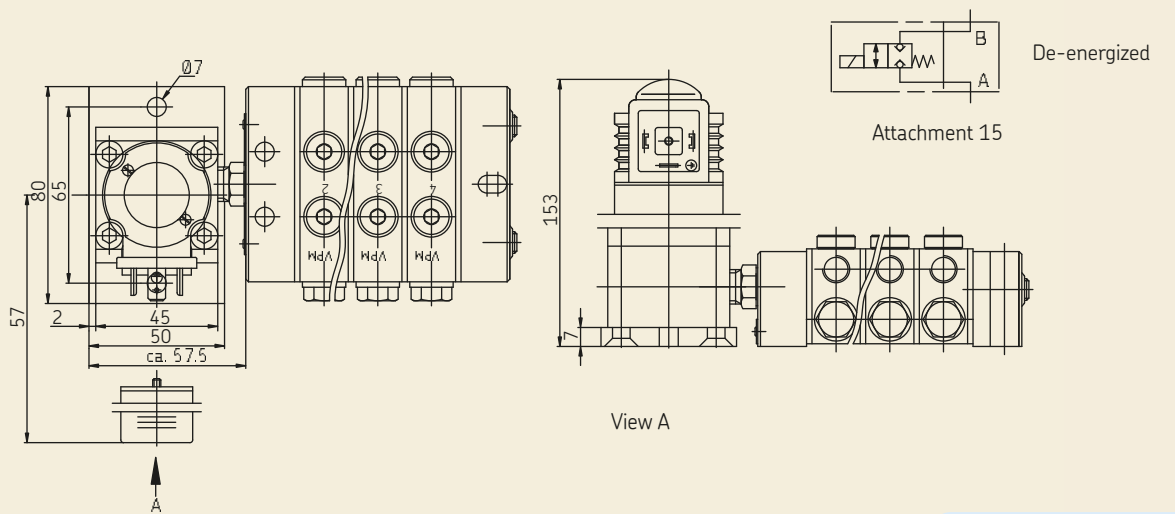
Note
For attachment 09 and attachment 14, the screw plug and the corresponding sealing ring must be ordered separately.

Minimum mounting dimensions	
W = width:	200 mm
H = height	185 mm
L = length	L2+90 mm

6.3.7 VP progressive feeder with 2/2 directional solenoid valve

for greases, attachment 15 with 2/2 directional solenoid valve, de-energized, continuity to feeder closed

VP progressive feeder with 2/2 directional solenoid valve, Fig. 21



Note!
You can find additional technical data on the cable sockets in the brochure "Electrical Plug and Socket Connectors," brochure No. 1-1730-EN.

Note!
Feeder and directional solenoid valve are supplied separately. Their assembly is performed by the customer.

Minimum mounting dimensions

W = width:	120 mm
H = height	170 mm
L = length	L2+60 mm

6.3.8 Assembly of the VP progressive feeder

-See Chapter 6.3.1, Figure 15

NOTE

In case of installation on moving machine parts or in case of strong vibrations (e.g. on pressing machines), self-locking screws or a locking adhesive should be used for installation of the feeder.

- Check the parallelism of the surface on which the component is to be installed. Stress-free installation of the component must be ensured.
- Check for any fouling on the threaded holes for feeder installation and on the surface on which the component is to be installed, and clean if needed.

The progressive feeder is installed using 3x M6 screws. If M6 threaded holes are used to fasten the unit, the screws must have a minimum length of 40 mm.

Fastening material to be provided by the customer:

o Hexagon head screws (3x) acc. to EN ISO 4017, M6x45-8.8

- Drill assembly holes (M6) acc. to assembly drawing (Fig. 14) and the conditions on the surface.
- Clean surface to remove drilling chips.
- Place the progressive feeder on the surface and roughly align it.
- Pass hexagon head screws (3x) acc. to EN ISO 4017, M6x45-8.8 through fixing holes on the progressive feeder and apply the screws to the M6 threads of the surface.
- Gently tighten hexagon head screws (3x).
- Align the progressive feeder and tighten the hexagon socket head cap screws diagonally with a torque of 9 Nm
- If necessary: Apply outlet screw unions or SKF plug connectors to the threads of the outlet bores and tighten with a torque of 25 Nm.

6.3.9 Changing VP feeder sections

-see Figure 22

NOTE

Absolute cleanliness is required when changing one or more feeder sections!
The feeder must be cleaned thoroughly prior to the retrofitting procedure, and the workspace must be free of contaminants and dust.
The feeder has already been disassembled, inlet and outlet screw unions and mounting screws must already be removed.

Separator plates are located between the feeder sections. They connect the mating boreholes within the sections while also sealing the system against outside influences. Different plates belong to the inlet, feeder, and end section.

- Clean any contamination from feeder, place on a clean installation surface or clamp into a vice in a stress-free position.
- Loosen and remove both self-locking nuts (**1**) from the tie-rods (**2**).

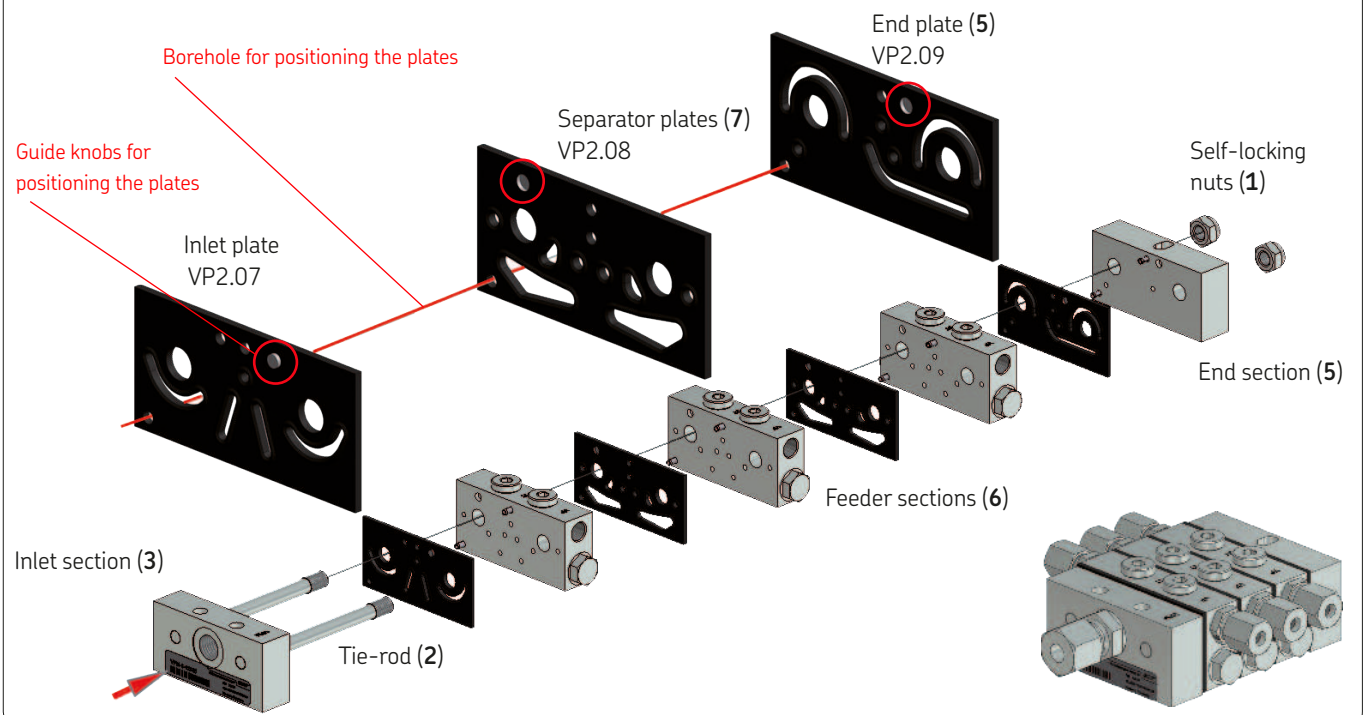
☞ If the tie-rod (**2**) comes out too when unscrewing the self-locking nuts (**1**), first remove the self-locking nut from the tie-rod. The tie-rod's thread must not be damaged in the process. In place of the self-locking nut, install two nuts and position them against each other. Apply locking adhesive at the other end of the tie-rod and then use the locknuts to screw the tie-rid into the inlet section (**3**) with a torque of 2.5 Nm. Then remove the locknuts.

- Carefully loosen the end section (**4**) with end plate (**5**) from the feeder sections (**6**) and
- separator plates (**7**) and remove them from the tie-rods (**2**).

☞ While performing the following installation of the new feeder sections (**6**) and separator plates (**7**), be sure that they are mounted in the correct position - see Fig. 22, assembly knobs.

- Carefully insert new feeder sections (**6**) with new separator plates (**7**) into the tie-rods.
- Carefully insert the end plate (**5**) with end section (**4**) into the tie-rods and align the inlet section, metering sections, separator plate, and end plate as well as the end section to one another.
- Apply self-locking nuts (**1**) to tie-rods (**2**) and tighten alternatingly up to a torque of 12 Nm each.
- Reinstall the feeder and check that it is properly sealed.

Assembly of a three-port VP progressive feeder, Fig. 22



6.3.10 Connecting outlets on the VPM

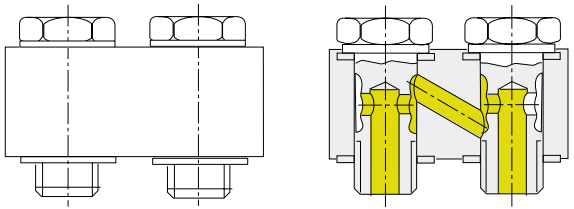
In the VPM series, the feeder sections have two outlets on each side, one on the side and one on the top, however only one may be used. The second outlet must always be kept closed.
Outlets can only be subsequently consolidated by using a VP-C crossporting bar that is screwed in the upper alternative outlets. Any odd number of outlets can be achieved with the help of single sections without additional crossporting bars.

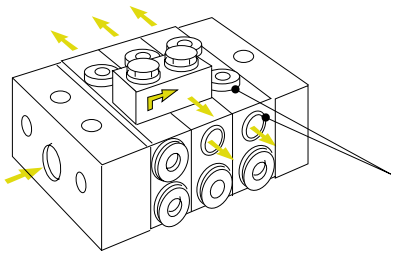
NOTE

Use only one outlet, either outlet top or side.
Crossporting is possible in both directions.

