VarioSuper
of the series UFV 20-XXX/UFV 30-XXX

Minimal quantity lubrication for internal and external lubrication

Assembly instructions

acc. to EC Dir. 2006/42/EC for partly completed machinery,
with associated operating instructions

EN

Version 02

SKF

EC Declaration of Incorporation acc. to Machinery Directive 2006/42/EC, Appendix II Part 1 B

The manufacturer, SKF Lubrication Systems Germany GmbH , Berlin Plant, Motzener Str. 35/37, DE - 12277 Berlin, hereby declares conformity of the partly completed machinery

Designation:	**VarioSuper**
Type:	**UFV 20-XXX / UFV 30-XXX**
Item number:	
Year of manufacture:	See rating plate

with the essential protection requirements of Machinery Directive 2006/42/EC at the time of placing on the market.
1.1.2 · 1.1.3 · 1.3.2 · 1.3.4 · 1.5.1 · 1.5.6· 1.5.8 · 1.5.9 · 1.6.1 · 1.7.1 · 1.7.3 · 1.7.4

The technical documentation described in Annex VII, part B of this Directive has been prepared. We undertake to transmit, in response to a reasoned request by the national authorities, the special documents for this partly completed machine. The Head of Technical Standards is the authorized representative for the technical documentation. See the manufacturer information for the address.

Furthermore, the following Directives and (harmonized) standards were applied in the applicable areas:

2011/65/EU	RoHS II
2014/30/EU	Electromagnetic Compatibility | Industry

Standard	Edition	Standard	Edition
DIN EN ISO 12100	2011	**DIN EN 61 000-6-2**	2006
Correction	2013	Correction	2011
DIN EN 60947-1	2011	**DIN EN 61 000-6-3**	2011
DIN EN 60947-5-2	2014	Correction	2012

The partially completed machinery must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the provisions of Machinery Directive 2006/42/EC and all other applicable Directives.

Berlin, October 10, 2016

Jürgen Kreutzkämper
Manager R&D Germany
SKF Lubrication Business Unit

Richard Lindemann
Manager Sustain Engineering Berlin
Lubrication Business Unit

Masthead

These assembly instructions pursuant to EC Machinery Directive 2006/42/EC are an integral part of the product described here and must be kept for future use.

Warranty

The instructions do not contain any information on the warranty. This can be found in the General Conditions of Sales, which are available at:
www.skf.com/lubrication.

Copyright / Integration of instructions

Manufacturer and service address

If you have technical questions, please contact:

SKF Lubrication Systems Germany GmbH
Berlin Plant
Motzener Strasse 35/37
12277 Berlin
Germany
Tel. +49 (0)30 72002-0
Fax +49 (0)30 72002-111
www.skf.com/lubrication

Hockenheim Plant
2. Industriestrasse 4
68766 Hockenheim
Germany
Tel. +49 (0)62 05 27-0
Fax +49 (0)62 05 27-101
www.skf.com/lubrication

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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.

Read the instructions completely and follow all operating instructions and the warning and safety instructions.

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

Possible symbols	
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)
	Environmentally sound disposal

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

- Rotation arrow
- Fluid connection labels must be followed and kept in fully legible condition.
- Warnings

Read the instructions thoroughly and follow them.

Series UFV 20-XXX and UFV 30-XXX of the SKF minimal quantity lubrication system VarioSuper have the same technical design.
Therefore, only the SKF minimal quantity lubrication system VarioSuper is referred to below.

Abbreviations and conversion factors

Abbreviations

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

Conversion factors

Length	1 mm = 0.03937 in.
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 assembly instructions/operating instructions are read and understood by all persons responsible for working on the product or who supervise or instruct such persons.
The assembly instructions/operating instructions must be kept readily available together with the product.
Note that the assembly instructions/operating instructions form part of the product and must accompany the product if sold to a new owner.
The product described here was manufactured according to the state of the art. Risks may, however, arise from its improper 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 instructions, statutory regulations and general regulations for accident prevention and environmental protection must be observed.

1.2 General behavior when handling the product

- The product may only be used 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.
- Responsibilities for different activities must be clearly defined and observed. Uncertainty seriously endangers safety.
- Protective and safety mechanisms must not 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 reinstalled immediately following conclusion of work and then inspected 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 relevant safety data sheets when handling lubricants.

- Only rotary leadthroughs designed for dry running may be used for internal lubrication.
- Only lubricants that are approved for use in the MQL system may be delivered.

1.3 Authorized technical personnel

Only qualified technical personnel may install, operate, maintain, and repair the products described in the assembly instructions.
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 electricians and the prohibition against employing non-qualified personnel are laid down in DIN VDE 0105 and IEC 364. Relevant country-specific qualifications for technical personnel apply for countries outside the scope of 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.
The operator must ensure that its personnel have fully understood the content of the assembly instructions/operating instructions.

1.4 Electric shock hazard

WARNING

Electric shock
Assembly, maintenance, and repair work may only be performed by qualified technical personnel.
De-energize the product prior to beginning work.
Local conditions for connections and local regulations (e.g., DIN, VDE) must be observed.

1.5 System pressure or hydraulic pressure hazard

WARNING

System pressure
Hydraulic pressure
Lubrication systems are pressurized during operation.
Depressurize the product before starting any assembly, maintenance, or repair work.

1.6 Compressed air hazard

WARNING

Compressed air
The product described here is pressurized during operation.
Depressurize the product before starting any assembly, maintenance, or repair work.

Depending on the design, the product may be able to be operated with compressed air. The compressed air must comply with at least quality class 5 as defined by ISO 8573-1:

- Max. particle size/density 40 µm / 10 mg/m³
- Pressure dew point 7°C
- Water content max. 7,800 mg/m³
- Residual oil content max. 25 mg/m³

1.7 Operating minimal quantity lubrication (MQL) systems

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

WARNING

Explosibility limit of aerosol
Open flames, sparks, and any lit or smoldering materials, etc. are prohibited.
The permissible local aerosol concentration must not be exceeded.
Do not spray aerosol on hot surfaces.

The SKF minimal quantity lubrication system VarioSuper may be used only in proper technical condition, in accordance with its intended use, and with due regard to safety and hazards, in compliance with the assembly and operating instructions and local safety regulations.
The area of the spray and rooms where the aerosol concentration exceeds the explosibility limit must be kept clear of any type of fire, e.g., in the form of open flame, sparks, lit cigarettes, etc. The aerosol must not be sprayed onto hot surfaces.
Processing rooms into which the aerosol is fed must be equipped with an extraction system with filter technology appropriate to the lubricant employed.
To prevent a potential hazard from exceeding the permissible amount of aerosol in case of an error, the minimal quantity lubrication system must be disconnected from the compressed air supply as quickly as possible. This can be done by actuating the quick-release coupling on the compressed air connection port; see Chapter 4.4.1, "Depressurizing the aerosol reservoir."

1.8 Assembly/maintenance/malfunction/decommissioning/disposal

The following instructions 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.
- Take appropriate measures to ensure 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 integrated must be de-energized and 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 their function impaired by the installation of the MQL system.
- No parts of the minimal quantity lubrication system 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.

1.9 Intended use

The SKF minimal quantity lubrication system VarioSuper, also referred to in the following as the MQL system, was designed for internal lubrication and external lubrication of cutting tools for the machining of materials. Internal lubrication is the direct application of lubricant onto the point of friction between the tool blade and workpiece through the tool spindle and tool. External lubrication refers to the supply of aerosol via lubrication lines to a spray nozzle that sprays the aerosol onto the tool. The SKF MQL system VarioSuper can be used for initial furnishing of machine tools and later retrofitting of machine tools with existing cooling and lubrication agent supply. The principle of internal lubrication also makes the system suitable for connection to machine tools with very small cooling duct diameters. Consult with SKF. The lubricants approved for the MQL system VarioSuper have been especially selected to meet the chemical and physical properties required to satisfy the MQL technology. For

this reason, only the MQL lubricants approved by SKFand listed in Chapter 2, “Lubricants,“ in sub-chapter 2.3.1, “Approved lubricants” may be used.Consult SKF's Service department if performing external lubrication.
Any other usage is deemed non-compliant with the intended use.

1.10 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
- To feed / forward / store Group 1 dangerous fluids according to Directive 67/548/EEC
- 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

1.11 Disclaimer of liability

The manufacturer shall not be held liable for damage resulting from:

- Failure to comply with these instructions
- Use of lubricants/media not approved for the unit type
- Contaminated or unsuitable lubricants
- Installation of non-original SKF components
- Inappropriate usage

- Improper assembly, configuration, or filling
- Improper response to malfunctions
- Non-observance of maintenance intervals
- Independent modification of system components

1.12 Referenced documents

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

- Operational instructions and approval rules
- Instructions from suppliers of purchased parts
- Safety data sheet of the lubricant used
- Project planning documents and other relevant documents, if provided

The operator must supplement these documents with applicable regulations for the country of use.
The documentation must be included if the product is transferred to a new operator.

1.13 Warning labels on the product

A warning label (item 1) is affixed to the product. Before startup, check that the warning label is present and intact. Immediately replace the label if it is damaged or missing. The product must not be operated until then.

See Figure 1 for the ordering number and item.

Positioning of warning labels, Fig. 1

Warning label, item 1

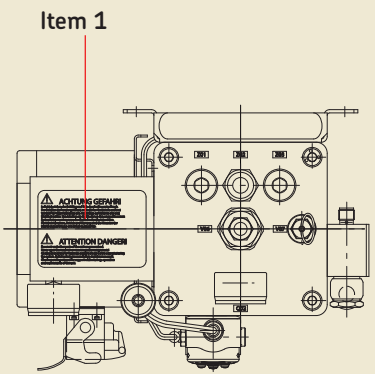
ACHTUNG GEFAHR!

In Betrieb stehen der Behälter und Teile des Gerätes unter Druck. Der Behälter darf weder geöffnet, noch dürfen Geräteteile entfernt werden! Vor Inbetriebnahme alle Anschlüsse auf sicheren Sitz und Dichtheit prüfen. Vor Arbeiten am Gerät oder an den angeschlossenen Systemkomponenten muss das Gerät druckentlastet werder Für Inbetriebnahme, Betrieb und Wartung sind die Hinweise der Bedienungsanleitung unbedingt zu beachten.

ATTENTION DANGER!

Reservoir and other parts of the unit are pressurized. Never open the reservoir or remove system components! Check connections for tightness and proofness before commissioning the system. Relief system pressure before maintenance work. Check operating manual for support while start up, operation and maintenance of the ur

Order No. 951-111-173



VarioSuper

1.14 Residual risks

Assessment of residual risk, Table 1

Residual risk	Remedy
Life cycle: Assembly	
Dropping of the MQL system during the installation procedure	• Install the MQL system using load lifters (e.g., a crane). Ensure adequate fastening/securing of the unit (loading capacity).
Life cycle: Commissioning / operation	
People slipping due to floor contamination with spilled lubricant	• Exercise caution when filling and when closing the filler socket cap. •Promptly apply suitable binding agents and remove the spilled lubricant. • Follow operational instructions for handling oils 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.
Lubricating oil spraying out due to faulty component fitting/line connection.	• Tighten all components with the appropriate tightening torques. Use hydraulic screw unions and lines suitable for the indicated pressures. These must be checked for proper connection and for damage prior to commissioning.
Life cycle: Malfunctions	
Lubricant blockage on tool	• Clean lubricant bores on the tool.
Life cycle: Maintenance	
Overpressure on reservoir, filter, screw unions, and lines	• The VarioSuper must be depressurized before maintenance work is performed.
Life cycle: Disposal	
Environmental contamination by lubricants and wetted parts	• Dispose of contaminated parts according to the applicable legal/company rules.

2. Lubricants

2.1 General information

IMPORTANT NOTE

All products from SKF Lubrication Systems may be used only for their intended purpose and in accordance with the information in the product's operating instructions.

Intended use is the use of the products for the purpose of providing minimal quantity lubrication within the physical usage limits which can be found in the documentation for the device, e.g., operating instructions and the product descriptions such as 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 minimal quantity lubrication systems and components and delivered and 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 consulting with and obtaining written approval from SKF Lubrication Systems.
SKF Lubrication Systems considers lubricants
to be an element of system design that must always be factored into the selection of components and the design of minimal quantity lubrication systems. The lubricating properties of the lubricants are very important in making these selections.

2.2 Selection of lubricants

IMPORTANT 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 machine manufacturer. It must be ensured 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 tools.

