



**HPM Technologie GmbH**

spraying · trickling · lubricants



**MQL-TECHNOLOGY  
AT ITS BEST  
FOR OVER  
70 YEARS**

CATALOGUE

**2017 / 2018**

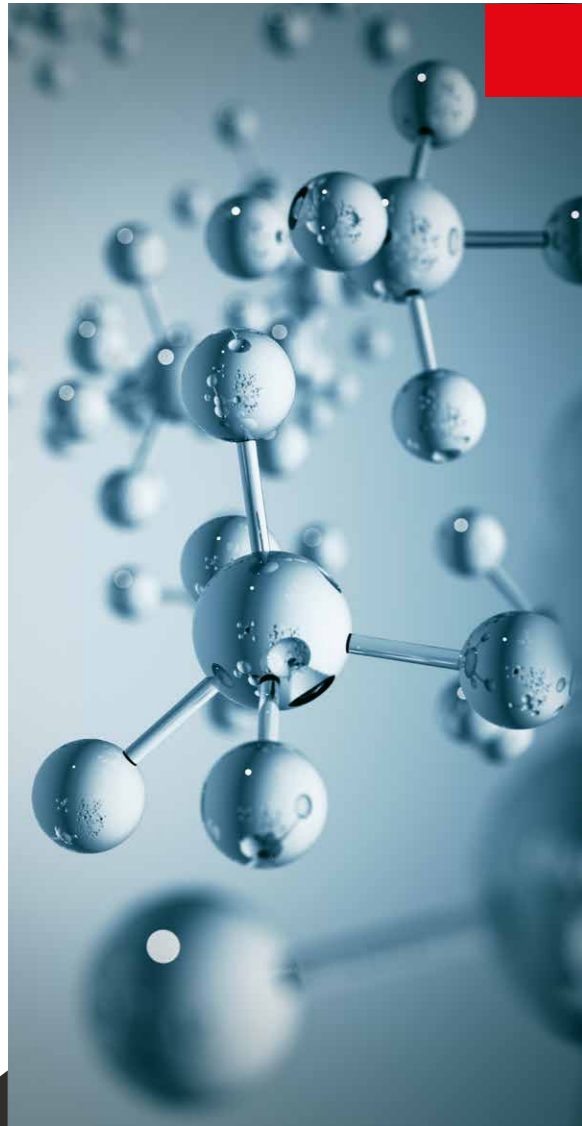


**WE THINK  
NOT ONLY  
PROACTIVELY  
BUT ALSO  
AHEAD.**

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## THE COMPANY



### ABOUT US

For 70 years now, the name of HPM Technologie has stood all over the world for the construction of highly modern plants in the area of minimum quantity spray application, trickling application and lubricants.

Thanks to a modular set-up, our systems for universal use can be adapted individually to any task – for purposeful application of any fluids to surfaces or to three-dimensional bodies.

### FACTS

- Made in Germany
- Sustainable products
- 2500 individual and replacement parts in stock
- 1500 customers per year
- BDSH-certified expert for minimum quantity cooling lubrication (MQL) and fluids
- HPM-certified application technician for MQL and fluids
- Research partner of industry and academia
- High investment ratio in research and development

**"OUR VISION IS TO BECOME THE INTERNATIONAL MARKET AND INNOVATION LEADER IN THE AREA OF MINIMUM QUANTITY LUBRICATION AND RELATED FLUIDS."**

## GREETING FROM THE MANAGEMENT



Managing director  
**Hanspeter Münzing**

Looking back, it all started over 70 years ago just as one would imagine in the year 1945.

The country lay in ruins, and people's future fate depended on how much personal effort they were willing to put into shaping their own future.

The most courageous individuals, without whom there would never have been an economic miracle in Germany, took the plunge into self-employment. That was how today's HPM Technologie was born.

HPM Technologie is now present everywhere that fluids are used in very small quantities. Wherever it is necessary to perfect work processes in manufacturing with the finest spray application or even with only one specifically applied drop of fluid.

Nationally, internationally, in industry, in trade, in nearly all sectors. This is our job. We define it in short with three words: "spray", "drops", "fluids".

However, three words are certainly not enough to give you a good overview. Although our work requires much more technical and technological expertise today than was the case 70 years ago, we would like to familiarise you with HPM Technologie and our range of products a little more with this catalogue.

We are your contact partner from A to Z.

# MQL IN PRACTICE

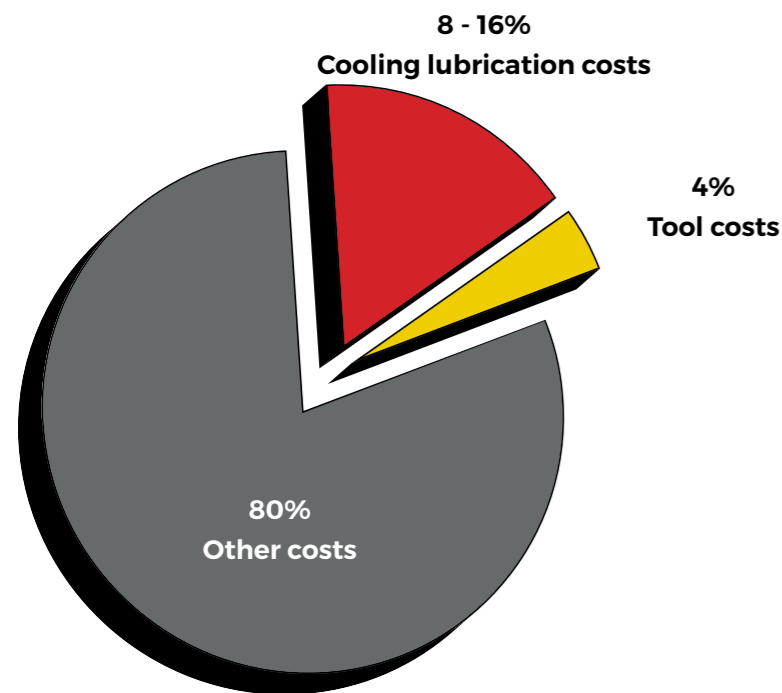
## COSTS & THE ENVIRONMENT

### Always exactly the amount that your process requires

The main advantage of minimum quantity lubrication is the enormous reduction in the amount of lubricant used in comparison to conventional cooling lubrication systems and concepts. Unlike conventional flood lubrication or large-area application, minimal quantity lubrication only requires a few millilitres per hour for the respective process. In addition, the minimal fluid application reduces the impact on people and the environment and is easy on the wallet.



EFFICIENT IN CONSUMPTION, FLEXIBLE IN USE. SUSTAINABLE PROTECTION OF PEOPLE AND THE ENVIRONMENT!