Attachment of a VPM crossporting bar, Fig. 23

Crossporting bars, design complete with banjo bolt and sealing rings.
Order No. VP-C





6.3.11 Modification of a piston detector (P2 or P3)

WARNING

System pressure
Pressure must not be applied to the feeder section during the retrofitting described below. Depressurize the progressive feeder.

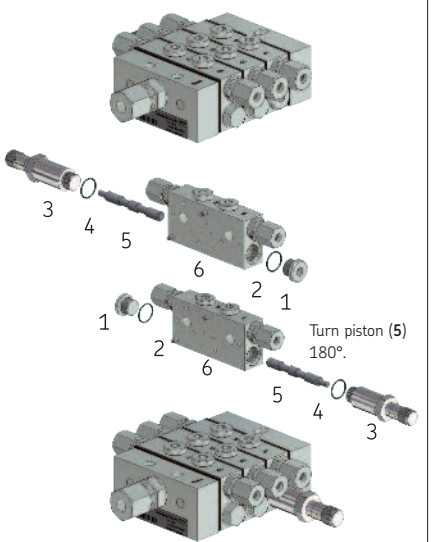
Retrofitting of the piston detector from a right-sided attachment to left-sided attachment is described below. The steps are identical for reverse retrofitting from left to right.

- Loosen screw plug (**1**) (left) and remove with O-Ring (**2**) (hexagon socket screw key WAF 5).
- Loosen piston detector (**3**) (right) (WAF 14) and remove with O-ring (**4**).
- Carefully push piston (**5**) out of the left side of the feeder section (**6**) using an arbor (Ø 6 mm).

☞ During subsequent insertion of the piston (**5**), ensure that it does not bend and that its O-ring is not sheared off.

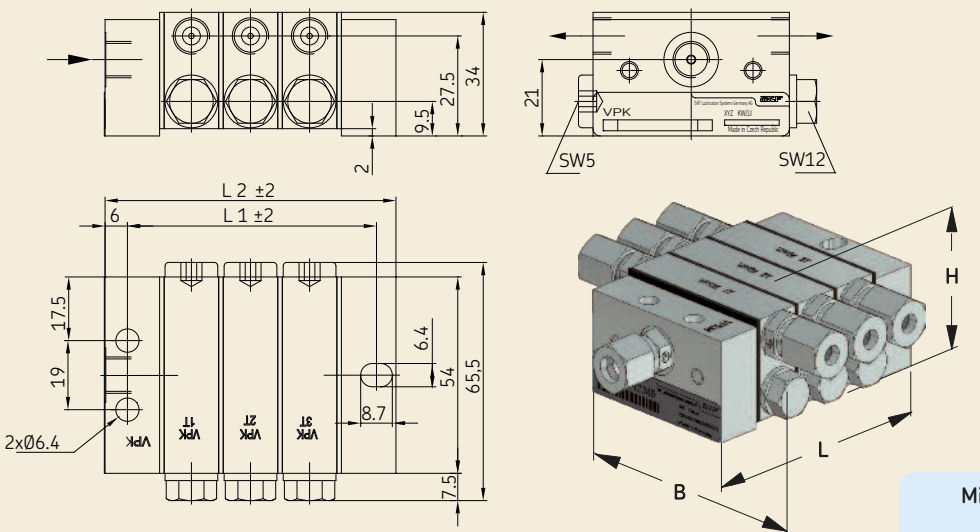
- Turn piston (**5**) 180° and carefully insert into the right side of the feeder section (**6**).
- Install the screw plug (**1**) with O-ring (**2**) on the right side.
- Install the piston detector (3) with O-ring (4) finger-tight on the left side (approx. 9-12 Nm).

Modification of piston detector, Fig. 24



6.4 VPK in basic design

VPK progressive feeder in basic design, Fig. 25



Minimum mounting dimensions

W = width:	80 mm
H = height	40 mm
L = length	L2+10 mm

VPK dimensions

Type	Number of feeder sections	Number of possible outlets	L1 [mm]	L2 [mm]
VPKM-3 / VPKG-3 [1]	3	6	68.4	79.9
VPKM-4 / VPKG-4	4	8	84.6	96.1
VPKM-5 / VPKG-5	5	10	100.8,	112.3
VPKM-6 / VPKG-6	6	12	117.0	128.5
VPKM-7 / VPKG-7	7	14	133.2	144.7
VPKM-8 / VPKG-8	8	16	149.4	160.9
VPKM-9 / VPKG-9	9	18	165.6	177.1
VPKM-10/VPKG-10	10	20	181.8	193.3

1) This progressive feeder must be installed with check valves

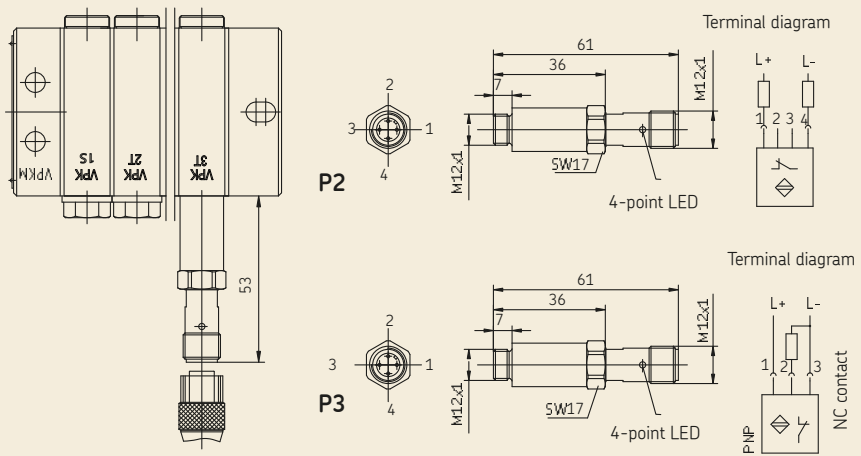
VPK accessories

Straight connectors Designation		Order No.
Inlet	for tube ø 6,	**406-423**
M10x1:	for tube ø 8,	**441-008-511**
	for tube ø 10,	**410-443**
Inlet	for tube ø 6,	**406-403W**
G1/8":	for tube ø 8,	**408-423W**
	for tube ø 10,	**410-443W**
Outlets	for tube ø 4,	**404-403**
M10x1:	for tube ø 6,	**406-403**
	for tube ø 8,	**441-008-511**
Outlets	for tube ø 4,	**404-403W**
G1/8":	for tube ø 6,	**406-403W**
	for tube ø 8,	**408-403W**
	VPM plug connector for tube ø 6, M	**451-006-518-VS**
	VPM plug connector for tube ø 6, G	**406-423W-VS**
Screw plug for unused outlets:		
	VPKM (M10x1)	**466-431-001**
	VPKG (G1/8")	**466-419-001**

6.4.1 VPK with piston detector for oil or grease

Monitoring types P2 and P3 (electric monitoring)

VPK progressive feeder with piston detector, Fig. 26



Note!
You can find additional technical data on the cable sockets in the brochure “Electrical Plug and Socket Connectors,” brochure No. 1-1730-EN.

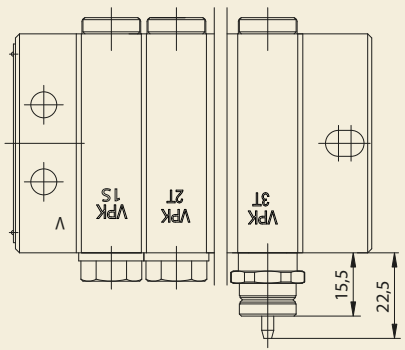
Minimum mounting dimensions

W = width:	140 mm
H = height	40 mm
L = length	L2+10 mm

6.4.2 VPK progressive feeder with cycle switch

for oil or grease, monitoring type ZY

VPK progressive feeder with cycle indicator, Fig. 27



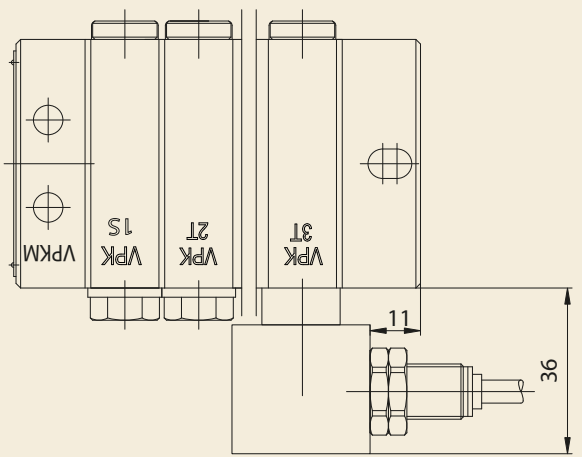
Minimum mounting dimensions

W = width:	110 mm
H = height	40 mm
L = length	L2+10 mm

6.4.3 VPK progressive feeder with proximity switch

for oil or grease, monitoring type ZS (electric monitoring)

VPK progressive feeder with proximity switch, Fig. 28



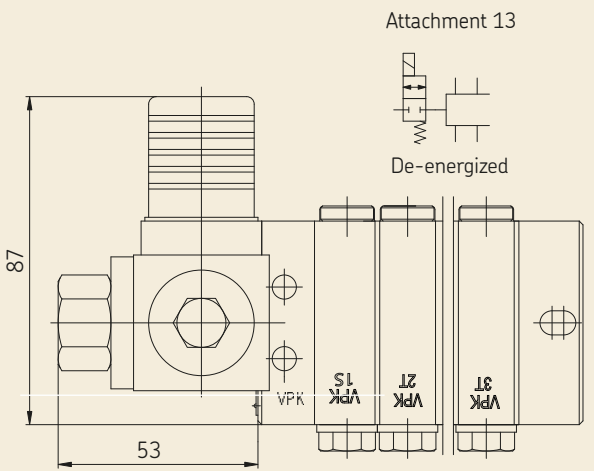
Minimum mounting dimensions

W = width:	120 mm
H = height	40 mm
L = length	L2+50 mm

6.4.4 VPKG progressive feeder with 2/2 directional solenoid valve

for oil, attachment 13, 2/2 directional solenoid valve, de-energized, feeder relieved, only design VPKG