When selecting a lubricant, the type of friction point, the expected loads during operation, and the anticipated ambient conditions must be taken into account. All economic and environmental aspects must also be considered.
Please contact SKF Lubrication Systems if you have further questions regarding lubricants.

2.3 Approved lubricants

IMPORTANT NOTE

Only lubricants approved for the product may be used; see Chapter 2.3.1 "Approved lubricants."
Unsuitable lubricants can lead to failure of the product and to property damage.

IMPORTANT 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 aerosol reservoir in order to prevent accidental mixing.

The product described here must be operated only using lubricants that meet the specifications in the technical data.

Note that in rare cases, there may be lubricants whose properties are within the permissible limits values but whose other characteristics render them unsuitable for use in minimal quantity lubrication systems.

For example, the use of lubricants with anti-fogging additives in minimal quantity lubrication (MQL) systems for internal lubrication might result in no aerosol formation.

IMPORTANT NOTE

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

2.3.1 Approved lubricants

Permissible lubricants approved by SKF, Table 2

Designation	Composition	Features	Area of application	Drum size [liters]	Order number
LubriOil	Fatty acid ester with additives	Viscosity at 40°C: 47 mm^2/s Density at 20°C: 0.92 g/cm^3	o Universal applications	1 2.5 5 10 200	OEL1-LUBRIOIL OEL2.5-LUBRIOIL OEL5-LUBRIOIL OEL10-LUBRIOIL OEL200-LUBRIOIL
LubriFluid F100	Synthetic polyesters based on natural fatty oil derivatives with oxidation inhibitors	Viscosity at 40°C: 25 mm^2/s Density at 20°C: 0.84 g/cm^3	o Especially for small tools and difficult lubrication tasks on aluminum, steel, and non-ferrous metals	1 2.5 5 10 200	OEL1-LUBRI-F100 OEL2.5-LUBRI-F100 OEL5-LUBRI-F100 OEL10-LUBRI-F100 OEL200-LUBRI-F100

2.4 Lubricants and the environment

IMPORTANT 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 that 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
Minimal quantity lubrication systems must always be free of leaks. Leaking lubricant is hazardous due to the risk of slipping and injury. Be mindful of any lubricant leaking out during assembly, operation, maintenance, and repair of minimal quantity lubrication systems. Leaks must be sealed off without delay.

Lubricant leaking from minimal quantity 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.

WARNING

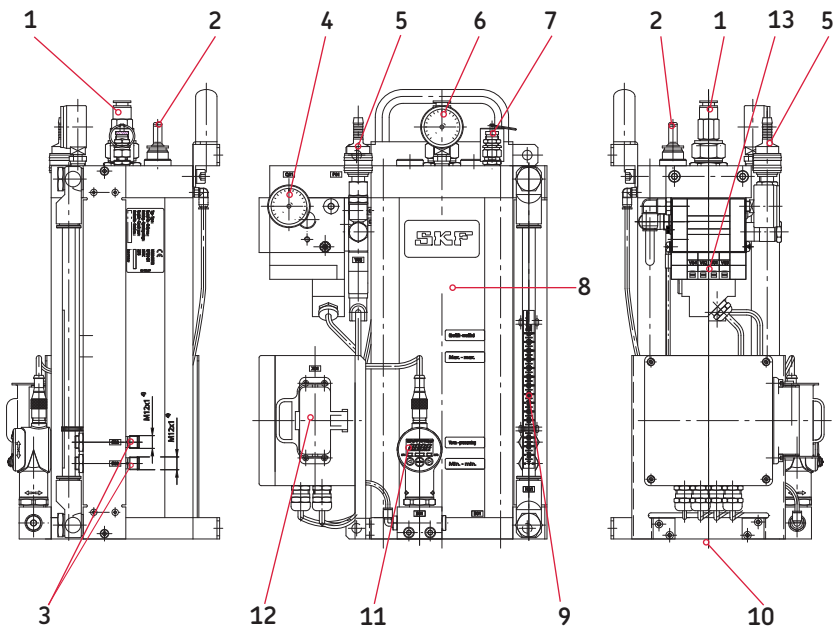
Explosibility limit of aerosol
Uncontrolled spraying of lubricants or lubricant-containing substances is prohibited because it may form a lubricant/air mixture with an explosive concentration.

WARNING

Health hazard from aerosol
Uncontrolled spraying of aerosol can be harmful to health. Do not spray people or animals with aerosol. The aerosol must not enter eyes and never be directly inhaled.

3. Overview

Overview of VarioSuper, Fig. 2



Item	Description
1	Check valve for lubricant fillport
2	Aerosol outlets (3x)
3	Connections for fill level monitoring
4	Pressure gauge for primary air pressure
5	Main air valve with compressed air connection port (NG8)
6	Pressure gauge for internal reservoir pressure
7	Pressure relief valve (12 bar)
8	Aerosol reservoir
9	Lubricating oil fill level indicator
10	Oil drain plug
11	Electronic pressure switch
12	Electrical supply connection
13	Valve cluster

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4. Assembly

4.1 General information

Only qualified technical personnel may install, operate, maintain, and repair the SKF minimal quantity lubrication system VarioSuper described in the assembly instructions. Qualified technical personnel are persons who have been trained, assigned, and instructed by the operator of the final product into which the described minimal quantity lubrication system is 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.

WARNING

Personal injury/property damage
Do not tilt or drop the product.
For proper functioning, the system must be installed vertically.
The MQL system must not be installed upside down.

IMPORTANT NOTE

Observe the technical data (Chapter 10).

The MQL system should be assembled and commissioned according to the following sequence:

- Set up and attach
- Connect the aerosol and compressed air lines
- Establish electrical connection and set software configuration in machine control unit.

4.2 Setup and attachment

The MQL system should be mounted so that it is protected from humidity and vibration but is also easily accessible, allowing all further installation work to be done without difficulty. All visual indicators must be clearly visible and all controls must be easily accessible.
The MQL system must not be subjected to rapid and severe temperature fluctuations. During assembly and especially when drilling, always pay attention to the following:

- The fill level of the reservoir must be clearly visible.
- The MQL system must be mounted in a vertical position.
- Any assembly holes must be made according to the following drilling template (Fig. 4).
- Design specifications and conditions of the manufacturer and the object must be observed when installing the MQL system.
- Existing lines/units must not be damaged.
- The product must be installed at an adequate distance from sources of heat or cold.

WARNING

Personal injury/property damage
Drill assembly holes in such a way that no lines, units, or moving parts are damaged or their function impaired.
Maintain safety clearances and comply with regulations for assembly and accident prevention.

WARNING

Bodily injury
Do not step below a raised or hanging MQL system.

The MQL system is installed on the machine using M8 screws (4x) with a minimum length of 20 mm.

Fastening material provided by customer.
Example:
- Hexagon head screws acc. to ISO 4017- M8x20-8.8 (4x)
- Washers (4x) acc. to ISO 7090-8-2000HV

4.2.1 Minimum mounting dimensions

To ensure enough space for maintenance work and for any disassembly of the product, ensure that the minimum mounting dimensions (Figure 3, page 24) are maintained.

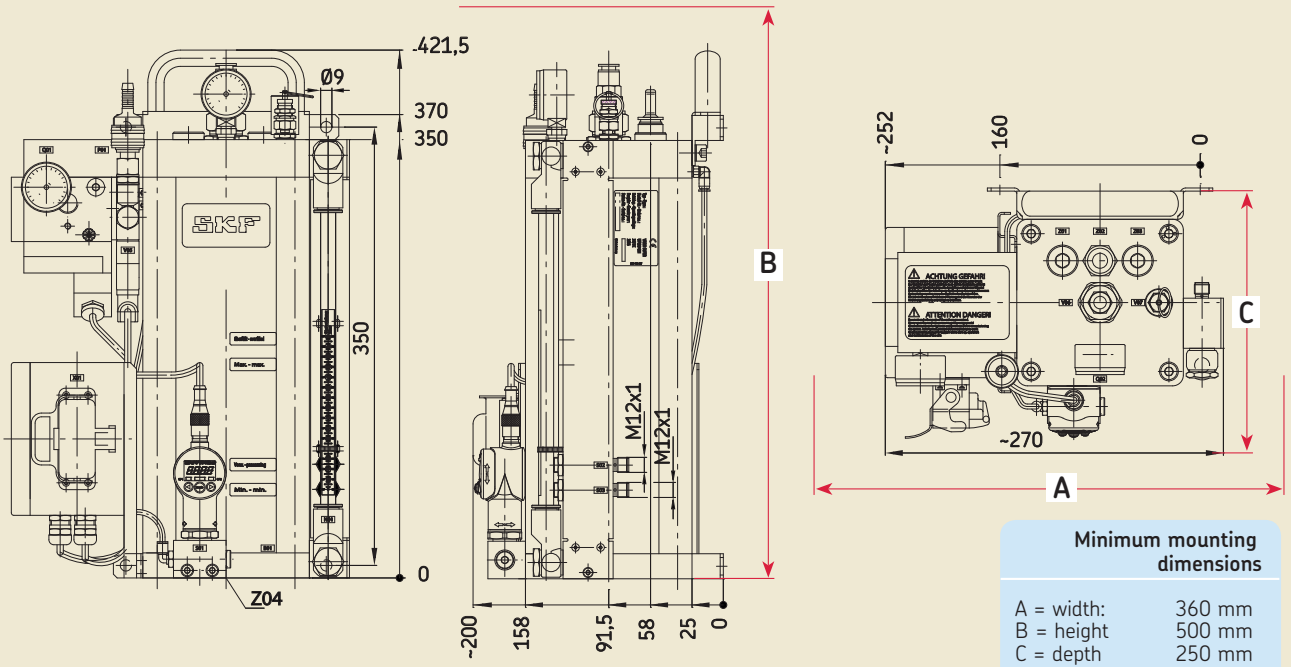
4.2.2 Attachment of the MQL system VarioSuper

☞ See Figure 3 on page 24 and Figure 4 on page 25

- Drill assembly holes (M8) acc. to the relevant assembly drawing and the conditions on the surface.
- Clean surface to remove drilling chips.
- Lift the MQL system using a hoist and align it to the assembly holes.
- Pass hexagon head screws (4x) acc. to ISO 4017-M8-8.8 with associated washers (4x) acc. to ISO 7090-8-2000HV through the fixing holes on the mounting plate and apply the screws to the M8 thread on the surface.
- Gently tighten hexagon head screws (4x).
- Align the MQL system horizontally and vertically, then tighten hexagon head screws with the following tightening torque
  Torque: 25 Nm

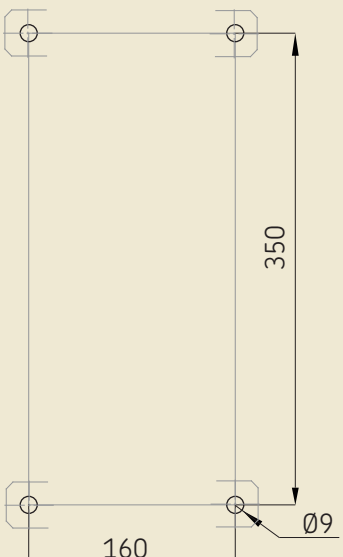
4.2.3 VarioSuper port dimensions, assembly holes, and minimum mounting dimensions

Vario assembly holes and minimum mounting dimensions, Fig. 3



Minimum mounting dimensions	
A = width:	360 mm
B = height	500 mm
C = depth	250 mm

Mounting template, Fig. 4



4.3 Connecting aerosol lines

The VarioSuper MQL system comes with three aerosol outlets that are designed as plug-in connections for hoses with an outer diameter of 12 mm.

IMPORTANT NOTE

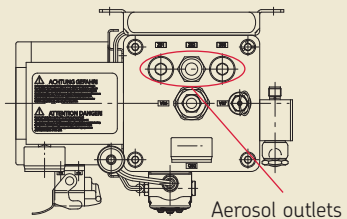
Only pneumatic hoses that withstand operating pressures of at least 10 bar and are resistant to the lubricants may be used.

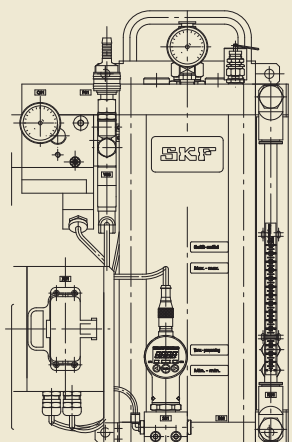
WARNING

System pressure
The product described here is pressurized during operation. Depressurize the product before starting assembly work.