8-16% cooling lubrication costs include proportionately	
Energy costs	7%
Work costs	10%
Cooling lubrication	14%
Disposal	22%
Other costs	7%
Assembly	40%

Proportionate costs using metal cutting as an example  
Source: German Federal Statistical Office

### Ensuring quality:

Depending on the requirement, the spray jet is regulated to the finest film (1 micrometre and up possible). Once they have been correctly set, our systems constantly ensure an even wetting of the workpieces or the surface to be sprayed for an optimum work product. Quality that pays off - for over 70 years.

### Reducing consumption:

The thin film of applied spray considerably reduces the consumption of processing media. And less consumption means less cleaning. This also relieves your cleaning baths. Our residue-free high-performance lubricants from the SURVOS series eliminate the need for time-consuming and environmentally harmful cleaning baths (as long as the material and belt are clean themselves). In addition, resulting chips and residual material can be disposed of normally and do not have to be expensively disposed of as hazardous waste.

### Protecting the environment:

Always the precise fluid application that your process requires. Health and our environment are always the ultimate good. Our minimum quantity lubrication systems reduce the unnecessary soiling of machines, hall floors and ambient air to a minimum.

### Increasing economic efficiency:

The precise, even and constant spray application protects tools and increases the tool life. The lower soiling of the machine saves time-consuming cleaning. The seamless integration in the machine installation and automatic processes immensely reduce setup and production costs.

## TCJ, PPJ & MDJ SERIES: VERSATILE & INDIVIDUAL

### OVERVIEW

MQL systems from HPM Technologie – the finest way of applying oils and other fluids (cooling lubricants, solvents, rust protection and lubrication oils, release agents and silicones); precisely – thinly – evenly – sparingly – ecologically!

Modular, flexible, economical and, thanks to the modular system, adaptable to your process. This is the best description of our container systems. Whether low-viscosity media to 100 mm<sup>2</sup> at 20 °C or high-viscosity media to 2300 mm<sup>2</sup> at 20 °C. We have a solution for everything. And all in a low-pressure process.

Our TCJ, PPJ and MDJ systems are used especially where liquid processing media have to be applied to formed parts (contours, inner/outer radii, hollow bodies, moulds, tools, stamps, rollers and surfaces).

Our TCJ, PPJ and MDJ systems are adapted to each task. With different size variants, it is possible to use several spray heads with various designs at the same time. Easy and fast to upgrade and retrofit in one clear and individually adaptable modular system.

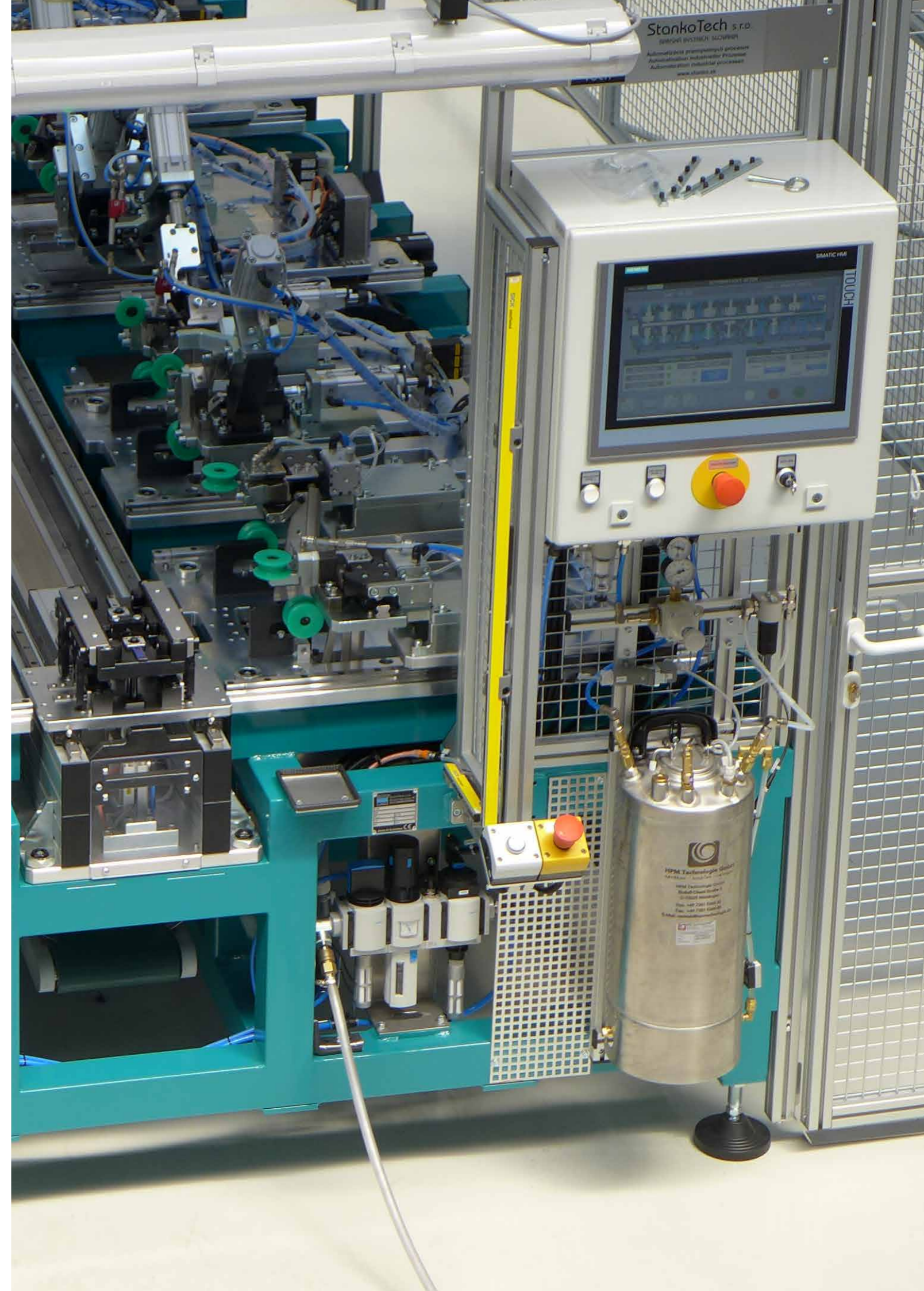
For even application of a fine spray film and reduction of fluid consumption, our devices are equipped with two 24 V electrical valves as standard. The spray pulse can be triggered via the machine control. Alternatively, limit switches, proximity switches, etc. can also be connected with our systems.

Control valves in other voltage versions, pneumatic valves and manual valves are available on request. The non-lubricated system air (min. 4 bar) is connected to the service unit. The spray pressure is set at the pressure reducer (consumption values see page 20).