VPKG progressive feeder with 2/2 directional solenoid valve, Fig. 29



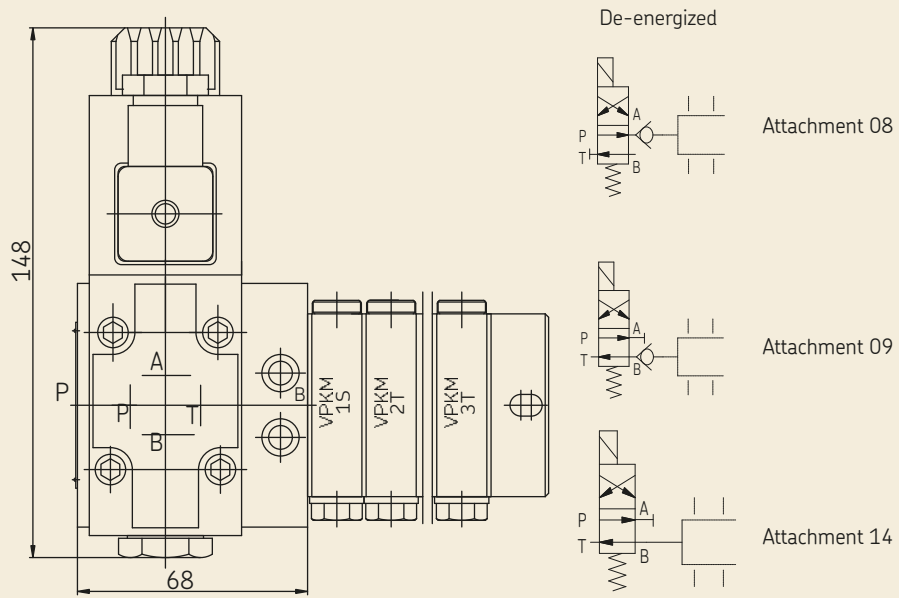
Minimum mounting dimensions

W = width:	100 mm
H = height	130 mm
L = length	L2+70 mm

6.4.5 VPK progressive feeder with 4/2 or 3/2 directional solenoid valve

for oil, attachments 08; 09; 14

VPK progressive feeder with 4/2 and 3/2 directional solenoid valve, Fig. 30



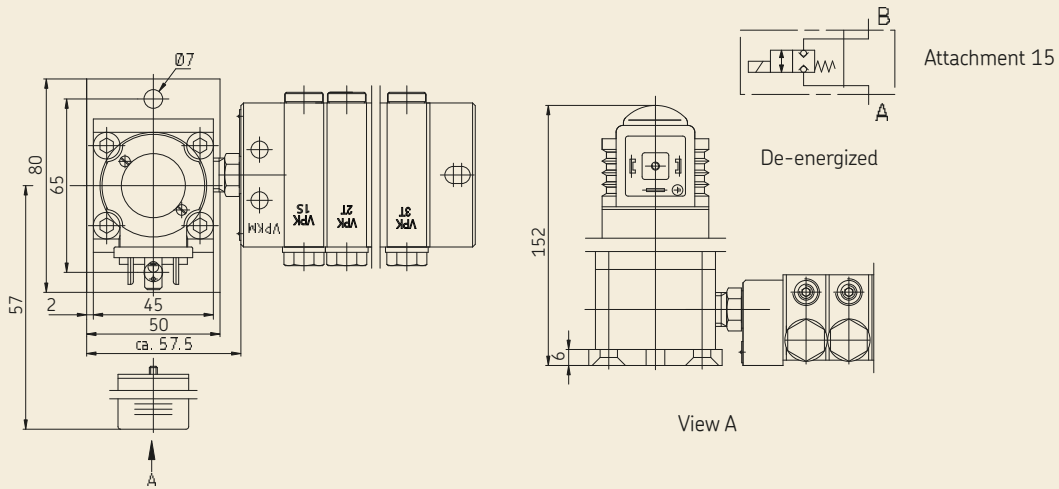
Note
For attachment 09 and attachment 14, the screw plug and the corresponding sealing ring must be ordered separately.

Minimum mounting dimensions	
W = width:	170 mm
H = height	185 mm
L = length	L2+80 mm

6.4.6 VPK progressive feeder with 2/2 directional solenoid valve

for greases, attachment 15 with 2/2 directional solenoid valve, de-energized, continuity to feeder closed

VPK progressive feeder with 2/2 directional solenoid valve,



Note!
You can find additional technical data on the cable sockets in the brochure "Electrical Plug and Socket Connectors," brochure No. 1-1730-EN.

Note!
Feeder and directional solenoid valve are supplied separately. Their assembly is performed by the customer.

Minimum mounting dimensions	
W = width:	100 mm
H = height	160 mm
L = length	L2+60 mm

6.4.7 Assembly of the VPK progressive feeder

NOTE

In case of installation on moving machine parts or in case of strong vibrations (e.g., on pressing machines), self-locking screws or a locking adhesive should be used for installation of the feeder.

- Check the parallelism of the surface on which the component is to be installed. Stress-free installation of the component must be ensured.
- Check for any fouling on the threaded holes for feeder installation and on the surface on which the component is to be installed, and clean if needed.

The progressive feeder is installed using 3x M6 screws. If M6 threaded holes are used to fasten the unit, the screws must have a minimum length of 40 mm.

Fastening material to be provided by the customer:

o Hexagon head screws (3x) acc. to EN ISO 4017, M6x45-8.8

- Drill assembly holes (M6) acc. to assembly drawing (Fig. 23) and the conditions on the surface.
- Clean surface to remove drilling chips.
- Place the progressive feeder on the surface and roughly align it.
- Pass hexagon head screws (3x) acc. to EN ISO 4017, M6x45-8.8 through fixing holes on the progressive feeder and apply the screws to the M6 threads of the surface.
- Gently tighten hexagon head screws (3x).
- Align the progressive feeder and tighten the hexagon socket head cap screws diagonally with a torque of 9 Nm
- If necessary: Apply outlet screw unions or SKF plug connectors to the threads of the outlet bores and tighten with a torque of 25 Nm.

6.4.8 Changing VPK feeder sections

-see Figure 32

NOTE

Absolute cleanliness is required when changing one or more feeder sections!

The feeder must be cleaned thoroughly prior to the retrofitting procedure, and the workspace must be free of contaminants and dust.
The feeder has already been disassembled, inlet and outlet screw unions and mounting screws must already be removed.

Separator plates are located between the feeder sections. They connect the mating boreholes within the sections while also sealing the system against outside influences. Different plates belong to the inlet, feeder, and end section.

- Clean any contamination from feeder, place on a clean installation surface or clamp into a vice in a stress-free position.
- Loosen and remove both self-locking nuts (**1**) from the tie-rods (**2**).

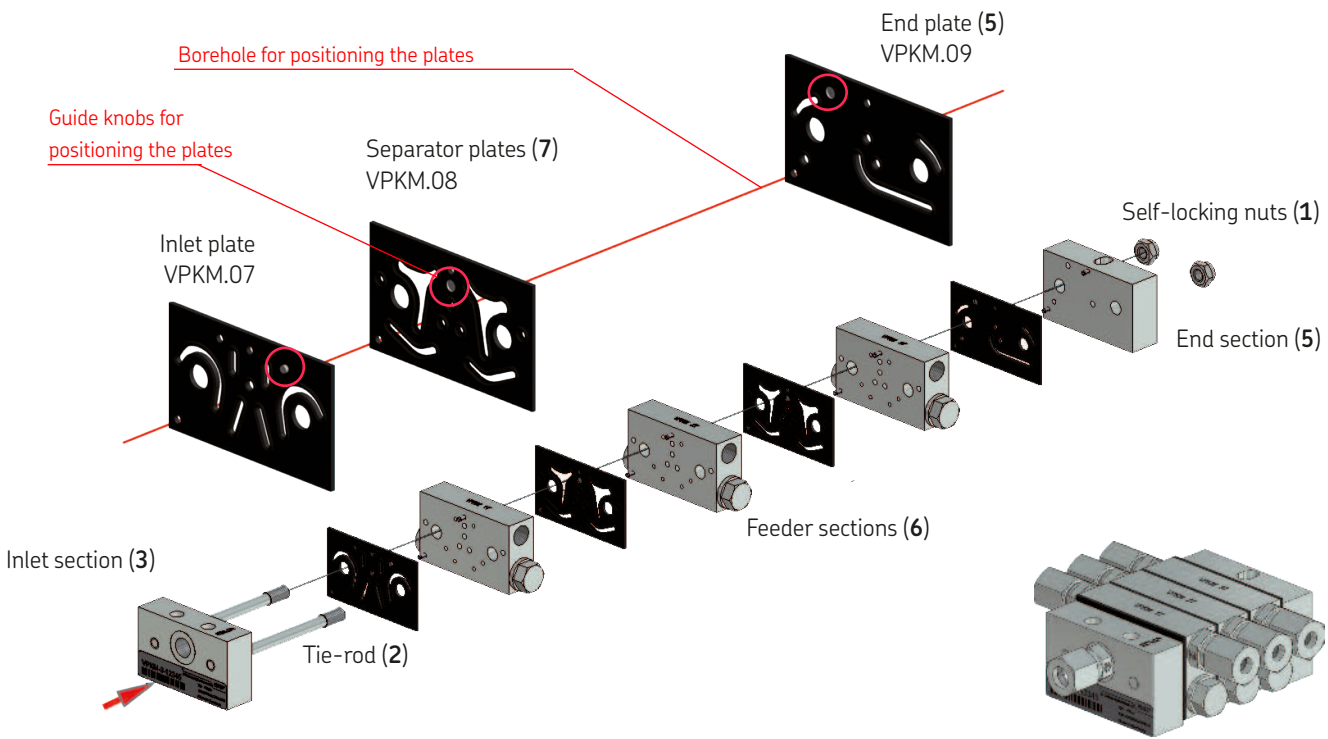
☞ If the tie-rod (**2**) comes out too when unscrewing the self-locking nuts (**1**), first remove the self-locking nut from the tie-rod. The tie-rod's thread must not be damaged in the process. In place of the self-locking nut, install two nuts and position them against each other. Apply locking adhesive at the other end of the tie-rod and then use the locknuts to screw the tie-rid into the inlet section (**3**) with a torque of 2.5 Nm. Then remove the locknuts.