By default, only one aerosol outlet is used. The two alternative outlets are plugged.

Aerosol connections, Fig. 5





VarioSuper

Several factors determine the quantity of lubricant that emerges as an aerosol at the tool. These include the cross-sections of lines and guideways
in the aerosol transport route, from the MQL system to the outlet opening on the tool. The following rules must be followed to reduce loss of aerosol and pressure during transport:

- Lubricant should not be fed through sharp changes in cross-sections, narrow passes, or abrupt bends because it may deposit at these locations and thus become unavailable for application.
- The line cross-section must be large enough to transport an adequate quantity of lubricant. However, the duct diameter in the area of the tool should be < 8 mm because

  higher flow velocity is desired here.
- The aerosol line should be kept as short as possible. Pressure and aerosol losses increase at longer aerosol line lengths.
- The aerosol lines should be laid as straight as possible, and sharp bends should be avoided in particular. Otherwise, there is a risk that the lubricant will settle. If deflections cannot be avoided, they should have a radius of at least 200 mm.
- The aerosol line should have as few changes in cross-section as possible. If cross-section changes are unavoidable, they should be as smooth as possible. A transition angle of <15° is ideal.
- All joints should have a smooth surface and have no holes or projecting edges. This applies especially to the transition area between the tool and toolholder.
- The aerosol lines should be laid in the lowest-vibration arrangement possible.
- The aerosol line should rise continuously to the machine. Downward bends should be avoided where possible, since lubricant could accumulate in these areas, for example when the machine is at standstill.
- If it is impossible to lay the aerosol lines without any downward bends, the accumulated lubricant must be blown out at regular intervals with the tool removed.
- Aerosol feeding to spindles or rotating tools should be in the axial direction. Radial feeding, especially at high spindle speeds, can lead to “centrifuging” of the lubricant, i.e., the aerosol will decompose. This is particularly important for applications with small and fast-rotating tools.
- The outlet of the cooling duct bore on the tool should not lie only on the tool’s cutting edge, as is usually the case with many tools for full spray lubrication. Optimal results are not attained when such tools are used, whereas minimal quantity lubrication systems can achieve much better results. Because of the considerably lower operating pressure of minimal quantity lubrication systems in comparison to full spray lubrication, the point between the tool and the workpiece is inadequately lubricated.

The following notes apply to the rotary leadthroughs and spindles of the machine tools:

IMPORTANT NOTE

Only rotary leadthroughs that are suitable for dry running may be used. The small lubricant quantities that are used for minimal quantity lubrication are insufficient for lubricating the rotary leadthrough.

Disregarding this fact could lead to considerable damage to the machine tool. Please contact the machine manufacturer and ask whether the rotary leadthrough of the machine tool is suitable for dry running

IMPORTANT NOTE

Rotary leadthroughs and spindles with integrated check valves must be modified.

Check valves are often built into rotary leadthroughs and spindles by the machine manufacturer. These check valves must be removed since it cannot be ensured that they would open completely because of the low operating pressure of the MQL system. Sufficient lubrication of the cutting process is therefore not ensured.
Please contact the machine manufacturer and ask how the check valves can be removed.
Please contact SKF Service if you have additional questions concerning installation of the MQL system.
- See the masthead, page 3.

4.4 Initial filling

☞ See Figure 6, page 30

IMPORTANT NOTE

Only lubricants provided by SKF may be used (see Chapter 2.3.1). SKF will not accept claims for damages resulting from the use of lubricants other than those approved by SKF.

IMPORTANT NOTE

Only fill using clean lubricant and an appropriate device. SKF recommends the use of a filling funnel with integrated fine strainer insert.

The first time the MQL system is used, the reservoir is filled prior to connecting the system to the customer's compressed air supply.

WARNING

System pressure
If the system is already connected to the compressed air supply, you must depressurize the reservoir before filling (see Chapter 4.4.1).

- If applicable, depressurize the aerosol reservoir (**1**) (see Chapter 4.4.1).
- Clean any contaminants from the outside of the VarioSuper.
- Loosen the check valve (**6**) (WAF 27).
- Remove the check valve (**6**) with the associated washer.

IMPORTANT NOTE

No aerosol can be generated if the reservoir is overfilled (fill level above the "Maximum" mark on the sight glass). Excess lubricant must therefore be drained in such cases. This is done by opening the oil drain plug at the base of the device (see Figure 2, item **10**).

- Fill lubricant up to the "Maximum" sight glass mark using a funnel.
- Apply the check valve (**6**) with washer to the aerosol reservoir (**1**). Ensure that the washer is in the correct position beforehand.
- Tighten the check valve (**6**) finger-tight.
- Clean any oil residues from the aerosol reservoir (**1**).

4.4.1 Depressurizing the aerosol reservoir

☞ See Figure 6, page 30

IMPORTANT NOTE

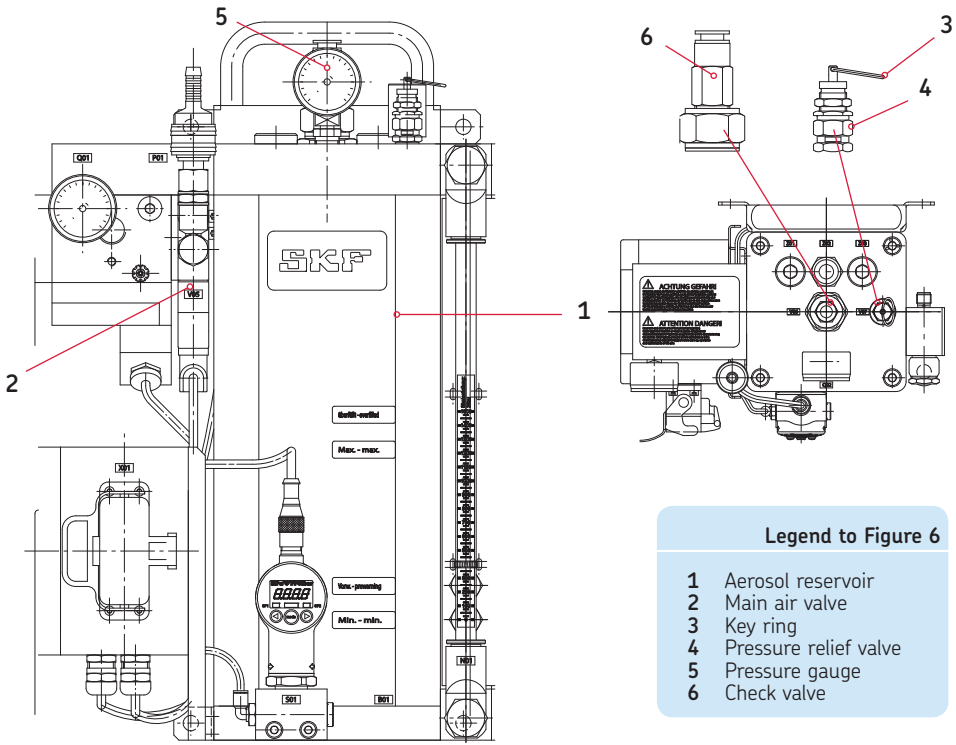
Escaping aerosol, wear goggles
Aerosol may escape during subsequent actuation of the pressure relief valve.

- To depressurize the aerosol reservoir (**1**), first close the main air valve (**2**). Then disconnect the MQL system from the compressed air line. Check the internal reservoir pressure using the pressure gauge (**5**) upstream of the filling coupling.
- Wait until the pressure has been released towards the tool via the aerosol outlets. If this path is shut off by a ball valve or similar, the pressure is released only via the relief setting of the main air valve.

☞ The valves must be opened by the machine control unit.

- Use the pressure gauge (**5**) to check whether the pressure has been completely released; if necessary, briefly actuate the pressure relief valve (**4**) using the key ring (**3**).

Depressurizing the aerosol reservoir, Fig. 6



Legend to Figure 6

1 Aerosol reservoir
2 Main air valve
3 Key ring
4 Pressure relief valve
5 Pressure gauge
6 Check valve

4.5 Compressed air connection

☞ See Figure 7

WARNING

System pressure
Depressurize the MQL system before connecting it to the compressed air supply.

WARNING

System pressure
Observe the maximum primary pressure of 10 bar.

The MQL system has a coupling socket with nom. size 8 for hoses with an inside diameter of 7-8 mm for connection to the compressed air supply.

- See Table 3 for the requirements for the supplied compressed air.

The MQL system can operate with a primary pressure as low as 4 bar. However, the system only reaches peak performance at or beyond a primary pressure of 6 bar.

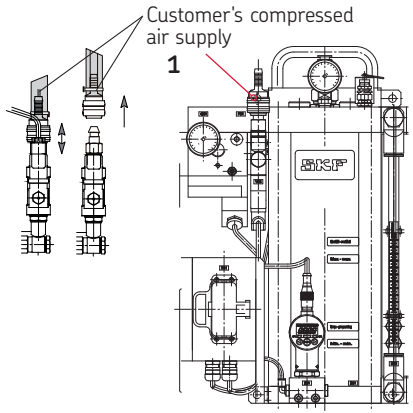
Compressed air requirements, Table 3

Requirements	Values
Maximum primary pressure	10 bar
Minimum primary pressure [1]	4 bar
Supply pressure when discharging 300 standard liters/min	max. 6 bar Overpressure
Compressed air quality class acc. to ISO 8573-1	5
Max. particle density	10 mg/m³
Max. pressure dew point	+7°C
Max. concentration of third-party lubricant	25 mg/m³

1) Depends on the diameter of the tool's cooling duct (back pressure)

- Connect the compressed air supply via the coupling socket (**1**).

Compressed air supply, Fig. 7



4.6 Electrical connection

☞ See Figures 8 to 10

IMPORTANT NOTE

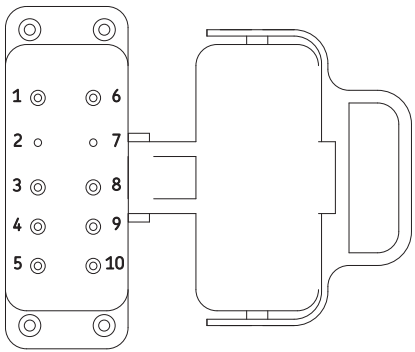
The electrical connection of the MQL system may only be established by qualified and trained technical personnel.
The instructions in this manual must be observed.

IMPORTANT NOTE

On the MQL system's electrical connections, ensure that appropriate measures prevent interference between signals due to inductive, capacitive, or electromagnetic couplings.

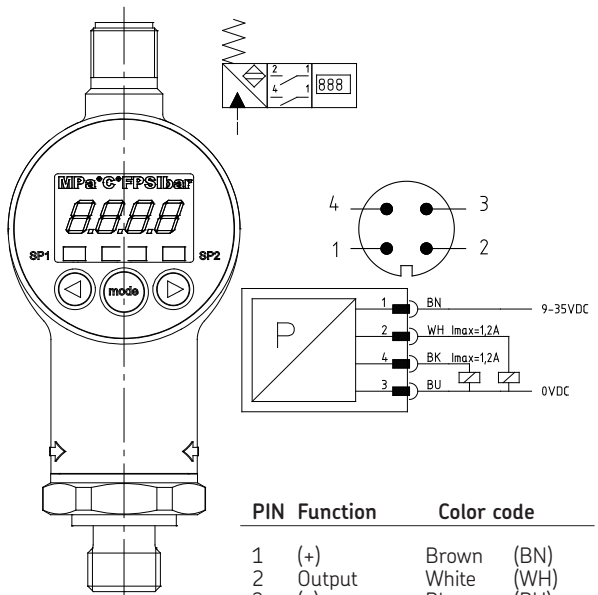
Shielded cables must be used in places where electrical interference fields can distort signal transmissions despite separate laying of cables. The rules and empirical values for "EMC-compliant" cabling must be taken into consideration.