### SELECTION OF THE RIGHT MQL SYSTEM

VISCOSITY AT 20 °C	AT 40 °C	FLUID (EXAMPLES)	
1 mm <sup>2</sup> /s		Water, SURVOS and SAMNOS fluids from HPM	<b>TCJ/ProfiKompakt</b>
35 mm <sup>2</sup> /s		Concrete release agent	
100 mm <sup>2</sup> /s	35 mm <sup>2</sup> /s	Cutting oil	<b>MDJ/PPJ</b>
101 mm <sup>2</sup> /s		Mineral oil	
300 mm <sup>2</sup> /s		Engine oil (diesel)	
400 mm <sup>2</sup> /s		Silicone oil	
640 mm <sup>2</sup> /s		Deep drawing oil	
2300 mm <sup>2</sup> /s	500 mm <sup>2</sup> /s	Deep drawing oil	

The fluids listed here show the viscosity range in which the minimum quantity lubrication systems from HPM Technologie work.



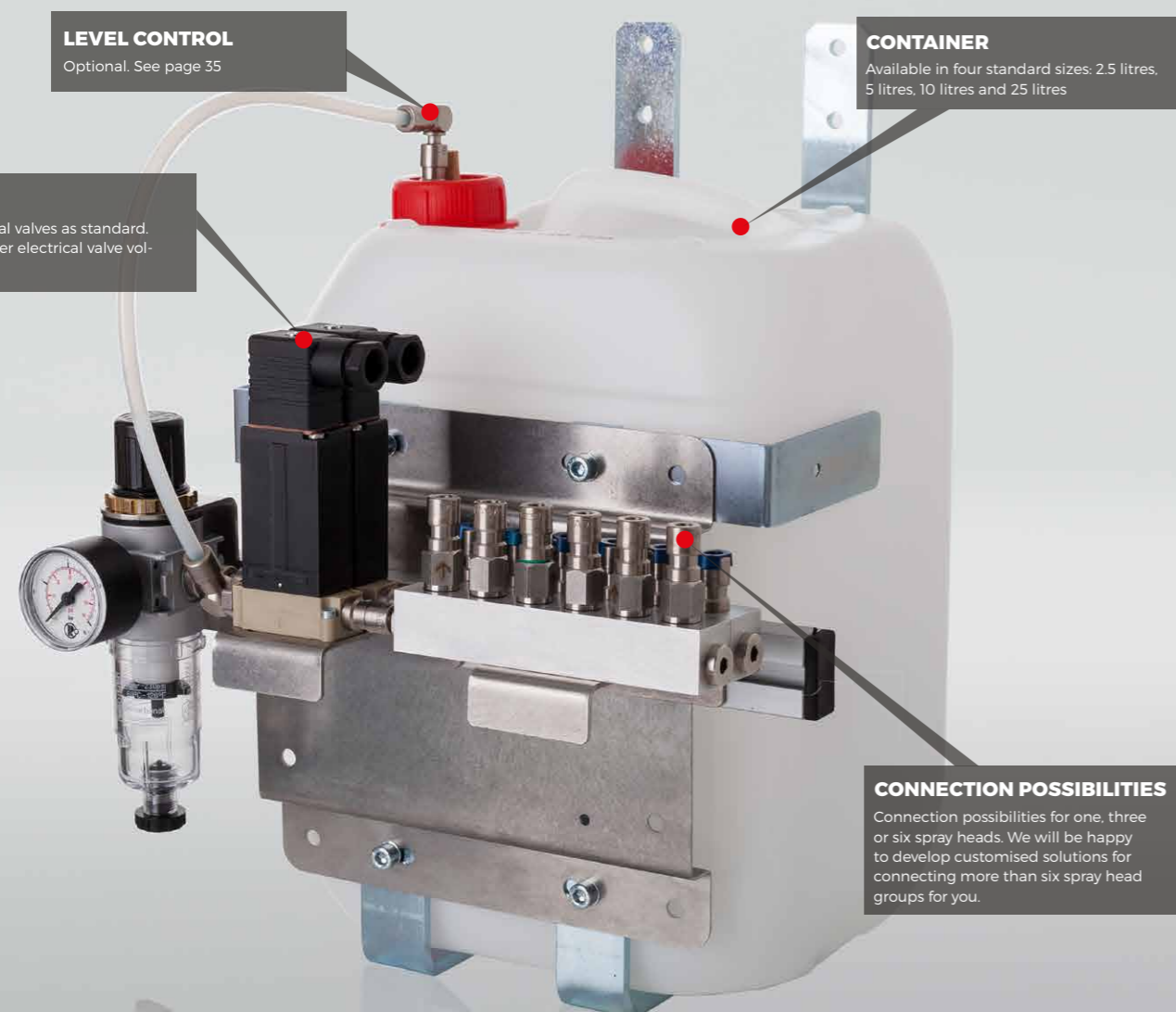
## TCJ SERIES

### APPLICATIONS AND ADVANTAGES OF THE TCJ SERIES

If you use a fluid or fluids up to a viscosity of max. 100 mm<sup>2</sup>/s at 20 °C (except for substances containing paint, resin and glue), then our self-priming systems of the TCJ series are just the right thing for you.

The module consists of a PE storage tank (2.5 – 25 litres) with a support for wall installation as well as one or more valve modules with a service unit.

The advantage of our TCJ system is that it reduces and prevents dirt ingress into your process. Our 10- and 25-litre systems are adapted to commercially available fluid containers. This allows the container to be directly changed – without cumbersome refilling. The result is no dirt in the container and thus a process that continues to function optimally.



#### LEVEL CONTROL

Optional. See page 35

#### CONTAINER

Available in four standard sizes: 2.5 litres, 5 litres, 10 litres and 25 litres

#### CONTROL

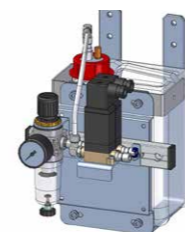
Via 24 V DC electrical valves as standard. Pneumatic and other electrical valve voltages on request.

#### CONNECTION POSSIBILITIES

Connection possibilities for one, three or six spray heads. We will be happy to develop customised solutions for connecting more than six spray head groups for you.