- Carefully loosen the end section (**4**) with end plate (**5**) from the feeder sections (**6**) and separator plates (**7**) and remove them from the tie-rods (**2**).

☞ While performing the following installation of the new feeder sections (**6**) and separator plates (**7**), be sure that they are mounted in the correct position - see Fig. 21, assembly knobs.

- Carefully insert new feeder sections (**6**) with new separator plates (**7**) into the tie-rods.
- Carefully insert the end plate (**5**) with end section (**4**) into the tie-rods and align the inlet section, metering sections, separator plate, and end plate as well as the end section to one another.
- Apply self-locking nuts (***1***) to tie-rods (***2***) and tighten alternatingly up to a torque of 12 Nm each.
- Reinstall the feeder and check that it is properly sealed.

Assembly of a three-port VPK progressive feeder, Fig. 32



6.4.9. Consolidation of multiple outlets (crossporting)

Twin sections of a feeder have a plug for crossporting.
The volumetric flow of an outlet can be consolidated with other outlets as desired by removing the corresponding plug.
This way, two or more outlets of an entire feeder side can be combined as long as there is no single section in-between. The single section completes the group formation; a new group can only be formed behind the single section. Should it later be necessary to separate the quantity of two neighboring outlets, for example due to an additional lubrication point, then this can be done without difficulty. The plug VPKM. U4 merely needs to be screwed back in and the previously closed outlet connected to the lubrication point.

Crossportings are typically necessary when:

- If individual sections on progressive feeders of series VPKM need to be replaced with sections with different metering;
- A feeder is to be supplemented with additional sections;
- A feeder is to be cleaned/repaired, then they must be disassembled and later consolidated again.

When increasing/reducing the number of sections, the two tie-rods (stud bolts) that hold the sections and plates together must always be replaced.

NOTE

Two neighboring outlets are consolidated from the end section towards the inlet section.

NOTE

The feeder section behind the inlet section must not be closed.
Always ensure that plug 917-006-101 has been removed before screwing in screw plug 466-431-001; otherwise, the feeder may jam.

NOTE

Outlets of a progressive feeder that are not needed must not be closed because this will cause the feeder to block.
Consolidate unneeded outlets as described with a neighboring outlet or connect them to the pump via the return line. Changing the number of sections and/or metering rate of individual sections while retaining the same quantity of grease supply changes all lubrication quantities of the outlets.

With crossporting, two or more outlets of an entire feeder side can be combined as long as there is no single section in-between. The single section completes the group formation; a new group formation can only be carried out behind the single section. Two neighboring outlets are consolidated from the end section towards the inlet section.

Procedure:

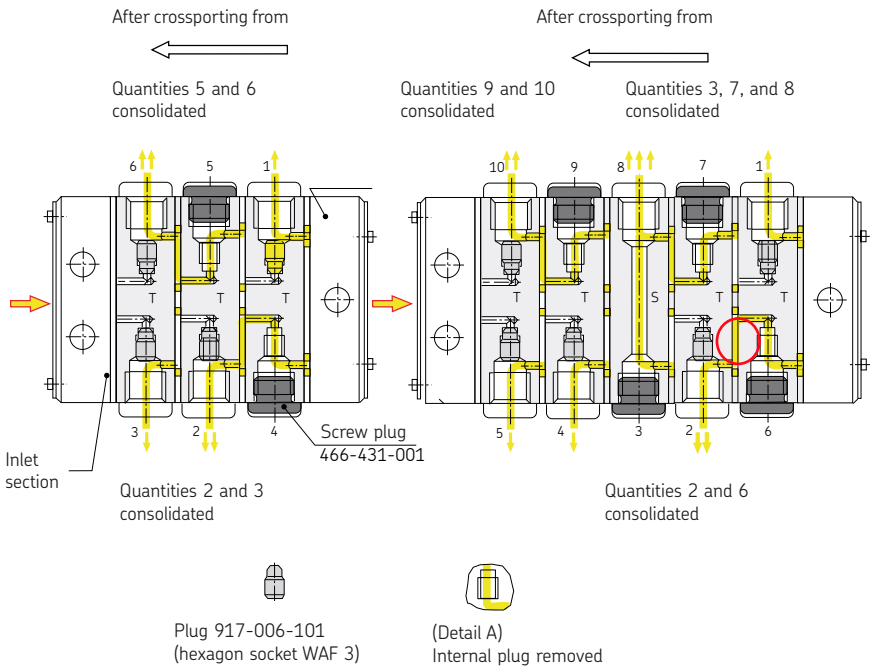
- Unscrew the appropriate plug
- 917-006-101 using a hexagon socket screw key (WAF 4).
- Close the outlet borehole with a screw plug.

☞ The quantity from both outlets will then flow out of the outlet neighboring the inlet section.

NOTE

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

Examples of crossporting, Fig. 33



6.4.10 Modification of a piston detector (P3)

WARNING

System pressure
Pressure must not be applied to the feeder section during the retrofitting described below. Depressurize the progressive feeder.

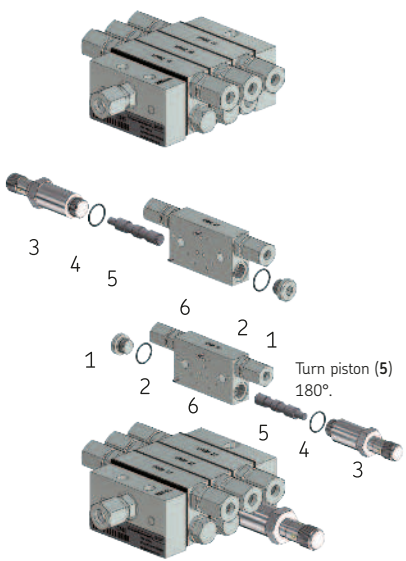
Retrofitting of the piston detector from a right-sided attachment to left-sided attachment is described below. The steps are identical for reverse retrofitting from left to right.

- Loosen screw plug (**1**) (left) and remove with O-Ring (**2**) (hexagon socket screw key WAF 5).
- Loosen piston detector (**3**) (right) (WAF 14) and remove with O-ring (**4**).
- Carefully push piston (**5**) out of the left side of the feeder section (**6**) using an arbor (Ø 6 mm).

☞ During subsequent insertion of the piston (**5**), ensure that it does not bend and that its O-ring is not sheared off.

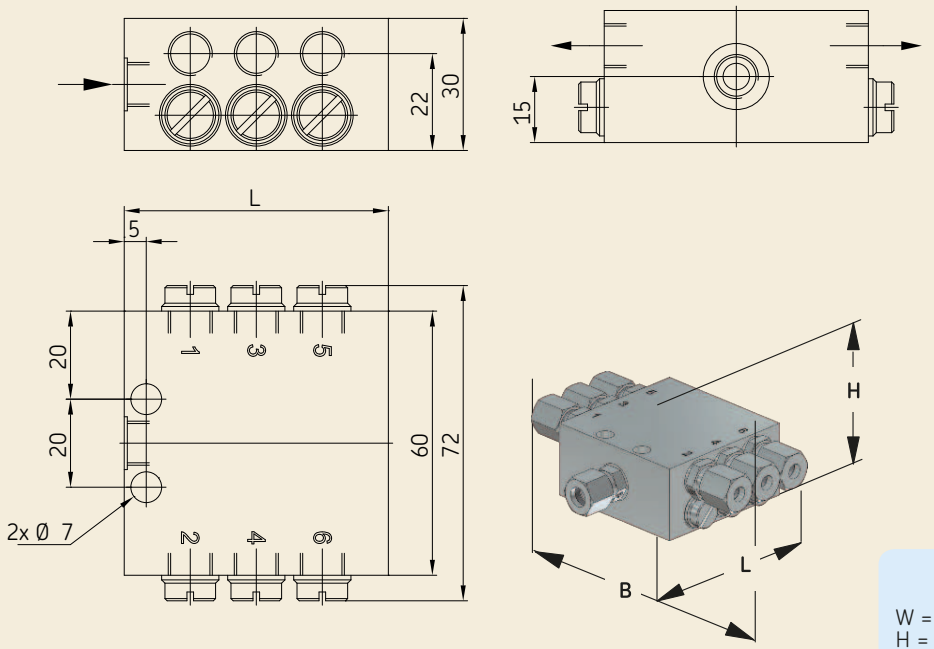
- Turn piston (**5**) 180° and carefully insert into the right side of the feeder section (**6**).
- Install the screw plug (**1**) with O-ring (**2**) on the right side.
- Install the piston detector (**3**) with O-ring (**4**) finger-tight on the left side (approx. 9-12 Nm).

Modification of piston detector, Fig. 34



6.5 VPB in basic design

VPB progressive feeder in basic design, Fig. 35



Minimum mounting dimensions

W = width:	80 mm
H = height	35 mm
L = length	L+10 mm

VPB dimensions

Type	Number of distributor pistons	Number of possible outlets	L [mm]
VPBM-3 [1]) / VPBG-3 [1])	3	6	60
VPBM-4 / VPBG-4	4	8	75
VPBM-5 / VPBG-5	5	10	90
VPBM-6 / VPBG-6	6	12	105
VPBM-7 / VPBG-7	7	14	120
VPBM-8 / VPBG-8	8	16	135
VPBM-9 / VPBG-9	9	18	150
VPBM-10/VPBG-10	10	20	165