Assignment of Harting connector, Fig. 8



Pin	Assignment	Pin	Assignment
1	+ 24 VDC	6	Not assigned
2	0 V (GND)	7	V04
3	V01	8	S01-V02
4	V02	9	S01-V04
5	V03	10	S01-1

Electronic pressure switch, Fig. 9



PIN	Function	Color code	
1	(+)	Brown	(BN)
2	Output	White	(WH)
3	(-)	Blue	(BU)
4	Output	Black	(BK)

Legend to Fig. 9

General characteristics	
Rated pressure range:	10 bar
Permissible overpressure:	30 bar
Burst pressure:	>50 bar
Adjustable display:	bar, psi, MPa
Ambient temperature:	-25 to +80°C
Temperature of medium:	-25 to +80°C
Materials in contact with medium:	Stainless steel; FKM
(FPM)	
Protection degree and class:	IP67
Mounting position:	Any
Vibration resistance:	<10g/0 to 500 Hz
Deviation from upper limit of effective range	
Accuracy (display):	<±0.5% FS typ [1])
	<±0.25% FS max.[1])
Temperature drift:	<±0.25%/10K
Electrical characteristics	
Operating voltage:	9 - 35 VDC
Power consumption without switching output:	max. 35 mA
Current-carrying capacity of signal outputs:	1.2 A
Number of signal outputs:	2
Type of signal outputs:	PNP transistor stages
Electrical connection:	M12x1 connector, 4-pin

1) FS (Full Scale) = relative to the full measuring range

4.7 Electrical fill level monitoring with up to four switching points (optional)

☞ See Figure 10

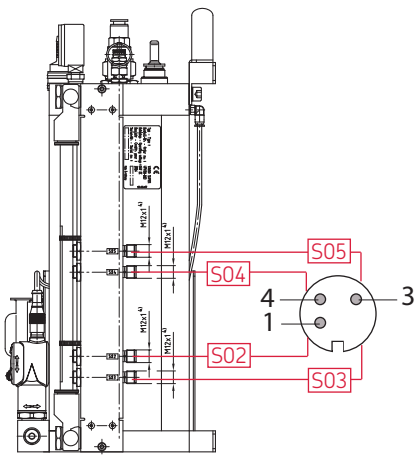
The VarioSuper MQL system can optionally be equipped with up to four fill level monitors with one switching point each.

They are assigned as follows:

Fill level monitor 1 (S02)
o Minimum fill level pre-warning (reserve: approx. 250 ml)
Fill level monitor 2 (S03)
o Minimal fill level (empty)
Fill level monitor 3 (S04)
o Maximum fill level
Fill level monitor 4 (S05)
o Device overfilled

If using a cable set with cable socket, see Chapter 12, "Accessories."

Electrical fill level monitoring with up to four switching points, Fig. 10



Fill level monitor S02-S05

Contact	Assignment
Pin 1	+ 24 VDC
Pin 3	0 V (GND) Ground
Pin 4	S02 = Min. fill level pre-warning
	S03 = Min. fill level
	S04 = Max. fill level
	S05 = Device overfilled

Groups

UFV20/30-001 - 2 fill level sensors (S02/S03)
UFV20/30-002 - 3 fill level sensors (S02/S03/S04)
UFV20/30-003 - 4 fill level sensors (S02/S03/S04/S05)

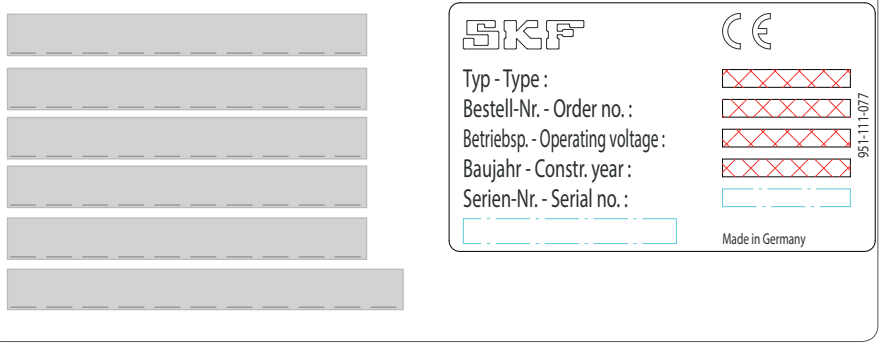
4.8 Note on the rating plate

☞ See Figure 11

The rating plate provides important data such as the type designation, order number, barcode, and serial number.
To avoid loss of this data in case a rating plate becomes illegible, these characteristics should be entered in Figure 12 below.

- Enter characteristics from rating plate in Figure 12 below:

Characteristics from rating plate, Fig. 11



4.9 Information on CE marking

The CE marking is based on the requirements of the applied Directives:

- 2004/108/EC Electromagnetic Compatibility
- 2011/65/EU(RoHS II)Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Note on Pressure Equipment Directive 2014/68/EU
Due to its performance characteristics, the product does not reach the limit values defined in Article 4, Paragraph 1, Subparagraph (a) item (i) and is, pursuant to Article 4, Paragraph 3, excluded from the scope of Pressure Equipment Directive 2014/68/EC.

VarioSuper
UFV 20-XXX/UFV 30-XXX

Minimal quantity lubrication for internal and external lubrication

Operating instructions associated with assembly instructions

1. Safety instructions

IMPORTANT NOTE

The operator of the product described here must ensure that the operating instructions are read and understood by all persons responsible for assembly, operation, maintenance, and repair of the product.
In addition to the operating instructions, general statutory regulations and other regulations for accident prevention and environmental protection must be observed and applied.

2. Lubricants

IMPORTANT NOTE

The lubricant notes listed in Chapter 2, “Lubricants," of the assembly instructions also apply without restriction to these operating instructions.

The operator of the product described here must ensure that the operating instructions are read and understood by all persons responsible for assembly, operation, maintenance, and repair of the product.
In addition to the operating instructions, general statutory regulations and other regulations for accident prevention and environmental protection must be observed and applied.

3. Delivery, returns, and storage

3.1 Checking the delivery

Immediately after receipt, the delivery must be checked for completeness according to the shipping documents. Any transport damage must be reported to the transport company immediately. The packaging material should be preserved until any discrepancies are resolved.

3.2 Return shipments

Before return shipment, all parts must be cleaned and properly packed (i.e., according to the requirements of the recipient country). There are no restrictions for land, air, or sea transport.

The following must be marked on the packaging of return shipments:

	Do not top load / This side up
	Keep dry
	Handle with care, Do not drop

WARNING

Personal injury/property damage

Do not throw the product.

The following conditions apply to storage:

3.3 Storage

3.3.1 Lubrication units

- Dry and dust-free surroundings, storage in well ventilated dry area
- Storage time: max. 24 months.
- Relative humidity: < 65%.
- Storage temperature: + 10 to +40°C.
- No direct sun or UV exposure
- Protected against nearby sources or heat or cold

3.3.2 Electronic and electrical devices

- Dry and dust-free surroundings, storage in well ventilated dry area.
- Storage time: max. 24 months.
- Relative humidity: < 65%.
- Storage temperature: + 10 to +40°C.
- No direct sun or UV exposure
- Protected against nearby sources or heat or cold

3.3.3 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
- Bare metallic surfaces must be protected using anti-corrosion agents Check corrosion protection every 6 months and reapply if necessary
- Motors must be protected from mechanical damage Do not store motors on the fan cowl

4. Assembly

4.1 Information on assembly

The assembly procedure for the product is described in detail in the assembly instructions (Chapter 4) associated with these operating instructions.

5. Functional description

5.1 Principle of minimal quantity lubrication (MQL)

Minimal quantity lubrication (MQL) involves total-loss lubrication, i.e., the lubricant is almost completely consumed during machining so treatment of the lubricant is not required. The actual lubrication is performed at the friction point between the tool and the chips running off in the chip groove. The lubricating effect is achieved by an aerosol, i.e., droplets of lubricant finely dispersed in an air flow. Minimal quantity lubrication provides for effective lubrication of cutting processes using very small amounts of lubricant. The arduous task of cleaning and disposing of large amounts of lubricant and cooling lubricant is greatly simplified or eliminated.

5.2 The principle of aerosol action

Aerosol is a mixture of air and lubricant in which air assumes the transfer properties for the lubricant. In terms of the size and distribution of lubricant droplets created, the SKF MQL system described here generates a very homogeneous aerosol with a droplet size of approx. 0.5 µm.
The lubricant droplets are very light due to their small size, which in turn results in a very low moment of inertia. These small droplets of lubricant can be transported over long stretches through lines and deflections without being deposited due to their moment of inertia.
Additionally, the transport of the aerosol through rotating spindles and tools is unproblematic for the MQL systems even at very high rotational speeds, since the effect of centrifugal force on the oil droplets is very low.

5.3 Design of the system

☞ See Figure 13

Figure 13 shows the basic structure of the VarioSuper minimal quantity lubrication system. The key components are described in more detail in the following sections.

5.3.1 Aerosol generator and lubricant reservoir

The heart of the SKF MQL system VarioSuper is the compressed air aerosol generator integrated into the aerosol reservoir (**8**). The reservoir at the same time serves for storage and as a pressure accumulator during operation.

The aerosol generator unit is comprised of several differently designed aerosol generators that can be combined. These generators and a valve system controlling the quantity of air required to generate the aerosol (see following section) enable the generation of aerosols with very different lubricant content. Thus, for different tools, the required delivery rate can be ensured to accommodate the cross-sectional and geometrical properties of the tool.

5.3.2 Main air valve

The main air valve (**5**) separates all downstream units of the MQL system from the compressed air supply. No aerosol is produced when the main air valve is closed. When the valve is closed, the lubricant reservoir is vented if the aerosol can flow out unimpeded through the aerosol lines.

The main air valve is controlled by the machine control unit via a multi-pole control line.

5.3.3 Valve cluster

The quantity of air required to generate aerosol is controlled by means of four valves which are integrated in a valve cluster (**13**). Three of these valves control the composition of the aerosol, while the fourth valve can be used to supply additional air to increase the transport speed for of the aerosol (auxiliary air valve - see following section).

The valves are directly controlled by the machine control unit via a multi-pole control line. By combining the operation of the different valves, the lubricant concentration of the aerosol can be adapted to the processing task at hand.

The respective switching conditions of the valves are indicated by LEDs on the valve cluster. When an LED is on, the valve is being energized, i.e., it is open.

5.3.4 Auxiliary air valve

Using the auxiliary air valve, air may be added to the aerosol, ensuring sufficient flow velocity of the aerosol even if very little lubricant is required (e.g., for tools with very small cooling duct diameter). The air added by this valve does not flow through the aerosol generator (also refer to the functional diagram, Chapter 5.4, page 47).

5.3.5 Pressure switch

This pressure switch (**11**) is used to monitor the pressure difference between the reservoir´s interior and the primary pressure. The pressure switch interrupts the compressed air supply and no more aerosol is produced if the pressure difference drops below a certain factory-set value due, e.g., to the use of a tool with a very small cooling duct cross-section. Aerosol which has already been produced drains off. Aerosol generation continues when the differential pressure rises again. This process is referred to as pressure differential control.

Pressure differential control is active when voltage is applied to the pressure switch. If the pressure switch remains voltageless, pressure differential control is shut off. More information concerning the pressure switch can be found in the respective operating manual.

5.3.6 Pressure gauge

The system features two pressure gauges. The pressure gauge, item (**4**), indicates the current primary pressure applied to the MQL system by the compressed air supply system; the pressure gauge, item (**6**), indicates the internal reservoir pressure.

If the MQL system operates intermittently, the pointer of the pressure gauge, item (**6**), alternates between two values. This type of indication is system-inherent and does not indicate an error condition.

5.3.7 Fill level indicator and monitoring

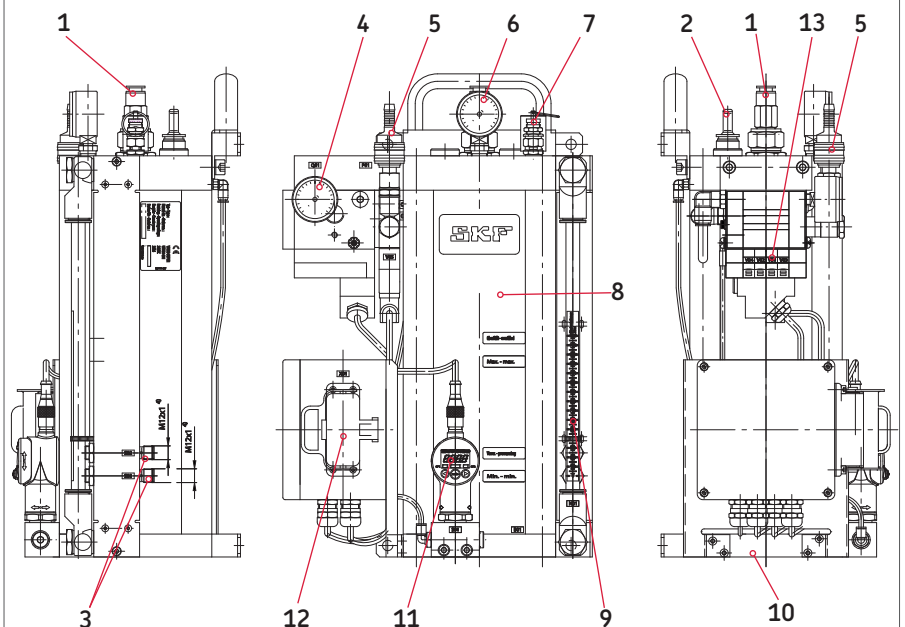
The lubricant level in the reservoir is continuously indicated by a spy glass (**9**) with scale. Depending on the version, the filling level may be monitored by means of sensors, while critical lubricant supply levels may be reported to the machine control unit.