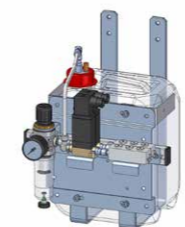
## PCJ SERIES VARIANTS

### TCJ 1-FOLD (1 spray head)



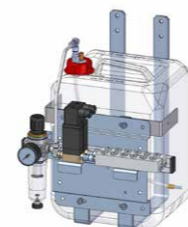
DESIGN	ARTICLE NUMBER	DESIGNATION
Container 2.5 l	55 00 0200.001	VBG-TCJ2.5L-01-1Z-2V-024DC
Container 5 l	55 00 0210.001	VBG-TCJ05L-01-1Z-2V-024DC
Container 10 l	55 00 0220.001	VBG-TCJ10L-01-1Z-2V-024DC
Container 25 l	55 00 0230.001	VBG-TCJ25L-01-1Z-2V-024DC

### TCJ 3-FOLD (up to 3 spray heads)



DESIGN	ARTICLE NUMBER	DESIGNATION
Container 2.5 l	55 00 0201.001	VBG-TCJ2.5L-03-1Z-2V-024DC
Container 5 l	55 00 0211.001	VBG-TCJ05L-03-1Z-2V-024DC
Container 10 l	55 00 0221.001	VBG-TCJ10L-03-1Z-2V-024DC
Container 25 l	55 00 0231.001	VBG-TCJ25L-03-1Z-2V-024DC

### TCJ 6-FOLD (up to 6 spray heads)



DESIGN	ARTICLE NUMBER	DESIGNATION
Container 2.5 l	55 00 0202.001	VBG-TCJ2.5L-06-1Z-2V-024DC
Container 5 l	55 00 0212.001	VBG-TCJ05L-06-1Z-2V-024DC
Container 10 l	55 00 0222.001	VBG-TCJ10L-06-1Z-2V-024DC
Container 25 l	55 00 0232.001	VBG-TCJ25L-06-1Z-2V-024DC

All of the TCJ systems shown above are also available with level control on request (see page 35).

## PPJ SERIES

### APPLICATIONS AND ADVANTAGES OF THE PPJ SERIES

The brand-new PPJ system impresses not only with its well-conceived components and size but also with its innovative form.

In this system, we have combined our decades of experience in an attractive design. The independent regulation of fluid and spray air pressure achieves excellent results even with higher-viscosity media.

Available for up to 6 spray heads and in versions with 1, 3 and 5 litres, this system has a very compact design

and therefore takes up extremely little space when installed. The system is suitable for the initial equipment of machines as well as for subsequent installation.

The PPJ system can be used with our spray heads (starting on p. 20) and the JOP drip-feed dosing device (p. 30) up to a maximum viscosity of 2300 mm<sup>2</sup>/s at 20 °C or 500 mm<sup>2</sup>/s at 40 °C (except for substances containing paint, resin and glue).



## PPJ SERIES VARIANTS

**NEW PRODUCT!**

### PPJ 1-FOLD (1 litre)



DESIGN	ARTICLE NUMBER	DESIGNATION
For spray heads	55 00 0361.001	VBG-PPJ-1L-01-1Z-2V-024DC
For drip-feed dosing devices	55 00 0361.002	VBG-PPJ-1L-01-1Z-1V-024DC-JOP

### PPJ 3-FOLD (3 litres)



DESIGN	ARTICLE NUMBER	DESIGNATION
For spray heads	55 00 0363.001	VBG-PPJ-3L-03-1Z-2V-024DC
For drip-feed dosing devices	55 00 0363.002	VBG-PPJ-3L-03-1Z-1V-024DC-JOP

### PPJ 6-FOLD (5 litres)



DESIGN	ARTICLE NUMBER	DESIGNATION
For spray heads	55 00 0365.001	VBG-PPJ-5L-06-1Z-2V-024DC
For drip-feed dosing devices	55 00 0365.002	VBG-PPJ-5L-06-1Z-1V-024DC-JOP

All of the PPJ systems shown above are also available with level control on request (see page 35).



## MDJ SERIES

### APPLICATIONS AND ADVANTAGES OF THE MDJ SERIES

The advantage of our MDJ systems is that they are independent of viscosity. In addition, the MDJ system is easier to use due to the separate regulation of the air and fluid pressure.

Suitable for all fluids that reach a maximum viscosity of 2300 mm<sup>2</sup>/s at 20 °C or 500 mm<sup>2</sup>/s at 40 °C (except for substances containing paint, resin and glue). Module for wall installation consisting of a stainless steel pressure tank with 10 or 15 litres, fluid filter (100...120 my), as well as one or more valve modules and a service unit.

Direct filling from the 200 litre barrel or 1000 litre IBC can be done via automatic filling (see page 53).

Due to the possibility of regulating the fluid pressure independently of the spray pressure, our MDJ system is also very well suited for larger transfer, profiling or automation systems with a large number of spraying points. We will be happy to plan a special system with you. Simply contact us.

#### CONTROL

Via 24 V DC electrical valves as standard. Pneumatic and other electrical valve voltages on request.

#### CONNECTION POSSIBILITIES

Connection possibilities for one, three or six spray heads. We will be happy to develop customised solutions for connecting more than six spray head groups for you.

#### LEVEL CONTROL

Optional. See page 35

#### CONTAINER

In the MDJ series, pressure tanks are available in two sizes (10 and 15 litres).



## MDJ SERIES VARIANTS

### MDJ 1-FOLD (1 spray head)



DESIGN	ARTICLE NUMBER	DESIGNATION
Pressure tank 10 l	55 00 0300.001	VBC-MDJ10L-01-1Z-2V-024DC

### MDJ 3-FOLD (up to 3 spray heads)



DESIGN	ARTICLE NUMBER	DESIGNATION
Pressure tank 10 l	55 00 0301.001	VBC-MDJ10L-03-1Z-2V-024DC

### MDJ 6-FOLD (up to six spray heads)

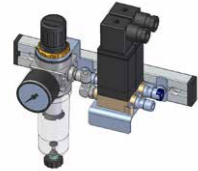


DESIGN	ARTICLE NUMBER	DESIGNATION
Pressure tank 10 l	55 00 0302.001	VBC-MDJ10L-06-1Z-2V-024DC

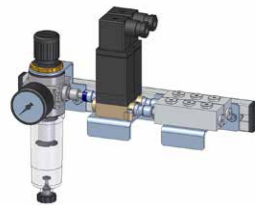
All of the MDJ systems shown above are also available with level control on request (see page 35).