1) This progressive feeder must be installed with check valves

VPB accessories

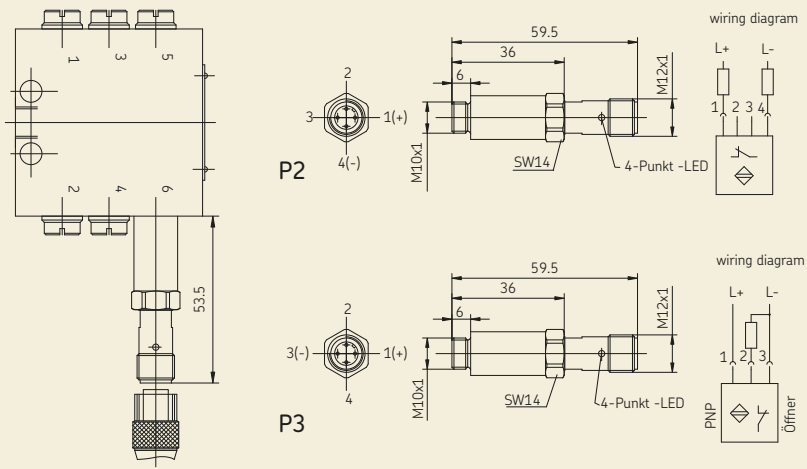
Straight connectors

Designation		Order No.
Inlet M10x1:	for tube ø 6	406-423
	for tube ø 8	441-008-511
	for tube ø 10	410-443
Inlet G 1/8:	for tube ø 6	406-403W
	for tube ø 8	408-423W
	for tube ø 10	410-443W
Outlets M10x1:	for tube ø 4	404-403
	for tube ø 6	406-403
	for tube ø 8	441-008-511
Outlets G 1/8:	for tube ø 4	404-403W
	for tube ø 6	406-403W
	for tube ø 8	408-403W
	VPM plug connector for tube ø 6, M	451-006-518 VS
	VPM plug connector for tube ø 6, G	451-006-518W VS
Screw plug for unused outlets:		
	VPKM	466-431-001
	VPKG	466-419-001

6.5.1 VPB with piston detector for oil or grease

Monitoring types P2 and P3 (electric monitoring)

VPB progressive feeder with piston detector, Fig. 36



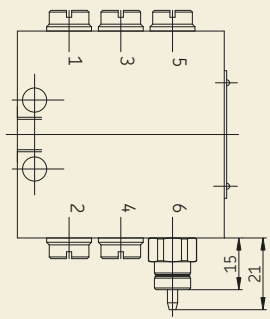
Note!
You can find additional technical data on the cable sockets in the brochure "Electrical Plug and Socket Connectors," brochure No. 1-1730-EN.

Minimum mounting dimensions	
W = width:	140 mm
H = height	35 mm
L = length	L+10 mm

6.5.2 VPB progressive feeder with cycle switch

for oil or grease, monitoring type ZY

VPB progressive feeder with cycle indicator, Fig. 37

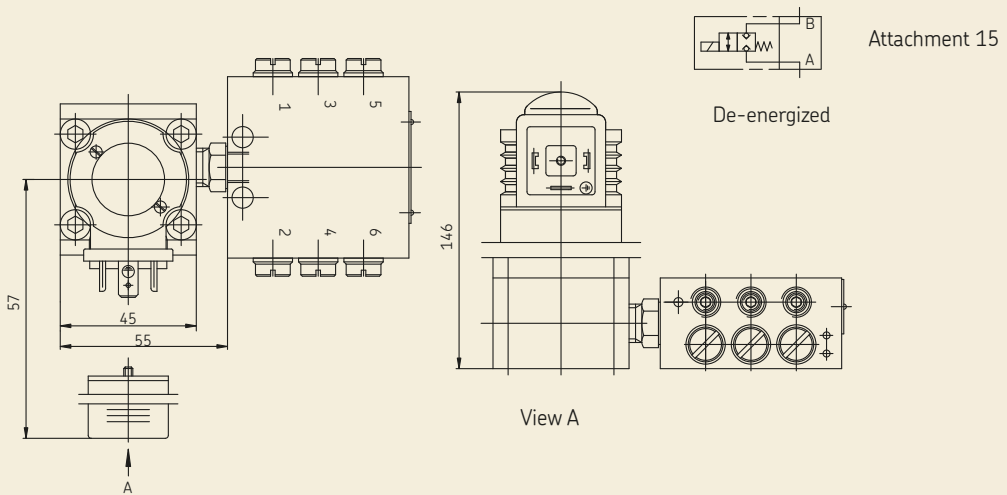


Minimum mounting dimensions	
W = width:	110 mm
H = height	35 mm
L = length	L+10 mm

6.5.3 VPB progressive feeder with 2/2 directional solenoid valve

for greases, attachment 15 with 2/2 directional solenoid valve, de-energized, continuity to feeder closed

VPB progressive feeder with 2/2 directional solenoid valve, Fig. 38



Note!
You can find additional technical data on the cable sockets in the brochure “Electrical Plug and Socket Connectors,” brochure No. 1-1730-EN.

Note!
Feeder and directional solenoid valve are supplied separately. Their assembly is performed by the customer.

Minimum mounting dimensions	
W = width:	100 mm
H = height	155 mm
L = length	L+10 mm

6.5.4 Assembly of the VPB progressive feeder

-See Chapter 6.5.1, Figure 34

NOTE

In case of installation on moving machine parts or in case of strong vibrations (e.g., on pressing machines), self-locking screws or a locking adhesive should be used for installation of the feeder.

- Check the parallelism of the surface on which the component is to be installed. Stress-free installation of the component must be ensured.
- Check for any fouling on the threaded holes for feeder installation and on the surface on which the component is to be installed, and clean if needed.

The progressive feeder is installed using 3x M6 screws. If M6 threaded holes are used to fasten the unit, the screws must have a minimum length of 40 mm.

Fastening material to be provided by the customer:

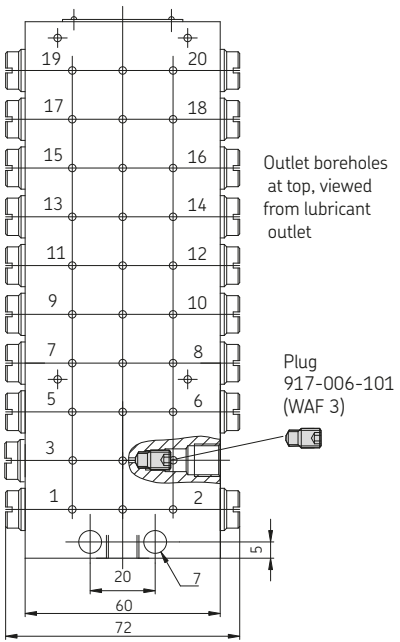
o Hexagon head screws (3x) acc. to EN ISO 4017, M6x40-8.8

- Drill assembly holes (M6) acc. to assembly drawing (Fig. 23) and the conditions on the surface.
- Clean surface to remove drilling chips.
- Place the progressive feeder on the surface and roughly align it.
- Pass hexagon head screws (3x) acc. to EN ISO 4017, M6x40-8.8 through fixing holes on the progressive feeder and apply the screws to the M6 threads of the surface.
- Gently tighten hexagon head screws (3x).
- Align the progressive feeder and tighten the hexagon socket head cap screws diagonally with a torque of 9 Nm
- If necessary: Apply outlet screw unions or SKF plug connectors to the threads of the outlet bores and tighten with a torque of 25 Nm.

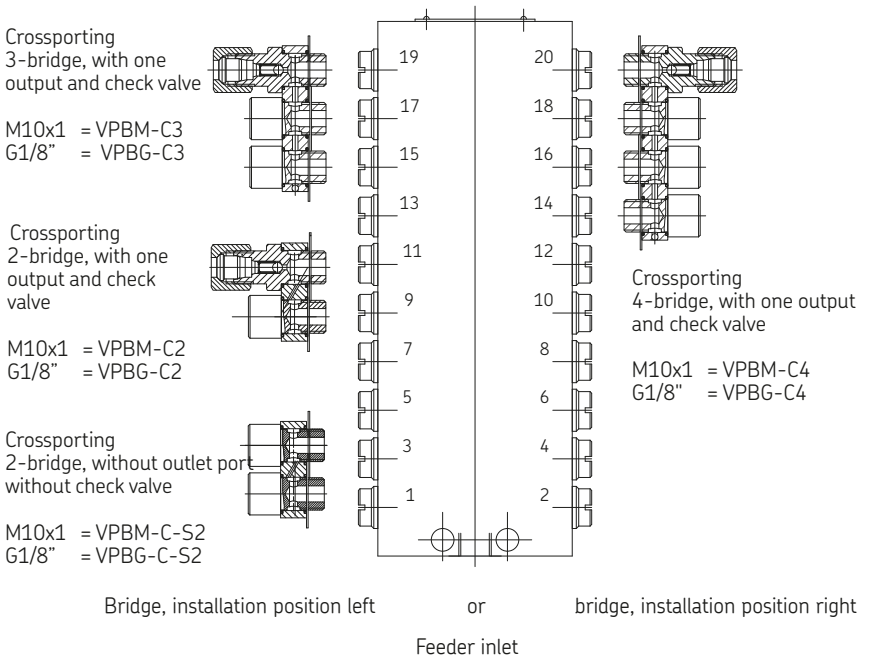
6.5.5 Consolidation of multiple outlets (crossporting)

It is possible to subsequently connect two opposite outlets internally by removing a plug from the right outlet borehole and closing one of the two outlets.

VPB consolidation of opposite outlets, Fig. 39

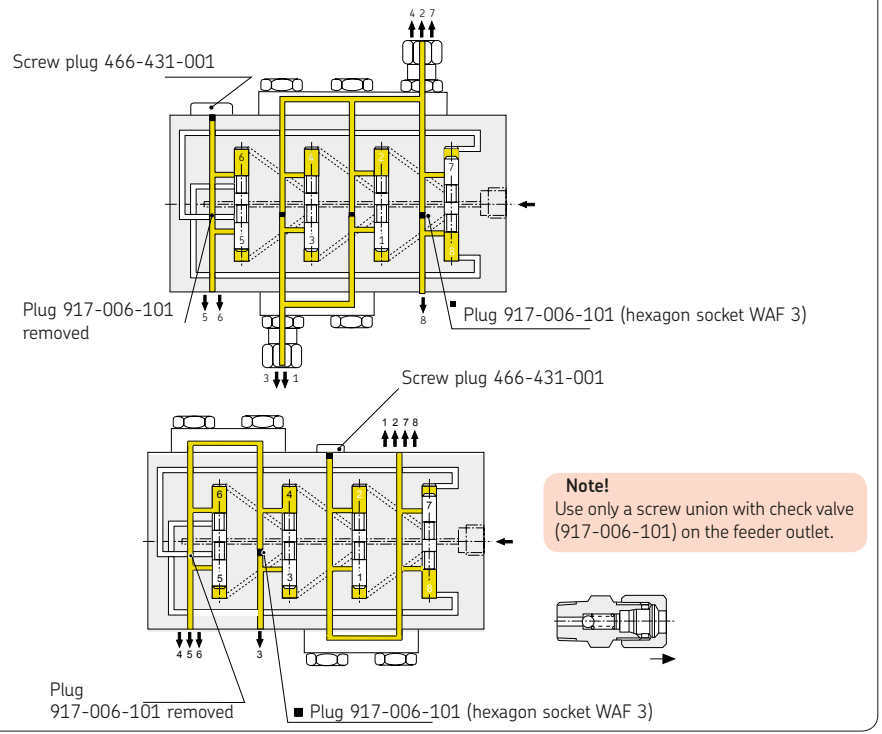


VPB bridge designs (crossporting), fig. 40



6.6 Lubrication line connection

VPB functional diagram of bridge designs (crossporting), Fig. 41



NOTE

Outlets of a progressive feeder that are not needed must not be closed because this will cause the feeder to block.
Unneeded outlets must be consolidated with a neighboring outlet or connected to the pump via the return line.