When the reservoir is overfilled (fill level higher than “Maximum”), the excessive lubricant must be drained (see Chapter 8.3, page 74), since aerosol can otherwise not be generated.

5.3.8 Pressure relief valve and other safety measures

As a safety device, a pressure relief valve is installed in the cover flange of the reservoir (**7**); it limits the interior reservoir pressure if the pressure to max. 12 bar. Manual operation of the pressure relief valve depressurizes the aerosol generator.
As a further safety measure, the thread of the fillport is provided with a groove. This ensures that the pressure can escape if the cover is accidentally removed from the pressurized reservoir. The same applies to the screw plugs for the alternative outputs. However, these screws have bores that ensure the pressure will escape from the reservoir as soon as the screw is loosened somewhat.

Overview of VarioSuper, Fig. 12



Item	Index	Description
1	V06	Lubricant filling port with check valve
2	Z01 -Z03	Aerosol outlets (3x), push-in type connectors for tube diameter 12 mm
3	S03 - S05	Electrical connections for filling level monitoring
4	Q01	Pressure gauge for primary air pressure
5	V01 P01	Main air valve with Compressed air connection (NS 8)
6	Q02	Pressure gauge for reservoir inside pressure
7	V07	Pressure relief valve (12 bar)
8	B01	Aerosol reservoir
9	N01	Filling-level display for lubrication oil
10	Z04	Oil drain screw
11	S01	Electronic pressure switch
12		Electrical connection plugs
13	V01-V04	Valve cluster

Note:
Index - see Functional diagram Figure 13

5.4 Functional description

The MQL system VarioSuper is operated with compressed air. Figure 13, page 46 shows the functional diagram.

The compressed air passes the main air valve (**V05**) and reaches the valve cluster (**V01-V04**), where the quantity of air required for the respective lubricant quantity is set. Next the air flows into the aerosol reservoir (**B01**), in which the operating pressure, also referred to as interior reservoir pressure, builds up. Subjected to this pressure, lubricant flows from the reservoir through the lubricant supply line to the aerosol generator unit, where the aerosol is generated with the aid of the incoming air. The aerosol is then transported by the air through one or several aerosol lines (**Z01-Z03**) to the tool or lubrication point connected

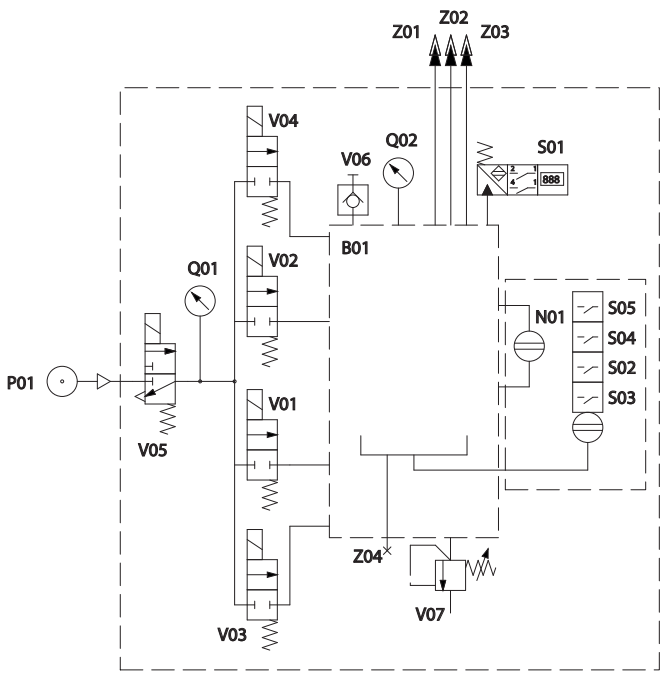
The MQL system VarioSuper is controlled by the machine tool, which, upon specification of the customized tool-specific M commands, outputs the required control signals to the MQL system.

The valves of the valve cluster are operated on the basis of these signals, thus achieving the required aerosol composition. Additionally, the main air valve and the auxiliary air valve are controlled by the machine control unit.

Also, the differential pressure control (**S01**) of the MQL system may be activated or deactivated as needed.

Differential pressure control is an operating mode of the MQL system, in which the pressure difference between the primary air pressure and the interior reservoir pressure is monitored. If the differential pressure drops below a certain factory-set value, e.g., because a tool with a very small cooling duct cross section is used, the compressed air supply is shut-off and no further aerosol produced. Aerosol which has already been produced drains off. Aerosol generation continues when the differential pressure rises again. This process is referred to as “intermittent operation” and is clearly detectable by operating noises.

Functional diagram of the MQL system VarioSuper, Fig. 13



Explanations

B01	Aerosol reservoir
N01	Fill level indicator
P01	Compressed air connection
Q01	Pressure gauge for primary pressure, display in bar
Q02	Pressure gauge for internal reservoir pressure, display in bar
S01	Electronic pressure switch
S02/03/04/05	Capacitive fill level monitoring
V01-V03	Valves for regulation the aerosol composition
V04	Additional air valve
V05	Main air valve
V06	Filler coupling
V07	Pressure relief valve
Z01-Z03	Aerosol outlets
Z04	Oil drain plug

6. Commissioning

IMPORTANT NOTE

Only fill using clean lubricant and an appropriate device. Contaminated lubricants lead to system malfunctions.

6.1 General

The optimal configuration for the MQL system VarioSuper depends on a variety of factors such as the primary pressure applied, the length of the aerosol transport lines, the type and size of the tool, as well as the cooling duct cross-section and the machining process. It is therefore not possible to predefine the setting parameters required to the particular machining situation.
The setting parameters shown in Table 4, page 51 are reference values and are intended to provide general orientation for configuring the MQL system for the customer's specific application.

In order to achieve the optimal results for the customer's machining process, the required settings must be ascertained and optimized on the basis of test runs.

After an extended machine downtime or a tool replacement, there may be temporary discontinuities in aerosol feeding at the lubrication point and an oil mist may form. However, lubricant feeding will restabilize and any oil mist will be eliminated during operation.

6.2 Effects of primary pressure

The MQL system VarioSuper draws the power required for aerosol generation from the compressed air supplied to the system. The systems are ready for operation and generate an aerosol adequate for most lubrication tasks at a primary pressure of 4 bar. The compressed air supply controlled by differential pressure can also ensure adequate lubricant supply to small tools.

However, the systems only reach peak performance at or beyond a **primary pressure of 6 bar**.

6.3. Using the auxiliary air valve

The auxiliary air can be used to increase the amount of air for aerosol transport. Note that the lubricant concentration in the aerosol decreases because it is enriched with air.

6.4 Procedures for setting parameters

IMPORTANT NOTE

If the MQL system is adjusted improperly, tools or workpieces may be damaged.

The following instructions will help find the correct settings for the MQL system regarding the particular application.

- Select a basic setting from Table 4 and program the machine control unit accordingly.
- Switch the MQL system on via the machine control unit.
- With the spindle at a standstill, check whether the aerosol can flow unimpeded through the duct system of the machine tool. This can be seen best if the tool is removed from the toolholder. The aerosol must emerge visibly from the duct system.
- Clamp the tool back into the toolholder and hold an oil-free workpiece surface approx. 1 - 3 mm below the tool at the outlet duct. If no lubricant film forms on the workpiece surface, there is a fault in the tool's duct system. Inspect the tool and the toolholder.
- Adapt the aerosol mixture and amount for the processing procedure until you achieve the desired result.
- Store the ascertained settings in the machine control unit so that you can retrieve them again when necessary.

6.5 Commissioning

Commissioning the MQL system involves a functional check and setting of the operating parameters.

Proceed as follows for commissioning:

- Before commissioning, ensure that the control cabinet housing and all its connections are firmly in place.
- Check that a sufficient amount of lubricant is in the lubricant reservoir.
- Check that compressed air is present.
- Set the operating parameters as described in the preceding chapter.
- Start the system.

Parameter settings for VarioSuper UFV 20-XXX/UFV 30-XXX, Table 4

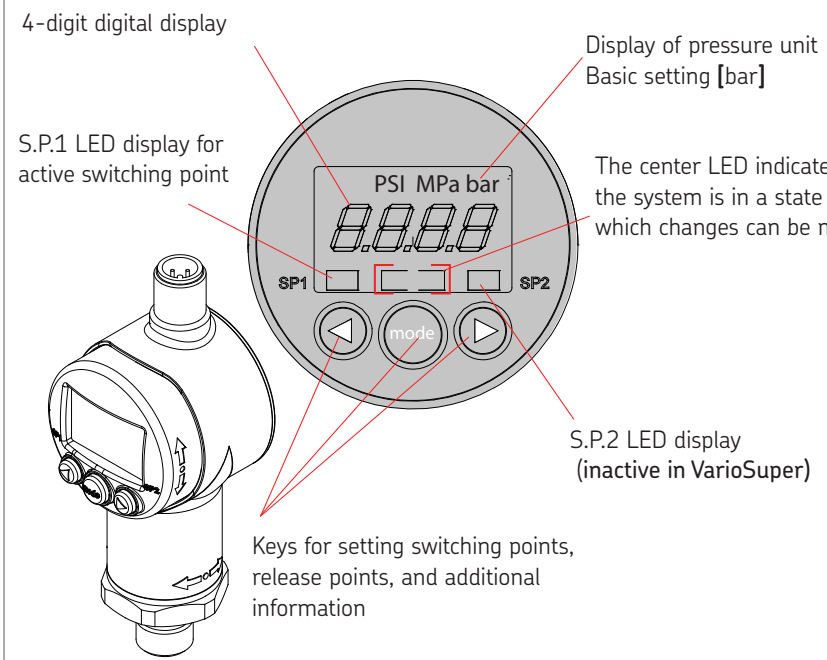
Tool geometry		Control of the valves and the pressure switch 0=No signal, valve closed, 1=signal, selected valve open							Oil quantity[1] in ml/h at primary air pressure of		
		Aerosol valves			Auxiliary air	Main valve	Pressure switch				
Cooling duct diameter	Cooling duct area	V01	V02	V03	V04	V05	S01-V02	S01-V04	4 bar	6 bar	8 bar
0.8	0.5	1	0	0	0	1	1	0	3	4	5
1	0.8	1	0	0	0		1	0	5	6	7
2	3.1	1	0	0	0		0	1	1	6	7
		1	0	0	0		0	0	6	7	8
		1	0	0	0		1	0	22	23	28
3	7.1	0	1	0	0		0	1	9	14	16
		0	1	0	0		0	0	24	25	26
		0	0	1	0		1	0	30	33	38
5	19.6	0	1	0	0		0	0	28	30	32
		0	1	1	1		0	0	50	70	100
7	38.5	0	0	1	0		0	0	65	75	120
		0	1	1	0		0	0	110	130	190

[1] The quantities indicated may differ in actual operation, since it is not possible to take into account the on-site influences of the aerosol line (rotary leadthrough, spindle, tool connection, tool, speed). Oil quantities apply to static operation (+/- 20%).

6.6 Electronic pressure switch

6.6.1 Overview

Controls, Fig. 14

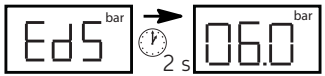


The MQL system VarioSuper is equipped with an electronic pressure switch that detects the current pressure in the aerosol reservoir and manages this pressure internally in the MQL system.

Depending on the design, the device offers the following functions:

- Display of the current measured pressure in PSI, MPa, and bar
- Display of a set switching point
- Actuation of switching points according to pressure and the set switching parameters
- Diagnostic signal to query the status of the pressure switch
- Menu for basic settings (adjustment of the pressure switch to the particular application)
- Programming releases

After the supply voltage is switched on, the device briefly displays "EdS" and begins displaying the current pressure (basic setting: bar).