# REPLACEMENT PARTS FOR TCJ VALVE AND CONTAINER MODULE

## VALVE MODULES



DESIGN	ARTICLE NUMBER	DESIGNATION
1 spray head	47 01 0000.001	Valve-group-01-1Z-2V-024DC



DESIGN	ARTICLE NUMBER	DESIGNATION
Up to 3 spray heads	47 01 0000.002	Valve-group-03-1Z-2V-024DC

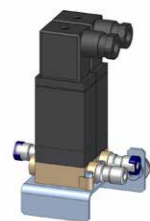


DESIGN	ARTICLE NUMBER	DESIGNATION
Up to 6 spray heads	47 01 0000.004	Valve-group-06-1Z-2V-024DC

## REPLACEMENT PARTS FOR VALVE MODULES



DESIGN	ARTICLE NO	DESIGNATION
Pressure controller group	49 01 0000.001	TC-filter-pressure-controller-3bar-G1/4-Ø6

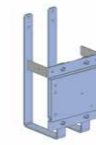


DESIGN	ARTICLE NO	DESIGNATION
Solenoid valve group	49 01 1000.001	TC-magnetic-valve-group-24VDC-mA-air/fluid



DESIGN	ARTICLE NO	DESIGNATION
TC distributor 3-fold	49 01 2000.001	TC-distributor-3-mAA-clogged
TC distributor 6-fold	49 01 3000.001	TC-distributor-6-mAA-clogged

## CONTAINER HOLDER



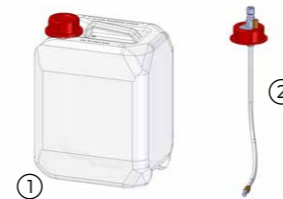
Container 2.5 - 10 litres



Container 25 litres

DESIGN	ARTICLE NUMBER	DESIGNATION
For 2.5-litre containers	44 86 2000.001	Container-holder-2.5L
For 5-litre containers	44 86 1000.001	Container-holder-5L
For 10-litre containers	44 86 0000.001	Container-holder-10L
For 25-litre containers	44 85 8000.011	Container-holder-25L

## TC CONTAINER WITH SUCTION GROUP IN THE LID



DESIGN	ARTICLE NUMBER	DESIGNATION
Container 2.5 litres	49 00 0000.001	TC-container-2.5L-with-induction-group-in-the-lid
(1)	44 83 4000.010	HDPE-replacement-canister-2.5L
(2)	49 00 6000.001	Lid2.5L-w-suction-silencer
Container 5 litres	49 00 1000.001	TC-container-5L-with-induction-group-in-the-lid
(1)	44 83 5000.010	HDPE-replacement-canister-5L
(2)	49 00 7000.001	Lid5L-w-suction-silencer
Container 10 litres	49 00 2000.001	TC-container-10L-with-induction-group-in-the-lid
(1)	44 83 6000.010	HDPE-replacement-canister-10L
(2)	49 00 8000.001	Lid10L-w-suction-silencer
Container 25 litres	49 00 3000.001	TC-container-25L-with-induction-group-in-the-lid
(1)	44 83 7000.010	HDPE-replacement-canister-25L
(2)	49 00 9000.001	Lid25L-w-suction-silencer

## TC CONTAINER WITH SUCTION GROUP IN THE LID AND LEVEL CONTROL (FLOAT SWITCH)



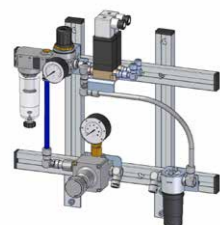
Container see "TC container with suction group in cover" - number 1



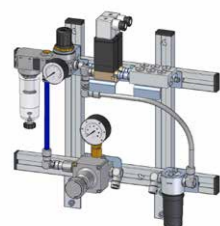
DESIGN	ARTICLE NUMBER	DESIGNATION
Container 2.5 litres	49 00 0000.010	TC-container-2.5L-with-induction-group-in-the-lid-VSS-L175
(3)	49 00 6000.010	Lid2.5L-with-induction-group-in-the-lid-VSS-L175
(4)	44 84 3000.001	Float-switch-VSS-L175-adv.-warn
Container 5 litres	49 00 1000.010	TC-container-5L-with-induction-group-in-the-lid-VSS-L210
(3)	49 00 7000.010	Lid5L-with-induction-group-in-the-lid-VSS-L210
(4)	44 84 3000.002	Float-switch-VSS-L210-adv.-warn
Container 10 litres	49 00 2000.010	TC-container-10L-with-induction-group-in-the-lid-VSS-L265
(3)	49 00 8000.010	Lid10L-with-induction-group-in-the-lid-VSS-L265
(4)	44 84 3000.003	Float-switch-VSS-L265-adv.-warn
Container 25 litres	49 00 3000.010	TC-container-25L-with-induction-group-in-the-lid-VSS-L425
(3)	49 00 9000.010	Lid25L-with-induction-group-in-the-lid-VSS-L425
(4)	44 84 3000.004	Float-switch-VSS-L425-adv.-warn

# REPLACEMENT PARTS FOR MDJ VALVE AND CONTAINER MODULE

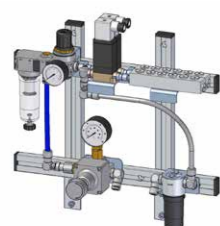
## VALVE MODULES



DESIGN	ARTICLE NUMBER	DESIGNATION
1 spray head	55 00 0300.101	MDJ-valve-group-01-1Z-2V-024DC



DESIGN	ARTICLE NUMBER	DESIGNATION
Up to 3 spray heads	55 00 0301.101	MDJ-valve-group-03-1Z-2V-024DC

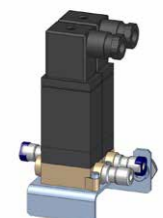


DESIGN	ARTICLE NUMBER	DESIGNATION
Up to 6 spray heads	55 00 0302.101	MDJ-valve-group-06-1Z-2V-024DC

## REPLACEMENT PARTS FOR VALVE MODULES



DESIGN	ARTICLE NO	DESIGNATION
Air basic group	49 03 0000.001	TC-air-basic-group-FA-DRA-1/4-3bar



DESIGN	ARTICLE NO	DESIGNATION
Solenoid valves	49 01 1000.001	TC-magnetic-valve-group-24VDC-mA-air/fluid



DESIGN	ARTICLE NO	DESIGNATION
TC distributor 3-fold	49 01 2000.001	TC-distributor-3-mAA-clogged
TC distributor 6-fold	49 01 3000.001	TC-distributor-6-mAA-clogged



DESIGN	ARTICLE NUMBER	DESIGNATION
Fine pressure regulator	49 03 1000.001	Fine-pressure-reg-group-G1/4-2.5bar

## MDJ TUBING BETWEEN VALVE MODULE AND PRESSURE TANK



DESIGN	ARTICLE NUMBER	DESIGNATION
white	49 03 8000.002	MDJ_fluid_connection_8-6x1_plug-with-coupling
blue	49 03 8000.001	MDJ_air_connection_8-6x1_plug-with-coupling

## MDJ PRESSURE TANK



10 l

DESIGN	ARTICLE NUMBER	DESIGNATION
MDJ pressure tank 10 l	55 00 0320.010	Container-group-MDJ-10L-NW5-visual

# PROFIKOMPAKT FLEXIBLE IN THE WORKSHOP

## OVERVIEW

Mobile minimum quantity lubrication system for controlled and fine film application of fluids in the low-pressure range according to the injector principle.