The lubrication line must be connected to the progressive feeder in such a way that no forces can be transferred to it once assembled (stress-free connection).
For higher operating pressures up to 250 bar, SKF cutting-sleeve screw unions conforming to DIN 2353 can be used. If using fittings from other manufacturers, pay careful attention to the assembly instructions and technical specifications provided by the manufacturer.

CAUTION

Slipping hazard

Beware of any lubricant leaking out during assembly, operation, maintenance, or repair of centralized lubrication systems. Leaks must be sealed off without delay.

6.7 Assembly of the lubrication lines using plug connectors

☞ see Figure 41 and Fig. 42

WARNING

System pressure

Lubrication systems are pressurized during operation. Centralized lubrication systems must therefore be depressurized before starting assembly, maintenance, or repair work, or any system modifications or system repairs.

The SKF plug connectors are available in designs for metal or plastic tubes. With the design for metal tubes, there is a further choice available between tube versions with and without claw groove. The claw groove securely fastens the tube in the plug connectors, which prevents the metal tube from slipping out of the SKF plug connector. Both designs, for metal and plastic tubes, have a locking claw. The locking claw of the collet secures the tube in the SKF plug connector, which prevents the tube from accidentally slipping out, at least in the case of the design for plastic tubes.

- Cut the connecting tube (**1**) to the correct length with a tube cutter (see Accessories).

☞ In the following installation of the tube, a noticeable resistance must be overcome when passing through the first O-ring (**2**), the locking claw (**5**) of the collet (**4**). If a

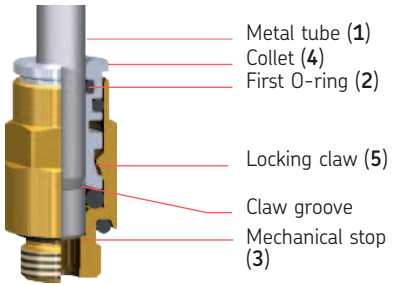
claw groove is not used, fix the tube using appropriate
fastening material (e.g., mounting clips) to prevent the tube from slipping out of the SKF plug connector.

- Manually insert the tube (**1**) fully into the collet (**4**) of the SKF plug connector until it clears the first O-ring (**2**) and the locking claw (**5**) of the collet (**4**) and reaches the mechanical stop (**3**).

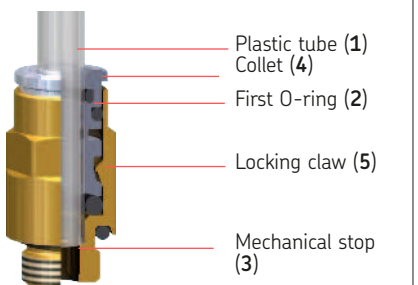
☞ To remove the metal tube (**1**), press the collet (**4**) inward into the SKF plug connector. The metal tube (**1**) can now be pulled out of the collet (**4**) of the SKF plug connector.
To remove the plastic tube (**1**), press the collet (**4**) inward into the SKF plug connector. To do this, also press the plastic tube (**1**) inward into the SKF plug connector fitting, which releases the collet (**4**) from the plastic tube (**1**). The plastic tube (**1**) can now be pulled out of the collet (**4**) of the SKF plug connector.

Before reassembling, shorten the end of the plastic tube by at least 7 mm to ensure that the locking claw (**5**) of the collet (**4**) functions properly.

Plug connector for metal tube, Fig. 42



Plug connector for plastic tube, Fig. 43



6.9 Lubrication line arrangement

When arranging the main lubricant lines and lubrication point lines, observe the following instructions in order to ensure that the entire centralized lubrication system functions smoothly.

The main lubricant line must be dimensioned in accordance with the maximum operating pressure occurring in the pump unit used and the displacement of that pump unit. If possible, the main lubricant line should rise upward from the pump unit and be ventable at the highest point on the lubrication line system.

Lubricant distributors at the end of the main lubricant line must be installed such that the outlets of the lubricant distributors point upwards. If the system configuration requires that the lubricant distributors be arranged below the main lubricant line, they should not be placed at the end of the main lubricant line.

The tubes, hoses, shutoff valves, directional control valves, fittings, etc. that will be used must be designed for the maximum operating pressure of the pump unit, the permissible temperatures, and the lubricants that will be delivered. The lubrication line system also needs to be protected from excessive pressure by means of a pressure-limiting valve.

All components of the lubrication line system such as tubes, hoses, shutoff valves, directional control valves, fittings, etc. must be carefully cleaned before assembly. No seals in the lubrication line system should protrude inwards in a way that disrupts the flow of the lubricant and could allow contaminants to enter the lubrication line system.

Lubrication lines should always be arranged so that air pockets cannot form anywhere. Avoid changes in the cross-section of the lubrication line from small to large cross-sections in the direction of flow of the lubricant. When the cross-section does change, the transition should be gentle.

The flow of lubricant in the lubrication lines should not be impeded by the incorporation of sharp bends, angle valves, or flap valves. Unavoidable changes in the cross-section in lubrication lines must have smooth transitions. Sudden changes of direction should be avoided if possible.

Note!
For further requirements for installation, see DIN 20066.

7. Commissioning

NOTE

Observe the instructions from the machine manufacturer regarding the lubricants that are to be used.

NOTE

Only fill using clean lubricant and an appropriate device. Contaminated lubricants lead to system malfunctions. The lubricant reservoir of the pump unit must be filled without introducing bubbles.

7.1 General information

The products described here function automatically. The progressive feeder(s) and the lubricant transport in the lubrication lines should, however, be subjected to regular visual inspection.

7.2 Commissioning

The progressive system must be vented before commissioning.

☞ The lubricant may only be fed without bubbles. Air pockets in the lubricant adversely affect the function of the device and impair the reliability of lubricant delivery, which can result in damage to the bearings requiring lubrication.

7.2.1 Venting a grease progressive system

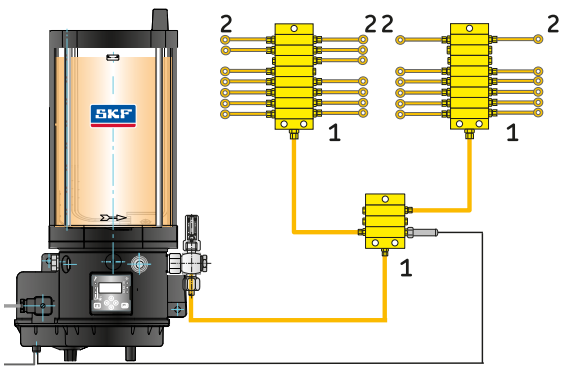
-see Figure 44

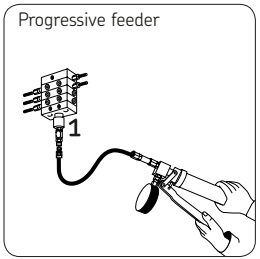
The progressive feeders are subjected to functional monitoring using oil at the factory. It is possible that oil will discharge from the feeder at the start of commissioning. The venting process starts at the master feeder and proceeds to the lubrication points, then from the secondary feeders to the master feeder.

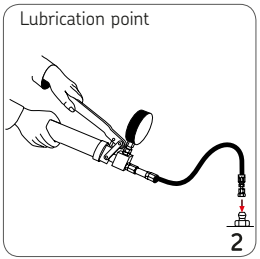
- Connect the hand lever grease gun or lubricating device to the feeder inlet (**1**) or, if present, to the emergency lubricant nipple attached to the feeder.
- Actuate the hand lever grease gun or lubricating device until bubble-free lubricant discharges at all feeder outlets.
- Use a hand lever grease gun or lubricating device to perform a flow check on or fill all lubrication points (**2**) that will be connected.
- Completely fill lubrication lines with grease and connect to the feeder outlets.

- Actuate the grease lubrication pump, hand lever grease gun, or lubricating device until bubble-free lubricant discharges at the end of the lubrication lines.

Example of progressive system with KFS/KFGL pump unit, Fig. 44







7.2.2 Venting an oil progressive system

-see Figure 45
A requirement for venting an oil progressive system is that the system has already been fully assembled.

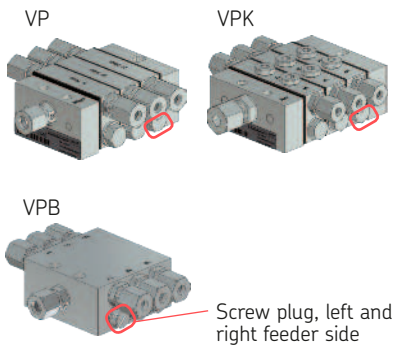
- Slightly loosen the main lubrication line on the hand pump or pump unit, actuate the pump/pump unit until bubble-free oil discharges at the main lubrication line.
- Retighten the main lubrication line at the pump.
- Slightly loosen the main lubrication line on the master feeder, actuate the pump/pump unit until bubble-free oil discharges at the feeder of the main lubrication line.
- Retighten the main lubrication line at the master feeder.
- Slightly loosen the main lubrication lines of the master feeder at the outlets, actuate the pump/pump unit until bubble-free oil discharges at the outlets.
- Retighten the lubrication line at the master feeder.
- Repeat venting at the secondary lubrication lines, secondary feeder, and lubrication lines.

An additional venting as described below is necessary if problems occur while venting the feeders (air still in the feeder, too little lubricant discharge).

VP and VPK progressive feeders:
- Loosen the right and left screw plugs **at the last metering section** as viewed from the feeder outlet.
- Actuate the pump/pump unit until bubble-free oil discharges at the screw plugs.
- Retighten the left and right screw plugs.