The "S.P.2" (switching point 2) switching function and "HY2" (hysteresis 2) are not used in VarioSuper series UFV 20-XXX and UFV 30-XXX!

6.6.2 Output characteristics

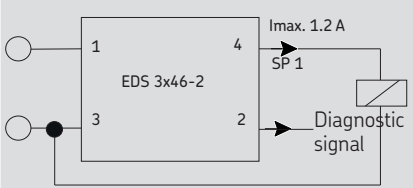
In terms of hardware, the electronic pressure switch is equipped with two switching outputs with switching points S.P.1 and S.P.2.
Switching point S.P.1 is actively used by the VarioSuper minimal quantity lubrication system, while the S.P.2 switching output is inactive.
A hysteresis H.Y.S.1 can be set for switching point S.P.1. The output switches once the set switching point is reached and switches back if the value falls below the release point. The release point is defined by the set hysteresis.

(release point = switching point minus hysteresis).
Abbreviations: "**S.P.1**" = switching point 1
"**H.Y.S.1**" = hysteresis 1

6.6.3 Pin assignment

Pin assignment of the pressure switch, Fig. 15

"S.P.1" design



Connections:
4-pin plug, M12x1

6.6.4 Overview of basic settings / default settings

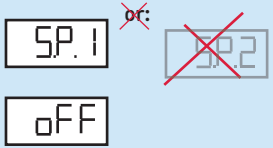
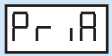
Overview of basic settings, Table 5

Setting		Display	Adjustment range	Default VarioSuper
Operating mode (TYPE)				
SPAn	1 switching output, 1 diagnostic output with non-adjustable hysteresis (0.5% FS), hydraulic clamping mode	TYPE	SPn /diAG /2SP	diAG
diAG	1 switching output, 1 diagnostic output, diagnostic mode			
2SP	2 switching outputs (inactive, not for Digital Super)			
Switching mode of switching output 1 (Sm 1)				
SP	Switching output 1 operates in hysteresis function switching point	Sm 1	SP / Win	SP
Win	Switching output 1 operates in window function			
Switching direction of switching output 1 (S 1)				
on	Make function	Sd 1	ON / OFF	on
oFF	Break function			

Overview of basic settings, Table 6

Setting		Display	Adjustment range	Default VarioSuper
Set the display range (RANGE) When switching between bar, PSI, and MPa, the electronic pressure switch automatically scales the switching settings to the newly selected unit.				
bAr SP.1 oFF	The pressure is displayed in bar. The pressure is displayed in PSI. The pressure is displayed in MPa.	rAnG	BAR/ PSI/ MPa	bAr
Version number (version)				
Displays the current software version (for viewing only).		UEr6		
End the basic setting (End)				
YES no	Leave the basic settings menu. The basic settings can continue to be edited.	End	YES/ NO	no

Overview of basic settings, Table 7

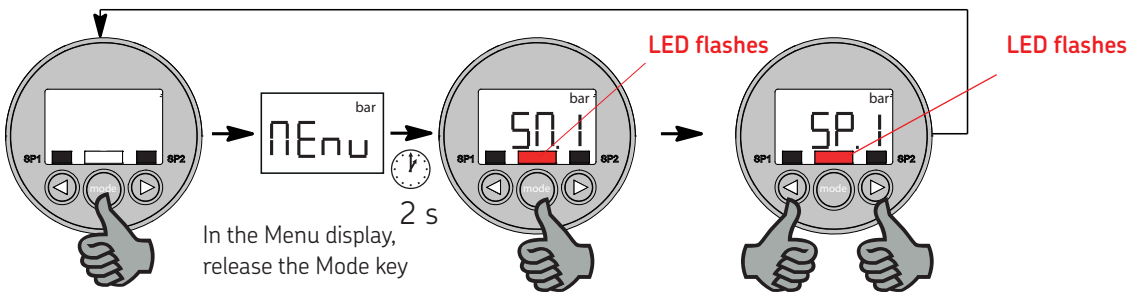
Setting		Display	Adjustment range [s]	Default VarioSuper
ON delay for switching output 1 (T_{on} 1)				
The time (in seconds) during which the switching point must be reached or exceeded in order for a switching operation to be performed			0.00..99.99s	0.01
OFF delay for switching point 1 (Toff 1)				
The time (in seconds) during which the value must be below the respective release point in order for a switching operation to be performed			0.00..99.99s	0.01
Primary display (Primary) Value that should be constantly shown in the display				
	Current pressure Switching point 1 (switching point 2 is inactive) Display is dark		ACT/ S.P.1/ S.P.2/ OFF	

6.7 Changing the basic settings

The pressure switch for the VarioSuper series UFV 20-XXX and UFV 30-XXX is preset for operation with a system pressure **of 6 bar**. The characteristics of the electronic pressure switch can be modified using several basic settings to adapt to the particular situation. These are summarized below.

☞ **No switching functions are executed while the menu is active!**

☞ If "LOC" appears in the display while attempting to configure, it indicates that programming is locked.
Remedy: Set programming release(s) to "free". (see Chapter 6.10)



- Press and hold the mode key and switch on the supply voltage.
- Press the mode key until the Menu message appears on the display.
- Press the mode key until the desired menu item is shown on the display.
- Release the mode key.
- Change the settings using ◀ or ▶ and then select the menu item.

6.8 Setting switching point S.P.1 and hysteresis

☞ The middle LED starts blinking when you enter the basic settings menu.
If no key is pressed after 2 minutes, the device will return to normal pressure switch mode without saving the changed values. The flashing frequency increases 20 seconds before this time expires.

The customer is permitted to change the default setting only to define the primary switching point "S.P.1" and its hysteresis "H.Y.S.1". This setting is based on the primary pressure supplied by the customer. See Table 8 for the corresponding setting for "S.P.1" and "H.Y.S.1".

- Simultaneously press the keys ◀ and ▶

☞ The display shows "**Free**".

- Press the "**mode**" key to select the desired parameter.

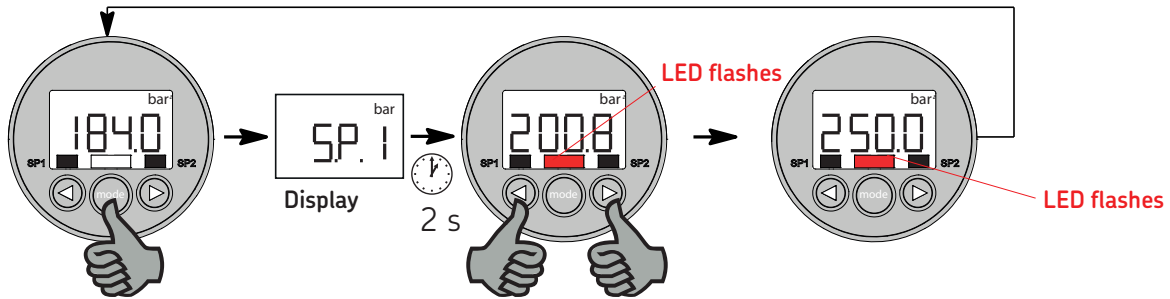
☞ If the switching point function is set, "**S.P.1**" or "**H.Y.S.1**" appears.

Note!
The "S.P.2" (switching point 2) switching function and "H.Y.S.2" (hysteresis 2) are not used in VarioSuper series UFV 20-XXX and UFV 30-XXX!
Change the setting using the ◀ and ▶ keys.

- Additional parameters can be selected using the "**mode**" key and the setting can be changed using the ◀ and ▶ keys.

☞ Pressing the "**mode**" key saves the settings. If no key is pressed within 2 minutes, the device will return to normal pressure switch mode without saving the changed values. Key operation is locked at the same time.

6.8.1 Setting the switching point in "S.P.1" mode



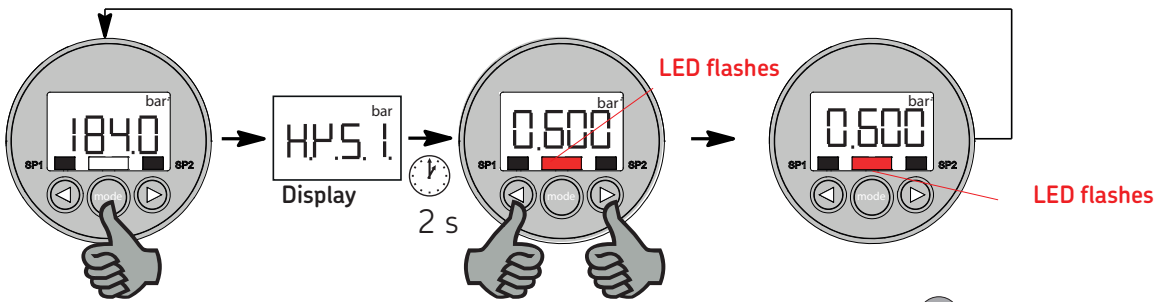
- Normal pressure switch operation, press the mode key until the desired parameter is set.
- Set the switching point
  - = Reduce value
  - = Increase value , e.g., to 4.5 bar
- Press the mode key to accept the setting.

- Pressing and holding the ◀ or ▶ key while changing the value causes it to be automatically incremented.
- If a setting has been changed, "PROG" appears briefly when switching the display. The new setting has been stored in the device.

Table 8

Primary operating air [bar]	Switching point [S.P.1] [bar]	Hysteresis [bar]
5 (Factory setting)	03.0	0.60
6	04.0	
7	05.0	
8	06.0	
9	07.0	
10	08.0	

6.8.2 Setting the switching point in "H.Y.S.1" mode



- Normal pressure switch operation, press the mode key until the desired parameter is set.
- Set the switching point
  = Decrease value , e.g., to 0.3 bar
  = Increase value
- Press the mode key to accept the setting.

☞ If "LOC" appears in the display while attempting to configure, it indicates that programming is locked. **Remedy:** Set programming release(s) to "free". (see the "Programming releases" chapter)

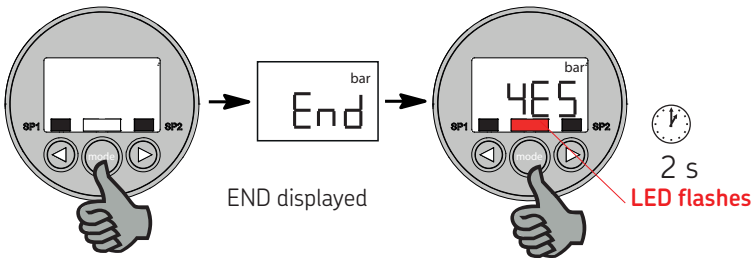
- Pressing and holding the ◀ or ▶ key while changing the value causes it to be automatically incremented.
- The display shows "PAOG " when a change is made, then the new data is stored.

Table 8

Primary operating air [bar]	Switching point [SP1] [bar]	Hysteresis [bar]
> 4	02.0	
5	03.0	
6	04.0	0.60
7	05.0	
8	06.0	
9	07.0	
10	08.0	

6.9 Ending the basic setting

☞ **No switching functions are executed while the menu is active!**

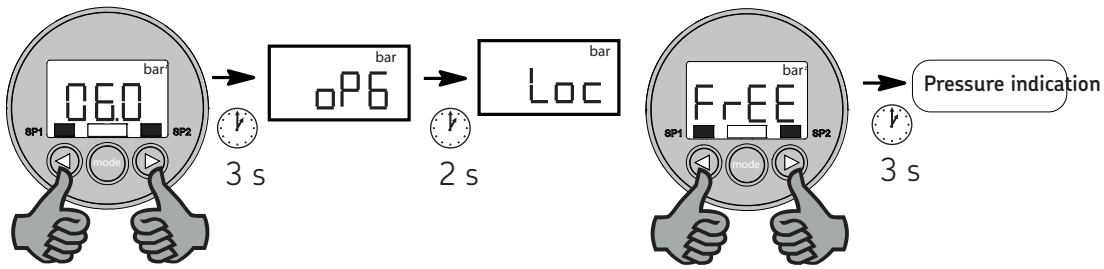


- Press the mode key until the "**END**" message appears on the display.
- Press the mode key until the "**YES**" menu item is shown in the display.
- Release the mode key.

If the basic settings have been modified, the message "**ProG**" appears briefly when leaving the basic settings and then the value selected in primary display is shown.
If an internal error occurs during operation (e.g., the measuring cell fails), all switching outputs are set to the value "**0**" and the diagnostic outputs report an error. The error cannot be acknowledged during operation.