The mobile spray unit is connected to the customer's compressed air line via a quick coupler and fastened with the magnetic base at the desired place of installation. The spray head is positioned via the accompanying bracket. A spray jet with a full cone of approx. 15° is created with little overspray at the spray head by switching the solenoid valve on and off.

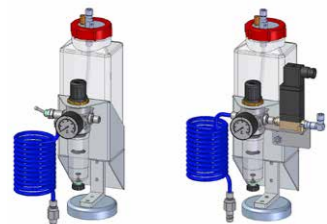
Suitable for all fluids with a maximum viscosity of 100 mm<sup>2</sup>/s at 20 °C and 35 mm<sup>2</sup>/s at 40 °C (except for substances containing paint, resin and glue).

Our ProfiKompakt is also available with our precision drip-feed dosing device. Our drip-feed dosing device is the simplest way of applying liquid processing media such as cooling lubricants, oils, lubricants or dispersions precisely and accurately: economically – precisely – evenly and with a minimal impact on people and the environment!

Wherever precisely defined quantities of fluids are required. In thread cutting, drilling, reaming, milling, deburring, thread forming, flow drilling, and for selective tool lubrication / die greasing, when additional lubrication is necessary.

One device. Simple, flexible and mobile.

## PROFIKOMPAKT



Toggle valve

Solenoid valve 24 V DC

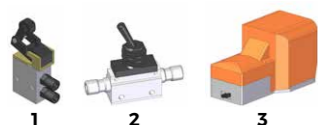
DESIGN	ARTICLE NUMBER	DESIGNATION
Toggle valve	46 12 1000.101	ProfiKompakt-1l-toggle
Solenoid valve 24 V DC	46 12 1000.001	ProfiKompakt-1L-024DC

## PROFIKOMPAKT FOR JOP DRIP-FEED DOSING DEVICES



DESIGN	ARTICLE NUMBER	DESIGNATION
Solenoid valve 24 V DC	46 12 1000.010	ProfiKompakt-1L-JOP-024DC

## HAND LEVER, TOGGLE AND FOOT VALVE



DESIGN	ARTICLE NO	DESIGNATION
1 Hand lever valve	43 76 7000.003	Hand_lever_valve_6-4x1_compl
2 Toggle valve	49 01 1500.010	Toggle_valve2/2_way_G1/8
3 Foot valve	44 91 4000.011	Foot-valve-3/2-PN-M5-engaging_with_screw-M5-6-4



# SPRAY HEADS FOR EVERY APPLICATION

## OVERVIEW

The spray heads are designed for controlled and fine-film application of fluids in the low-pressure range using the injection principle. This means a very economical air consumption of approx. 2 - 5.5 l/min. at the same time.

All fluids can be sprayed that have a maximum viscosity of approx. 2300 mm<sup>2</sup>/s at 20 °C or 500 mm<sup>2</sup>/s at 40 °C (except for substances containing paint, resin and glue).

The spray head is set to a medium value at the factory. The spray jet produces a nearly full cone of approx.

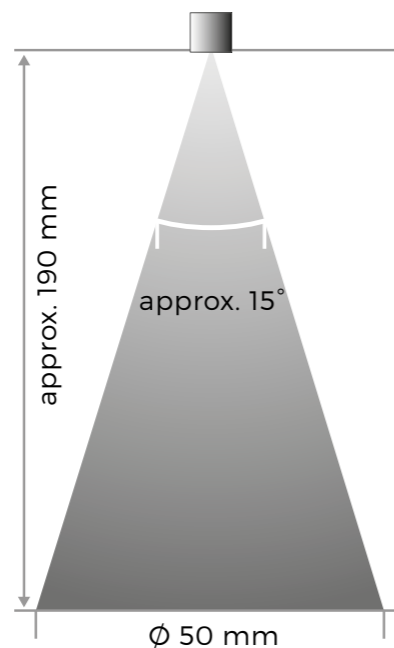
15°. Depending on the fluid structure of the processing media used, the opening angle of the spray cone can be larger or smaller.

Ideally, the distance of the spray nozzle to workpiece/tool to be sprayed should not be greater than 200 mm. An average spray cone of 15° covers an area of approx. Ø 50 mm.

The output quantity with water is 0.04 litres to 4.2 litres per hour in continuous operation.

## VISCOSITY & CONSUMPTION VALUES

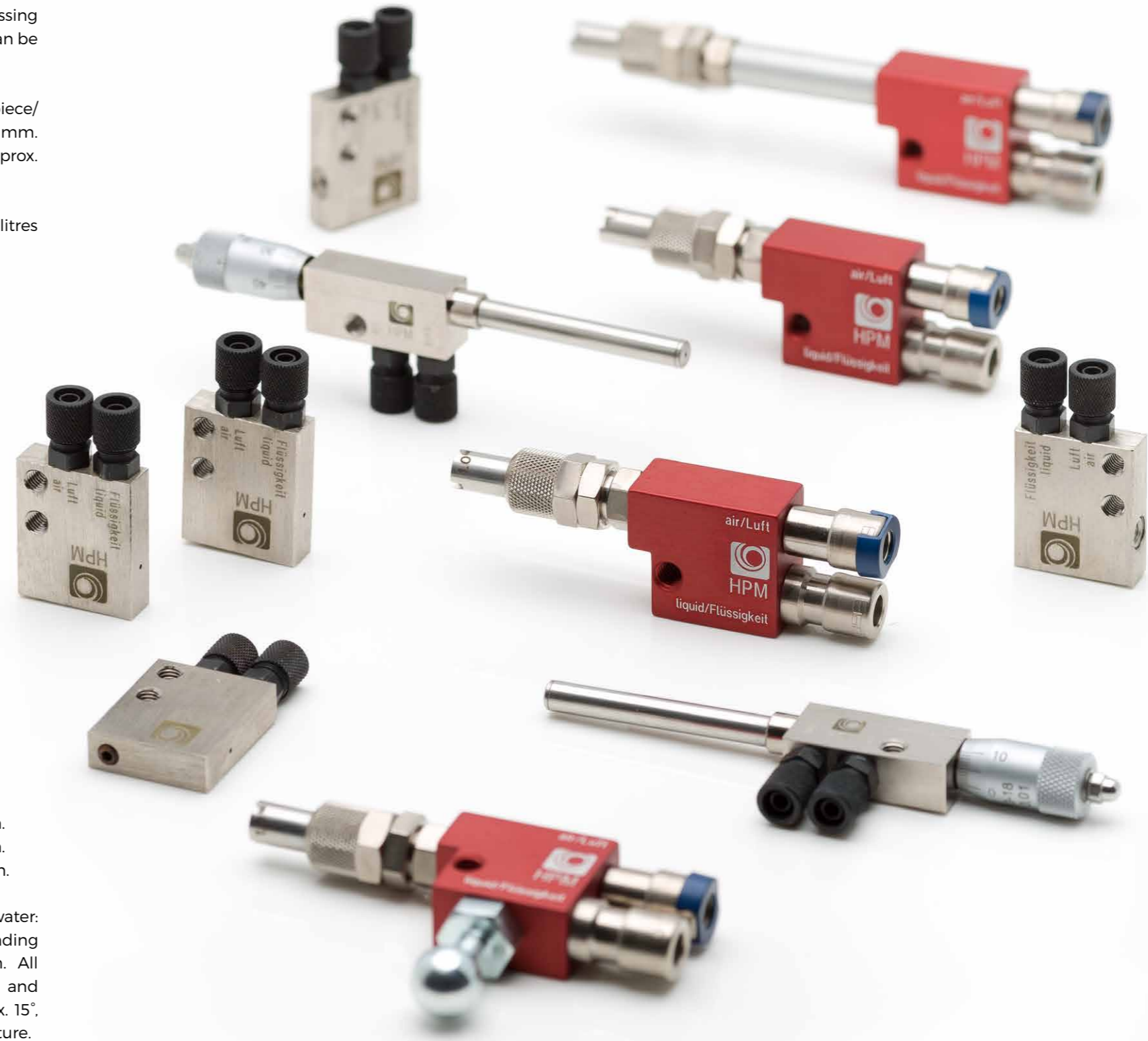
Fluids with a viscosity of up to 100 mm<sup>2</sup>/s (20 °C) can be sprayed with our spraying systems. We recommend using SURVOS, SENTOS or SAMNOS fluids from HPM Technologie, which apply an even, fine film of the medium with sometimes absolutely residue-free drying (SURVOS) with very low consumption volumes.