VPB progressive feeders:
- Loosen the right and left screw plugs **at the first metering piston** as viewed from the feeder outlet.
- Actuate the pump/pump unit until bubble-free oil discharges at the screw plugs.
- Retighten the left and right screw plugs.

Position of screw plugs, Fig. 45



8. Shutdown and disposal

8.1 Temporary shutdown

The described product can be temporarily shut down by disconnecting the hydraulic supply connections. Observe the instructions in the chapter “Assembly” while doing so.
If the product is to be shut down for an extended period of time, follow the instructions in chapter “Transport, delivery, and storage.”
To recommission the product, follow the instructions in chapter “Assembly.”

8.2 Shutdown and disposal

If the product will be permanently shut down, the local regulations and laws regarding the disposal of contaminated equipment must be observed.

NOTE

Environmental pollution
Lubricants can contaminate soil and waterways. Lubricants must be used and disposed of properly. Observe the local regulations and laws regarding the disposal of lubricants.

The product can also be returned to SKF Lubrication Systems Germany GmbH for disposal, in which case the customer is responsible for reimbursing the costs incurred. The parts are recyclable.

EN

9. Maintenance

9.1 General

SKF progressive feeders are maintenance-free. All connections and fittings must be regularly inspected for proper seating to ensure proper function. If necessary, the product can be cleaned using mild cleaning agents that are compatible with the product's materials (non-alkaline, non-soap).
Do not allow any cleaning agent to enter the interior of the product during cleaning. It is normally not necessary to clean the interior of the product.
The interior of the product must be cleaned if incorrect or contaminated lubricant is accidentally filled into the product.
Contact the SKF Service department if this occurs.

NOTE

Dismantling of the product or individual parts thereof within the statutory warranty period is not permitted and voids any claims.

NOTE

Only original SKF spare parts may be used. Unauthorized alterations to products and the use of non-original spare parts and accessories are prohibited and nullify the statutory warranty.

SKF Lubrication Systems Germany GmbH shall not be held liable for damages resulting from improperly performed assembly, maintenance or repair work on the product.

NOTE

Use only clean lubricant. The purity of the lubricants used is the decisive factor in the service life of the progressive feeder and the lubricated machinery elements.

10. Malfunctions, causes, and remedies

The following tables provide an overview of possible malfunctions and their causes. Contact the SKF Service department if you cannot remedy the malfunction.

NOTE

Dismantling of the progressive feeder is prohibited and voids any claims.
Defective progressive feeders must be replaced. Only SKF Service is capable of repairing them.

NOTE

Only original SKF spare parts may be used. Unauthorized alterations to products and the use of non-original spare parts and accessories are prohibited.

WARNING

System pressure
Lubrication systems are pressurized during operation. Lubrication systems must therefore be depressurized before starting assembly, maintenance or repair work, or any system modifications or system repairs.

NOTE

Outlets of a progressive feeder that are not needed must not be closed because this will cause the feeder to block.
Unneeded outlets must be consolidated with a neighboring outlet or connected to the pump via the return line.

10.1 Prior to beginning troubleshooting

The only condition that can cause a properly configured progressive feeder to jam/clog is the entry of contaminants into the lubricant lines or an insufficient quantity of lubricant. Preventing contaminants from entering during work or when refilling the lubricant reservoir thus first and foremost requires a clean work environment.
The progressive feeder outlet is typically equipped with a screw union with check valve. Do not replace this with another connector because this may cause problems in the progressive feeder's operation.
Each outlet of the progressive feeder can supply each bearing/each secondary feeder with a different, precalculated quantity of grease. Therefore, the position of each lubricant line to the progressive feeder outlet should be noted prior to starting work.

10.2 Feeder and system malfunctions

Malfunction	Cause	Remedy
No lubricant at lubrication points	o Master feeder or secondary feeder is defective - Can be detected if no grease can be pressed through the distributor after removing all union nuts or screw unions at the outlets. o Check the flow in the master feeder and secondary feeder - Sequentially remove union nuts or screw unions at the outlets; check valves may be built into the outlet screw unions. - Trigger interim lubrication. - The feeder is functioning properly if significant grease discharge is seen at all outlets. - Replace the feeder if grease does not discharge at all outlets. **Note!** The metering and arrangement of sections on the new feeder must be identical to the disassembled (defective) feeder.	• Replace the feeder - Loosen all screw unions, mark lines, secure against outside influences • Install a new feeder • Install lubrication lines in the correct order as marked previously • Only use original SKF spare parts! • Perform commissioning and functional inspection.
	o Defective or blocked feed line	• Detach feed line, identify cause of blockage, replace feed line if necessary

Malfunction	Cause	Remedy
Insufficient lubricant discharge	o Air cushion in master feeder or secondary feeder	• Perform venting on the secondary feeder discharging too little lubricant. **Grease progressive system - see Chapter 7.2.1** **Oil progressive system - see Chapter 7.2.2**
No lubricant at lubrication points	o Damaged lubricant line, detectable only by visual inspection and significant lubricant discharge. o Visual inspection	• Replace the lubricant line • Use only grease-filled SKF original spare lines on grease progressive systems. Perform commissioning and functional inspection. • Visual inspection for mechanical damage • Pinching and sharp bends are blocking the grease flow
	o Check the lubricant supply	• Check grease supply in the lubricant reservoir, refill if necessary. • Commissioning, functional inspection • Trigger interim lubrication.
	o Defective lubrication point o Defective bearing o Bearing bush twisted	• Check bearing for mechanical damage or contamination. • Check bearing for proper function (move the machine and check for • bearing noise). • Use a high-pressure grease gun to make the bearing move freely • If this is not possible, the bearing must be repaired or replaced by technical personnel • Install all lines and screw unions that were removed during troubleshooting. • Perform commissioning and functional inspection.

Malfunction	Cause	Remedy
System malfunction	o Piston detector on master feeder has indicated that the system is not working.	• Loosen both lubrication lines on the last metering section of the master feeder, switch on the lubrication system, and check whether lubricant discharges without bubbles. If lubricant discharges without bubbles, tighten both lubrication lines and repeat the procedure on all secondary feeders, starting from the closest feeder. Vent the possibly defective feeder again; replace in the event of reoccurrence. • If all feeders function properly, check the electrical connection of the piston detector and the piston detector itself for proper function.
No pressure build up in the main line	o Pressure relief valve does not close	• Clean or replace pressure relief valve. Only use original SKF spare parts.
	o Unsuitable lubricant (see technical data)	• Remove lubricant from entire system and dispose of lubricant in the proper manner; fill system with suitable lubricant.
	o Fill level too low	• Top up lubricant.
	o Pump element is defective	• Inspect pump element and replace if necessary

11. Spare parts

Piston detector for VP progressive feeder

Designation	Order No.
Piston detector, 2-pin .	177-300-091
Piston detector, 3-pin .	177-300-094
O-ring for piston detector	WVN501-12×1.5

Piston detector for VPK progressive feeder

Designation	Order No.
Piston detector, 2-pin	177-300-092
Piston detector, 3-pin	177-300-095
O-ring for piston detector	WVN501-10x1.5

Piston detectors for VPB progressive feeder

Designation	Order No.
Piston detector, 2-pin	177-300-096
Piston detector, 3-pin	177-300-097
O-ring for piston detector	N532-12x1.5

Note!
You can find additional technical data on the cable sockets in the brochure “Electrical Plug and Socket Connectors,” brochure No. 1-1730-EN.

Cycle indicator for VP progressive feeder

Order No.

Cycle indicator (only complete with feeder section)

Example: **VP** M **-K-** 3T **-ZY-** R

Specification of the thread, metric = **M**, inches = **G**

Specification of metering section, e.g., from **2T**; **..**

Specification of installation position, e.g., left =**L**, right = **R**

Cycle indicator for VPK progressive feeder

Order No.

Cycle indicator (only complete with feeder section)

Example: **VPK** M **-K-** 3T **-ZY-** R

Specification of the thread, metric = **M**, inches = **G**

Specification of metering section, e.g., from **2T**; **..**

Specification of installation position, e.g., left =**L**, right = **R**

Proximity switch for VPK progressive feeder

Designation	**Order No.**
Proximity switch	177-300-075
Proximity switch housing	VPKM.13
Screws for housing fitting	DIN914-M4x6-45H

2/2 directional solenoid valve for VP and VPK progressive feeder, for oil, attachment 13

Designation	**Order No.**
2/2 directional solenoid valve	VPKG-VEN+924
Cable socket- 2/2 directional control valve	24-1882-2029

4/2 directional solenoid valve for VP progressive feeder, for oil, attachments 08; 09; 14

Note: The cable socket of the directional solenoid valve must be ordered separately!

VPG (inch thread)

Designation	**Order No.**
Starter plate for directional solenoid valve	44-0711-2265
4/2 directional solenoid valve	161-140-050+924
Plug directional solenoid valve	24-1882-2029
Fixing bolts for 4/2 directional solenoid valve	DIN912-M5x20-8.8 screw plug
(for unused connection)	95-0018-0908
Sealing ring	504-019

VPM (metric thread)

Designation	**Order No.**
Starter plate for 4/2 directional solenoid valve	44-0711-2266
4/2 directional solenoid valve	161-140-050+924
Cable socket directional solenoid valve	24-1882-2029
Fixing bolts for 4/2 directional solenoid valve	DIN912-M5x20-8.8
Screw plug (for unused connection)	DIN 908-M10x1-5.8
Sealing ring	504-019

Note!
You can find additional technical data on the cable sockets in the brochure “Electrical Plug and Socket Connectors,” brochure No. 1-1730-EN.

4/2 directional solenoid valve for VPK progressive feeder, for oil, attachments 08; 09; 14

Note: The cable socket of the directional solenoid valve must be ordered separately!

VPKG (inch thread)

Designation	**Order No.**
Starter plate for directional solenoid valve	44-0711-2263
4/2 directional solenoid valve	161-140-050+924
Plug directional solenoid valve	24-1882-2029
Fixing bolts for 4/2 directional solenoid valve	DIN912-M5x20-8.8
screw plug (for unused connection)	95-0018-0908
Sealing ring	504-019

VPKM (metric thread)

Designation	**Order No.**
Starter plate for 4/2 directional solenoid valve	44-0711-2264
4/2 directional solenoid valve	161-140-050+924
Cable socket directional solenoid valve	24-1882-2029
Fixing bolts for 4/2 directional solenoid valve	DIN912-M5x20-8.8
Screw plug (for unused connection)	DIN 908-M10x1-5.8
Sealing ring	504-019

Note!
You can find additional technical data on the cable sockets in the brochure “Electrical Plug and Socket Connectors,” brochure No. 1-1730-EN.