6.10 Enabling or disabling the pressure switch

In standard mode, the pressure switch (DS) is not locked. If, however, the pressure switch is locked (Loc), proceed as shown below.



- Simultaneously press both arrow keys and hold them for 3 seconds.
- Release the arrow keys as soon as this display appears.
- Change settings using ◀ or ▶.
  FrEE = Program is free
  Loc = Program is locked

7. Operation/decommissioning and disposal

IMPORTANT NOTE

Only lubricants provided by SKF may be used (see the assembly instructions, Chapter 2.3.1, “Approved lubricants”).
SKF will not accept claims
for damages resulting from the use of lubricants other than those approved by SKF.

IMPORTANT NOTE

Only fill using clean lubricant and an appropriate device. Contaminated lubricants lead to system malfunctions.

7.1 Operation

The described product functions automatically. The lubricant transport in the aerosol line should, however, be subjected to regular visual inspection.
The lubricant fill level in the aerosol reservoir should be subjected to visual inspection on a regular basis. Top up the lubricant if the fill level is too low.

IMPORTANT NOTE

Escaping aerosol, wear goggles
Aerosol may escape during subsequent work.

7.2 Temporary shutdown

If the MQL system will be shut down temporarily, the entire system should be disconnected from the compressed air supply and the reservoir depressurized. Additionally, the system must be disconnected from operating voltage and properly protected against restarting and direct contact.

In case of an extended shutdown, it is recommended that the lubricant also be drained.Follow the instructions in the "Assembly" chapter.

Also follow the instructions in the chapter “Delivery, returns, and storage.”

7.3 Decommissioning and disposal

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

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.

CAUTION

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.

8. Maintenance

8.1 General information

WARNING

System pressure
Depressurizethe aerosol reservoir before starting maintenance work (see Chapter 8.2.1).

WARNING

Electric shock
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.

SKF products are low-maintenance. All connections and fittings must be regularly inspected for proper seating to ensure proper function. If necessary, the product's exterior can be cleaned using mild cleaning agents that are compatible with the product's materials (non-alkaline, non-soap).
For safety reasons, the product should be disconnected from the power supply. Do not allow any cleaning agent to enter the interior of the product during cleaning. The interior of the product is not designed or permitted to be cleaned.
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.

IMPORTANT NOTE

Dismantling of the aerosol reservoir or individual parts of the MQL system within the statutory warranty period is not permitted and voids any claims.

IMPORTANT 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 shall not be held liable for damages resulting from improperly performed assembly, maintenance, or repair work on the product.

8.2 Filling the aerosol reservoir

8.2.1 Depressurizing the aerosol reservoir

IMPORTANT NOTE

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

☞ See Figure 16, page 67

- To depressurize the aerosol reservoir (**1**), first close the main air valve (**2**). Then disconnect the MQL system from the compressed air line. Check the internal reservoir pressure using the pressure gauge (**5**) upstream of the filling coupling.

- Wait until the pressure has been released towards the tool via the aerosol outlets. If this path is shut off by a ball valve or similar, the pressure is released only via the relief setting of the main air valve.

☞ The valves must be opened by the machine control unit.

- Use the pressure gauge (**5**) to check whether the pressure has been completely released.
  if necessary, briefly actuate the pressure relief valve (**4**) using the key ring (**3**).

8.2.2 Filling the aerosol reservoir

☞ See Figure 16, page 67

IMPORTANT NOTE

Only fill using clean lubricant and an appropriate device. SKF recommends the use of a filling funnel with integrated fine strainer insert.

WARNING

System pressure

If the system is already connected to the compressed air supply, you must depressurize the reservoir before filling (see Chapter 8.2.1).

- Clean any contaminants from the outside of the VarioSuper.
- Loosen the check valve (**6**) (WAF 27).
- Remove the check valve (**6**) with the associated washer.

IMPORTANT NOTE

No aerosol can be generated if the reservoir is overfilled (fill level above the "Maximum" mark on the sight glass). Excess lubricant must therefore be drained in such cases. This is done by opening the oil drain plug (**7**).

- Fill lubricant up no higher than the “Maximum” sight glass mark using a funnel.
- Apply the check valve (**6**) with washer to the aerosol reservoir (**1**). Ensure that the washer is in the correct position beforehand.
- Fasten the check valve finger-tight.
- Clean any oil residues from the aerosol reservoir (**1**).
- Switch on the customer's compressed air supply.

8.3 Draining lubricant from the aerosol reservoir

☞ See Figure 16, page 67

WARNING

System pressure
Depressurize the aerosol reservoir before draining the lubricant.

- To depressurize the aerosol reservoir (**1**), first close the main air valve (**2**). Then disconnect the MQL system from the compressed air line. Check the internal reservoir pressure using the pressure gauge (**5**) upstream of the filling coupling.
- Wait until the pressure has been released towards the tool via the aerosol outlets. If this path is shut off by a ball valve or similar, the pressure is released only via the relief setting of the main air valve.

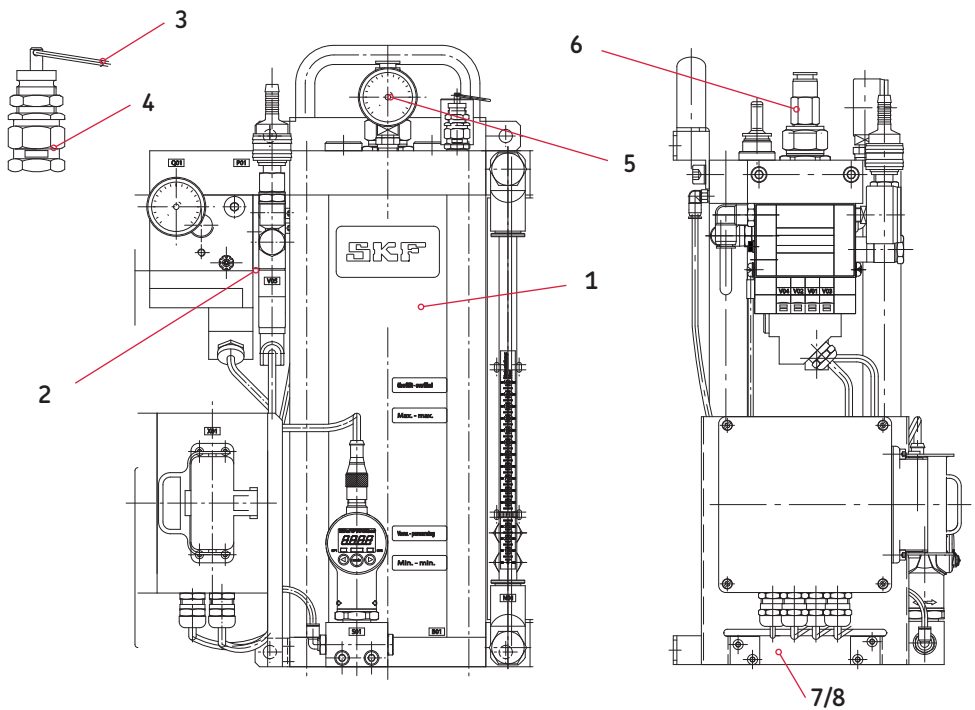
☞ The valves must be opened by the machine control unit.

- Use the pressure gauge (**5**) to check whether the pressure has been completely released; if necessary, briefly actuate the pressure relief valve (**4**) using the key ring (**3**).
- Clean any contaminants from the outside of the VarioSuper.
- Place the oil drip tray (provided by customer) under the VarioSuper MQL system.
- Carefully loosen the oil drain plug (WAF 10) (**7**) at the base of the reservoir.
- Remove the oil drain plug (**7**) with washer (**8**).

☞ After the lubricant has been drained, apply a new washer to the oil drain plug.

- Place the oil drain plug (**7**) with a new washer (**8**) on the oil drain bore and tighten it.
- Remove the customer's oil drip tray and clean any oil residues from the outside of the VarioSuper.

Maintenance work, Fig. 16



9. Malfunctions, causes, and remedies

The following requirements must be met so that the MQL system functions smoothly:

- The system is correctly connected.
- Compressed air with an adequate primary air pressure (at least 4 bar) is supplied.

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

WARNING

System pressure
The product described here is pressurized during operation. Depressurize the product before starting any assembly, maintenance, or repair work (see Chapter 8.2.1).

IMPORTANT NOTE

Dismantling of the product or individual parts thereof within the statutory warranty period is prohibited and voids any claims.

IMPORTANT NOTE

All assembly, maintenance, and repair work beyond this scope must be performed by SKF's service department.

IMPORTANT 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.

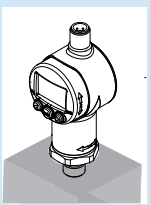
WARNING

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.

9.1 Commissioning, product, and system malfunctions

Malfunction	Cause	Remedy
The system does not produce any aerosol.	o Use of lubricants not approved by SKF o The system is defective or misadjusted.	• Use only lubricants which have been approved by SKF. • Contact SKF's service department.
No aerosol is reaching the tool.	o The aerosol lines are bent, blocked, or have excessive changes in cross-sections.	• See the line arrangement instructions in the assembly instructions, Chapter 4.3, page 25, "Connecting aerosol lines."
	o A shutoff valve (if present) on the spindle inlet is not actuated / is incorrectly actuated.	• Contact the manufacturer of the machine tool.
	o A check valve is installed in the spindle.	• Remove the check valve. • See the instructions in the assembly instructions, Chapter 4.3, page 27, "Rotary leadthrough and spindle."
	o The existing spindle is unsuitable (e.g., rough transitions, excessively narrow cross-section).	• Use suitable spindles; contact the manufacturer of the machine tool.
	o The rotary leadthrough is unsuitable.	• See the instructions in the assembly instructions, Chapter 4.3, page 27, "Rotary leadthrough and spindle."
No aerosol is reaching the tool.	o The transitions from the spindle to the toolholder are unfavorable.	• Use only toolholders which are suitable for minimal quantity lubrication.

Malfunction	Cause	Remedy
No aerosol is reaching the tool.	o The toolholder is leaky.	• Use only toolholders which are suitable for minimal quantity lubrication.
	o The tool has an unsuitable lead-in and a very small cooling duct.	• Use only tools which are suitable for minimal quantity lubrication.
	o For small tools: the primary pressure is too low.	• Increase the primary pressure.
Machining is incorrect despite adequate aerosol discharge at the tool.	o The tool has an unsuitable outlet bore.	• Use only tools which are suitable for minimal quantity lubrication.
	o The cutting parameters are not adapted to machining using minimal quantity lubrication.	• Change the cutting parameters.
The system does not operate intermittently and the interior reservoir pressure is equal to the system pressure.	o The pressure switch for pressure differential control is defective or misadjusted.	• Contact SKF's service department Correct the setting if required (observe Chapter 6.6 "Electronic pressure switch")

Electronic pressure switch display			
	Display	**Cause**	**Remedy**
	**E.01**	The settings for the switching points and hystereses established a release point outside the permissible setting range. Example: switching point is set to 180 bar and hysteresis to 200 bar.	Correct the settings.
	E.10	A data error was detected in the stored settings. Possible causes are strong electromagnetic interference or a component defect.	Check all settings (programming releases, switching points, release points, and basic settings) and correct them if necessary. If the error occurs frequently, please contact our service department.
	E12	An error was detected in the stored calibration data. Possible causes are strong electromagnetic interference or a component defect.	Disconnect the device from the power supply and then reconnect. If the error message continues to be displayed, the device must be returned to the factory for recalibration or repair.
	E21	Internal communication error	The error can be acknowledged by pressing the "**mode**" key. If the error message continues to be displayed after acknowledgement, the device must be sent back to the factory.