### Spray head example

Air consumption per nozzle:  
 at 0.5 bar            2 l/min.  
 at 1.5 bar            4 l/min.  
 from 1.5 to 2.5 bar   5 l/min.

Consumption value with water:  
 from 0.04 to 4.2 l/h, depending  
 on the nozzle combination. All  
 nozzles achieve a full cone and  
 a spray cone angle of approx. 15°,  
 depending on the fluid structure.



# HTR SPRAY HEAD SERIES

**OUR ABSOLUTE CLASSIC. PROBABLY THE MOST FREQUENTLY SOLD SPRAY HEAD IN THE WORLD.**

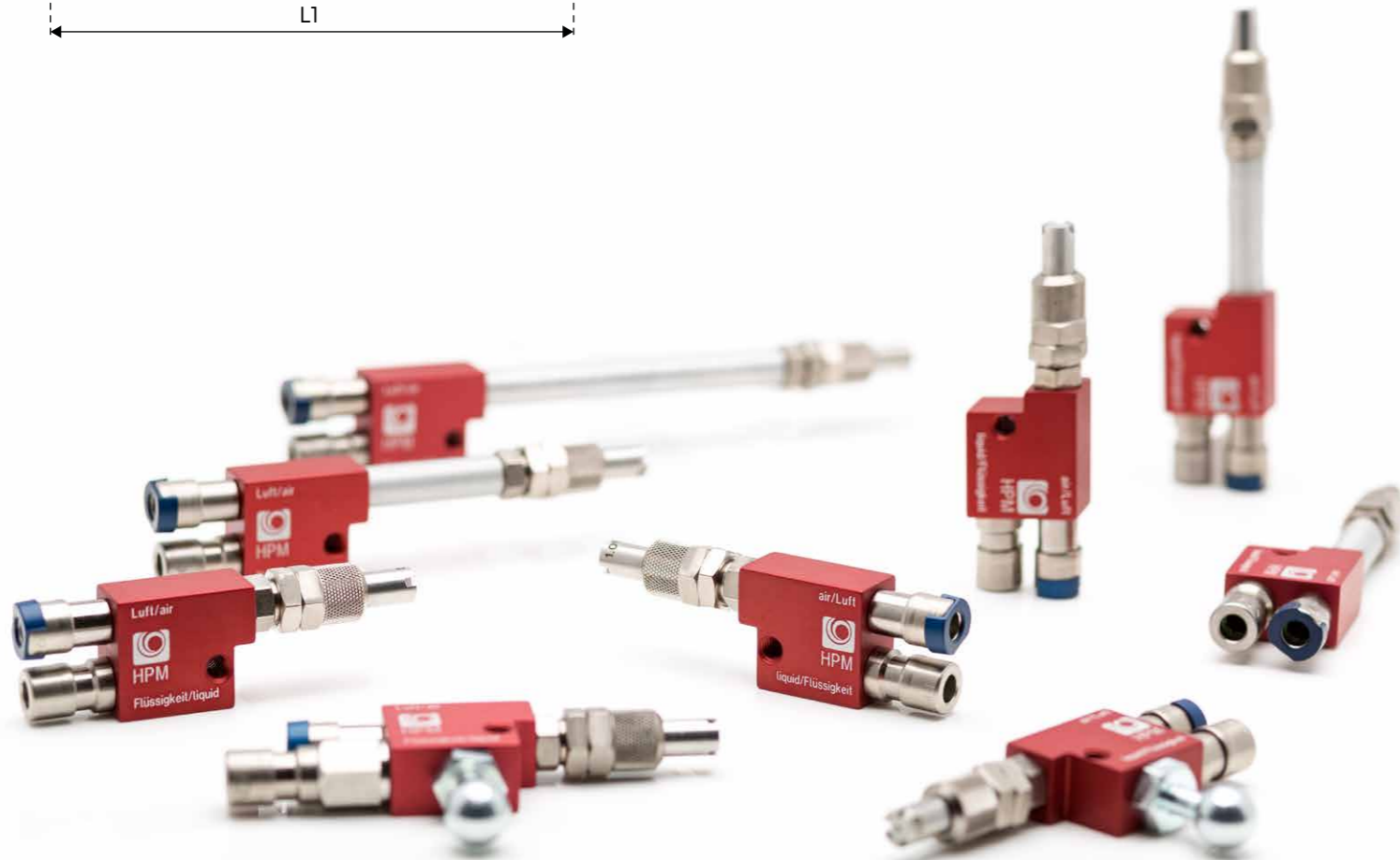
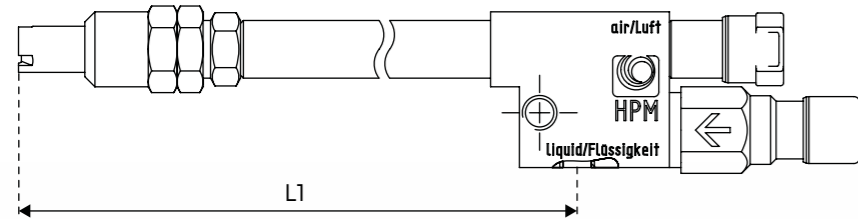
**GENERAL DESCRIPTION:** Universal spray head, very robust and suitable for all applications. Due to the large channel diameters and a direct supply, our HTR spray head can also be used with especially critical and viscous media. The quantity is dosed in the front at the nozzle.