2/2 directional control valve for VP progressive feeder, for grease, attachment 15

Designation	Order No.
2/2 directional control valve	161-110-031 +924
Cable socket - 2/2 directional control valve	24-1882-2029
Adapter plate	44-1503-2366
Screws for adapter plate	DIN963-M6x16-4.8
VPM (metric thread)	
Inter-screw connection M14x1.5 to G1/4	402-116-351
Sealing ring	DIN7603-A14x18-CU
VPG (inch thread)	
Inter-screw connection G1/4" to R1/4 conical	402-116-652
Sealing ring	508-108

2/2 directional control valve for VPK progressive feeder, for grease, attachment 15

Designation	Order No.
2/2 directional control valve	161-110-031
Cable socket - 2/2 directional control valve	24-1882-2029
Adapter plate	44-1503-2365
Screws for adapter plate	DIN963-M6x16-4.8
VPKM (metric thread)	
Inter-screw connection R1/4" to M10x1	44-0159-2282
Sealing ring	504-019
VPKG (inch thread)	
Inter-screw connection R1/4" to R1/8"	96-6013-0282

2/2 directional control valve for VPB progressive feeder, for grease, attachment 15

Designation	Order No.
2/2 directional control valve	161-110-031+924
Cable socket - 2/2 directional control valve	24-1882-2029
VPBM (metric thread)	
Inter-screw connection G1/4" to M10x1	44-0159-2282
Sealing ring	504-019
VPBG (inch thread)	
Inter-screw connection G1/4 to G1/8	96-6013-0282

Note!

You can find additional technical data on the cable sockets in the brochure "Electrical Plug and Socket Connectors," brochure No. 1-1730-EN.

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12. Accessories

12.1 Accessories for VP progressive feeders

Inlet screw unions for VP progressive feeder

	VPM	VPG
Straight connector acc. to DIN2353, Ø 6 mm, L	406-413	
Straight connector acc. to DIN2353, Ø 6 mm, S		406-413W
Straight connector acc. to DIN2353, Ø 8 mm, L		408-403W
Straight connector acc. to DIN2353, Ø 8 mm, S	408-413	
Straight connector acc. to DIN2353, Ø 10 mm, L	410-403	410-403W
Straight connector acc. to DIN2353, Ø 12 mm, L	412-423	
Straight connector, design E02, Ø 6 mm	471-006-351	471-006-161
Straight connector, design E02, Ø 8 mm	471-008-351	471-008-161
Straight connector, design E02, Ø 10 mm	471-010-351	471-010-161
Straight connector, design E02, Ø 12 mm		471-012-161
Straight connector plug connector, Ø 6 mm		406-054-VS
Elbow acc. to DIN2353, Ø 8 mm, conical, L		408-405W
Elbow acc. to DIN2353, Ø 10 mm, conical, L	410-405	410-405W
Banjo fitting acc. to DIN2353, Ø 6 mm, S		445-516-061
Banjo fitting acc. to DIN2353, Ø 8 mm, L		445-516-081
Banjo fitting acc. to DIN2353, Ø 10 mm, L	445-535-101	445-516-101

Outlet screw unions, check valves, crossportings for VP progressive feeder

	VPM	VPG
Straight connector acc. to DIN2353, Ø 4 mm, conical, LL	404-403	
Straight connector acc. to DIN2353, Ø 4 mm, LL		404-403W
Straight connector acc. to DIN2353, Ø 6 mm, conical, LL	406-423	
Straight connector acc. to DIN2353, Ø 6 mm, L	406-403	406-403W
Straight connector acc. to DIN2353, Ø 8 mm, conical, LL	441-008-511	408-423W
Straight connector acc. to DIN2353, Ø 10 mm, conical, L		410-443W
Straight connector, design E02, Ø 4 mm	471-004-311	471-004-191
Straight connector, design E02, Ø 6 mm	471-006-311	471-006-192
Straight plug connector, Ø 4 mm	404-006-VS	404-040-VS
Straight plug connector, Ø 4 mm conical	451-004-518-VS	
Straight plug connector, Ø 6 mm	406-004-VS	456-004-VS
Straight plug connector, Ø 6 mm conical	451-006-518-VS	406-423W-VS

Outlet screw unions, check valves, crossportings for VP progressive feeder

	VPM	VPG
Ø 4 mm screw union with check valve	VPM-RV4	VPG-RV
Ø 6 mm screw union with check valve	VPM-RV	VPG-RV6
Ø 8 mm screw union with check valve	VPM-RV8	VPG-RV8
Ø 10 mm screw union with check valve	VPM-RV10	
Banjo fitting acc. to DIN2353, Ø 4 mm, LL		445-519-041
Banjo fitting acc. to DIN2353, Ø 6 mm, L	445-531-061	445-519-061
Banjo fitting acc. to DIN2353, Ø 6 mm, LL	445-531-062	
Banjo fitting, plug connector, Ø 4 mm	504-102-VS	504-108-VS
Banjo fitting, plug connector, Ø 4 mm, conical	455-531-048-VS	
Banjo fitting, plug connector, Ø 6 mm	506-140-VS	506-108-VS
Banjo fitting, plug connector, Ø 6 mm, conical	455-531-068-VS	

12.2 Accessories for VPK progressive feeders

Inlet screw unions for VPK progressive feeder

	VPKM	VPKG
Straight connector acc. to DIN2353, Ø 6 mm, L		406-403W
Straight connector acc. to DIN2353, Ø 6 mm, con., LL	406-423	
Straight connector acc. to DIN2353, Ø 8 mm, con., LL		408-423W
Straight connector acc. to DIN2353, Ø 10 mm, con., L		410-443W
Straight connector, design E02, Ø 6 mm	471-006-311	471-006-192
Straight plug connector, Ø 6 mm	406-004-VS	456-004-VS
Straight connector plug connector, Ø 6 mm, con.	451-006-518-VS	406-423W-VS
Elbow acc. to DIN2353, Ø 6 mm, conical, L	406-405	406-405W
Elbow acc. to DIN2353, Ø 6 mm, conical, LL	406-425	
Elbow acc. to DIN2353, Ø 8 mm, conical, LL	408-425	408-425W
Elbow for plug connector, Ø 6 mm, con.	506-510-VS	506-511-VS
Banjo fitting acc. to DIN2353, Ø 6 mm, L	445-531-061	445-519-061
Banjo fitting acc. to DIN2353, Ø 6 mm, LL	445-531-062	
Banjo fitting, plug connector, Ø 6 mm	506-140-VS	506-108-VS
Banjo fitting, plug connector, Ø 6 mm, con.	445-531-068-VS	

Outlet screw unions, check valves, crossporting for VPK progressive feeder

	VPKM	VPKG
Straight connector acc. to DIN2353, Ø 4 mm, conical, LL	404-403	
Straight connector acc. to DIN2353, Ø 4 mm, LL		404-403W
Straight connector acc. to DIN2353, Ø 6 mm, conical, LL	406-423	
Straight connector acc. to DIN2353, Ø 6 mm, L	406-403	406-403W
Straight connector acc. to DIN2353, Ø 8 mm, conical, LL	441-008-511	408-423W
Straight connector acc. to DIN2353, Ø 10 mm, conical, L		410-443W
Straight connector, design E02, Ø 4 mm	471-004-311	471-004-191
Straight connector, design E02, Ø 6 mm	471-006-311	471-006-192
Straight plug connector, Ø 4 mm	404-006-VS	404-040-VS
Straight plug connector, Ø 4 mm, conical	451-004-518-VS	
Straight plug connector, Ø 6 mm	406-004-VS	456-004-VS
Straight plug connector, Ø 6 mm, conical	451-006-518-VS	406-423W-VS
Ø 6 mm screw union with check valve	VPKM-RV-S4	VPKG-RV
Ø 6 mm screw union, plug connector with check valve	VPKM-RV-VS	

Outlet screw unions, check valves, crossportings for VPK progressive feeder

	VPKM	VPKG
Banjo fitting acc. to DIN2353, Ø 4 mm, LL		445-519-041
Banjo fitting acc. to DIN2353, Ø 6 mm, L	445-531-061	445-519-061
Banjo fitting acc. to DIN2353, Ø 6 mm, LL	445-531-062	
Banjo fitting, plug connector, Ø 4 mm	504-102-VS	504-108-VS
Banjo fitting, plug connector, Ø 4 mm, conical	455-531-048-VS	
Banjo fitting, plug connector, Ø 6 mm	506-140-VS	506-108-VS
Banjo fitting, plug connector, Ø 6 mm, conical	455-531-068-VS	

12.3 Accessories for VPB progressive feeders

Inlet screw unions for VPB progressive feeder

	VPBM	VPBG
Straight connector acc. to DIN2353, Ø 6 mm, L		406-403W
Straight connector acc. to DIN2353, Ø 6 mm, con., LL	406-423	
Straight connector acc. to DIN2353, Ø 8 mm	441-008-511	408-423W
Straight connector acc. to DIN2353, Ø 10 mm	410-443	410-443W

Outlet screw unions, check valves, crossporting for VPB progressive feeder

	VPBM	VPBG
Straight connector acc. to DIN2353, Ø 4 mm, conical, LL	404-403	
Straight connector acc. to DIN2353, Ø 4 mm, LL		404-403W
Straight connector acc. to DIN2353, Ø 6 mm, L	406-403	406-403W
Straight connector acc. to DIN2353, Ø 8 mm, conical, LL	441-008-511	408-423W
Straight connector acc. to DIN2353, Ø 10 mm, conical, L		410-443W
Straight plug connector, Ø 6 mm, conical	451-006-518-VS	451-006-518W-VS
Screw plug for unused outlets	446-431-001	446-419-001

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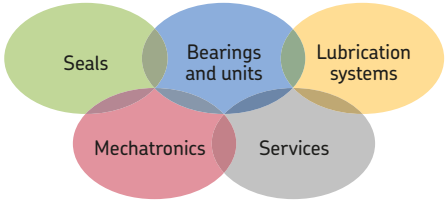

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