10. Technical data

10.1 VarioSuper UFV 20-XXX / UFV 30-XXX

		Characteristics
Designation	**Unit**	
Housing		AL
Ambient temperature	°C	+10 to +40
Mounting position		Vertical, connections upward
Exterior dimensions H x W x D	mm	426 x 270 x 200
Empty weight	kg	9.5
Operating pressure of compressed air		
Primary Pressure maximum	bar	10
Primary pressure, min.	bar	4 (dependent on the diameter of the tool's cooling ducts, i.e., on the back pressure)
Aerosol reservoir capacity	l	1.8
Lubricant output [1])	ml/h	1-200
Air consumption [1])	Nl/min	1-300
Air flow rate	Nl/min	10-500 (dependent on primary air pressure and diameter of cooling ducts)
Purity of permissible compressed air		At least quality class 5 as defined by DIN ISO 8573-1: max. particle size/ 40 µm/10 mg/m³; pressure dew point 7°C; water content max. 7,800 mg/ m³; residual oil content max. 25 mg/m³.
Aerosol outlets		3 (optional)
Specification for aerosol hoses	Ø mm	12 (material: polyamide)
Compressed air connection of aerosol outlets		Coupling socket nom. size 8 for hose (internal)Ø 7-8 mm
Electrical system		
Harting plug connector	HAN	10A
Fill level control (2 x capacitive switches)		
Switched voltage	VDC	24
Switched current, max.	A	0.2
Protection class acc. to DIN 40050	IP	64
Main air valve		
Operating voltage	VDC	24
Power consumption	A	2
Protection class acc. to DIN 40050	IP	65
Pressure switch		
Protection class acc. to DIN 40050	IP	67

1) *Depends on the diameter of the tool's cooling ducts (back pressure) and the lubricant.*

10.2 Electronic pressure switch

Electronic pressure switch, characteristics	
Input variables	
Measuring ranges	10 bar
Overload ranges	30 bar
Burst pressure	50 bar
Output variables	
Accuracy (display)	≤±0.5 % FS typ. [1] ≤± 1 % FS max. [1]
Reproducibility	≤±0.25 % FS max.
Temperature drift	≤±0.25 % / 10 K zero point max. ≤±0.25 % / 10 K range max.
Switching outputs	
Design	PNP transistor output
Switched current	Max. 1.2 A
Switching cycles	> 100 million
Response time	< 10 ms
DESINA diagnostic signal (pin 2)	
Function	OK: HIGH level; not OK: LOW level
Level	HIGH: = +Ub ; LOW: < + 0.3 V
Ambient conditions	
Medium temperature range	-25 to +80°C
Ambient temperature range	-25 to +80°C
Storage temperature range	-40 to +80°C
Rated temperature range	-10 to +70°C
CE marks	EN 61000-6-1, EN 61000-6-2, EN 61000-6-3, EN 61000-6-4

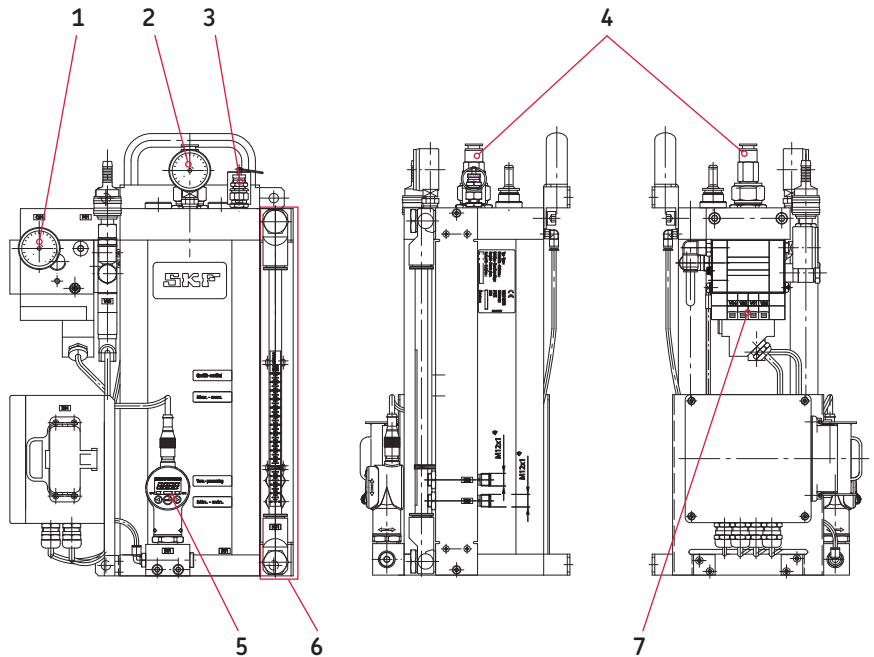
1) FS (Full Scale) = relative to the full measuring range

Electronic pressure switch, characteristics		
Vibration resistance		Approx. 10 g / 0 to 500 Hz (IEC 60068-2-6)
Impact resistance		Approx. 50 g / 11ms (IEC 60068-2-29)
Other data		
Supply voltage		9 to 35 VDC
Power consumption		Max. 35 mA (inactive switching output)
Protection class		IP 67
Twistability	Long. axis	340°
	Display	270°
Hydraulic connection		$G\frac{1}{4}$ A DIN 3852; Form E
Tightening torque		17 to 20 Nm
Wetted parts, thin film DMS		Stainless steel, FKM (FPM) seal
Display:		4-digit, LED, 7-section, red,
Weight:		Approx. 120 g

EN

11. Spare parts

Spare parts for VarioSuper, Fig. 17

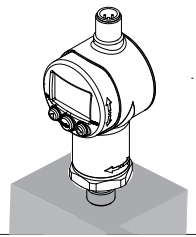


Legend to Figure 17

Item	Description	Order No.
1	Pressure gauge (primary air pressure)	169-101-606
2	Pressure gauge (internal reservoir pressure)	248-602.26
3	Pressure relief valve	UFZ.U00-132
4	Check valve (fillport)	UFZ.0358
5	Pressure switch	176-190-002
6	Level switch (available complete):	
	2 switching points	UFV.U14-001
	3 switching points	UFV.U14-003
	4 switching points	UFV.U14-002
7	Valve cluster	UFD.20.004

11

Electronic pressure switch, Fig. 18

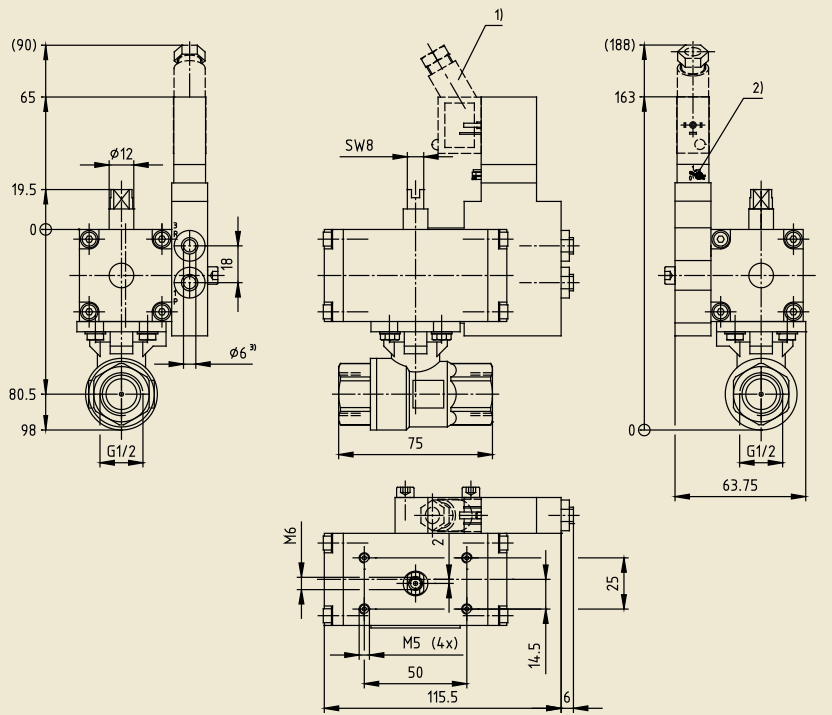


Electronic pressure switch	Order No.
16 bar	176-190-002
16 bar, with block, cpl.	UFV.U20-000

EN

12. Accessories

Ball valve, Fig. 19

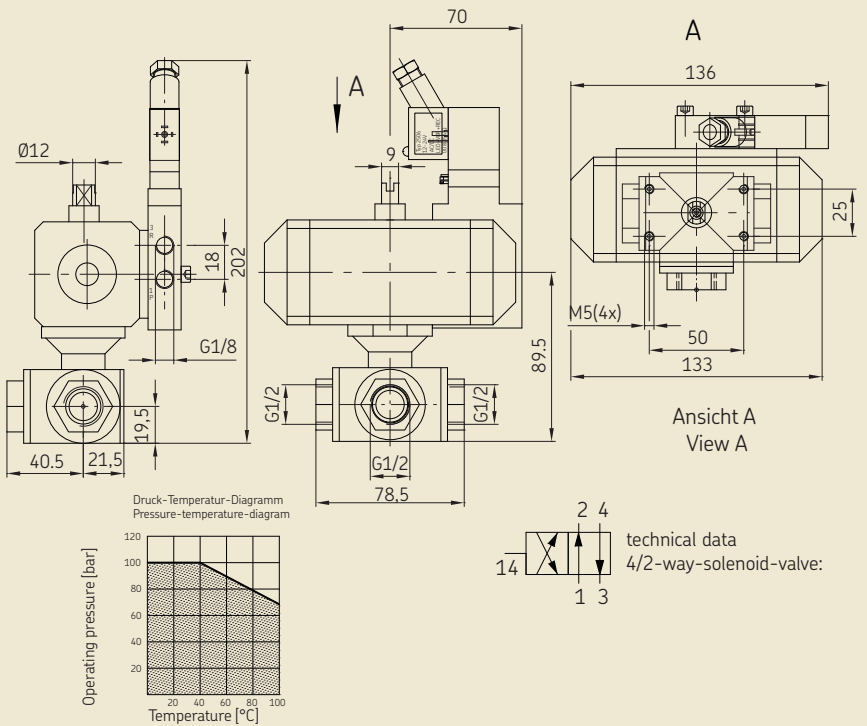


Electrically and pneumatically actuated 2/2 way ball valve	
Designation	**Order No.**
Ball valve	UFZ.U00-128

1) Port for connector socket DIN EN 175301-803 type C
2) Manual actuation
3) Plug connector for pipe 6mm

12

3/2 way ball valve, Fig. 20



	3/2 way ball valve
Designation	**Order No.**
3/2 way ball valve	UFZ.000-041

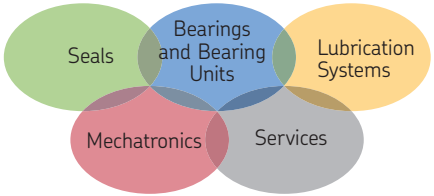
Screw unions/aerosol hose/electrical power lead

Designation	Order No.
Plug connector G 1/2, for connecting the aerosol hose to the ball valve	UFZ.0081
Aerosol hose, specify length when ordering	UFZ.0027
Power lead for VarioSuper (for Harting connector), 5 m	UFZ.0272
Power lead for VarioSuper (for Harting connector), 10 m	UFZ.0426

Cable sockets, Fig. 21

Designation		Order No.	Weight [g]
Cable sockets M12x1, 4-pin design, without LED			
A	**Circular connector, straight,** without cable diameter 4–6 mm, 4-pin, max. 0.75 mm²	179-990-371	15
B	**Circular connector, straight,** with 5-m integrally extruded cable, 4-pin, 4×0.25 mm²	179-990-600	178
B	**Circular connector, straight,** with 10-m integrally extruded cable, 4-pin, 4×0.25 mm²	179-990-603	325
C	**Circular connector, angled,** without cable diameter 4–6 mm, 4-pin, max. 0.75 mm²	179-990-372	16
D	**Circular connector, angled,** with 5-m integrally extruded cable, 4-pin, 4×0.25 mm²	179-990-601	182

For other cable sockets, please refer to brochure No. 1-1730-EN, "Electrical Plug and Socket Connectors."



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Not all lubricants can be fed using centralized lubrication systems. SKF can, on request, inspect the suitability of the lubricant selected by the user for pumping in centralized lubrication systems. Lubrication systems and their components manufactured by SKF are not approved for use in conjunction with gases, liquefied gases, pressurized gases in solution, vapors, or such fluids whose vapor pressure exceeds normal atmospheric pressure (1 013 mbar) by more than 0.5 bar at their maximum permissible temperature.
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SKF Lubrication Systems Germany GmbH
Motzener Strasse 35/37 · 12277 Berlin · Germany
PO Box 970444 · 12704 Berlin · Germany
Tel. +49 (0)30 72002-0
Fax +49 (0)30 72002-111
www.skf.com/lubrication

SKF Lubrication Systems Germany GmbH
2. Industriestrasse 4 · 68766 Hockenheim · Germany

Tel. +49 (0)62 05 27-0
Fax +49 (0)62 05 27-101
www.skf.com/lubrication