Our HTR spray head is available in two variants: The HTRR spray head has an M6 thread for fastening to a customer-side mount. The HTRB spray head has a ball joint. This allows it to be attached flexibly and precisely with the flexible HPM Technologie mounts (page 34).

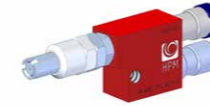
All of our spray heads are available individually or as a spray head group. The spray head group contains air and fluid connections (check valve) for the distributor.

An optional check valve mounted on the spray head prevents the fluid from dripping out through the spray head in the case of a critical line route or critical positioning.

**VARIANTS:** Available in the nozzle lengths (L1) 50, 85, 110 and 135 mm (see drawing)

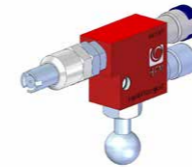


## HTRR SPRAY HEAD



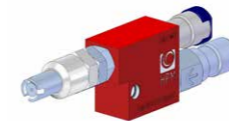
DESIGN	SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
50 mm	55 00 0030.001	Spray-head-HTRR050-05x10-AL	55 00 0031.001
85 mm	55 00 0032.001	Spray-head-HTRR085-05x10-AL	55 00 0033.001
110 mm	55 00 0034.001	Spray-head-HTRR110-05x10-AL	55 00 0035.001
135 mm	55 00 0036.001	Spray-head-HTRR135-05x10-AL	55 00 0037.001

## HTRB SPRAY HEAD



DESIGN	SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
50 mm	55 00 0040.001	Spray-head-HTRB050-05x10-AL	55 00 0041.001
85 mm	55 00 0042.001	Spray-head-HTRB085-05x10-AL	55 00 0043.001
110 mm	55 00 0044.001	Spray-head-HTRB110-05x10-AL	55 00 0045.001
135 mm	55 00 0046.001	Spray-head-HTRB135-05x10-AL	55 00 0047.001

## HTRR SPRAY HEAD with attached check valve



DESIGN	SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
50 mm	55 00 0010.001	Spray-head-HTRR050_05x10-RV5513F	55 00 0011.001
85 mm	55 00 0012.001	Spray-head-HTRR085_05x10-RV5513F	55 00 0013.001
110 mm	55 00 0014.001	Spray-head-HTRR110_05x10-RV5513F	55 00 0015.001
135 mm	55 00 0016.001	Spray-head-HTRR135_05x10-RV5513F	55 00 0017.001

## HTRB SPRAY HEAD with attached check valve



DESIGN	SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
50 mm	55 00 0020.001	Spray-head-HTRB050_05x10-RV5513F	55 00 0021.001
85 mm	55 00 0022.001	Spray-head-HTRB085_05x10-RV5513F	55 00 0023.001
110 mm	55 00 0024.001	Spray-head-HTRB110_05x10-RV5513F	55 00 0025.001
135 mm	55 00 0086.001	Spray-head-HTRB135_05x10-RV5513F	55 00 0087.001

# LEO SPRAY HEAD SERIES

**THE NEXT GENERATION OF SPRAY TECHNOLOGY. OUR NEW LEO. REDUCE YOUR COSTS THROUGH REPRODUCIBLE VOLUMETRIC FLOW CONTROL.**

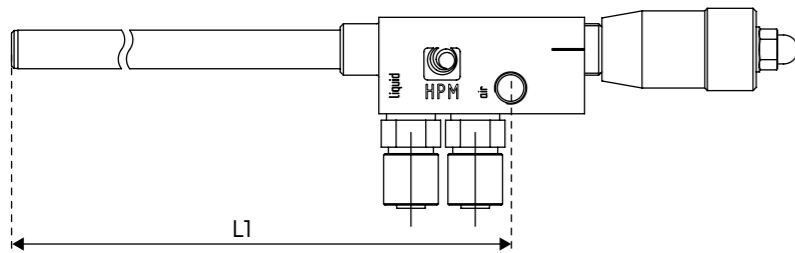
**GENERAL DESCRIPTION:** Universal spray head where the spray quantity is set via a scaled measuring drum. This makes it possible to check the set quantities at any time. Any changes are immediately visible and can be corrected. With constant parameters (fluid, spray and fluid pressure), the quantity is always 100% reproducible. The supply line exits at an angle of 90° to the spray jet.

Our LEO spray head is available in two variants: The LEOR spray head has an M5 thread for fastening to a customer-side mount. The LEOB spray head has a ball joint. This allows it to be attached flexibly and precisely

with the flexible HPM Technologie mounts (page 34).

All of our spray heads are available individually or as a spray head group. The spray head group contains air and fluid connections (check valve) for the distributor.

**VARIANTS:** Available in the nozzle lengths (L1) 30, 70, 105, 130 and 155 mm (see drawing)



## LEOR SPRAY HEAD



DESIGN	SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
30 mm	55 00 0120.001	Spray-head-LEOR030-05x10	55 00 0121.001
70 mm	55 00 0120.002	Spray-head-LEOR070-05x10	55 00 0121.002
105 mm	55 00 0120.003	Spray-head-LEOR105-05x10	55 00 0121.003
130 mm	55 00 0120.004	Spray-head-LEOR130-05x10	55 00 0121.004
155 mm	55 00 0120.005	Spray-head-LEOR155-05x10	55 00 0121.005

## LEOB SPRAY HEAD



DESIGN	SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
30 mm	55 00 0122.001	Spray-head-LEOB030-05x10	55 00 0123.001
70 mm	55 00 0122.002	Spray-head-LEOB070-05x10	55 00 0123.002
105 mm	55 00 0122.003	Spray-head-LEOB105-05x10	55 00 0123.003
130 mm	55 00 0122.004	Spray-head-LEOB130-05x10	55 00 0123.004
155 mm	55 00 0122.005	Spray-head-LEOB155-05x10	55 00 0123.005

**NEW PRODUCT!**



# PSM SPRAY HEAD SERIES

## SMALL BUT POWERFUL. OUR POWER PACK

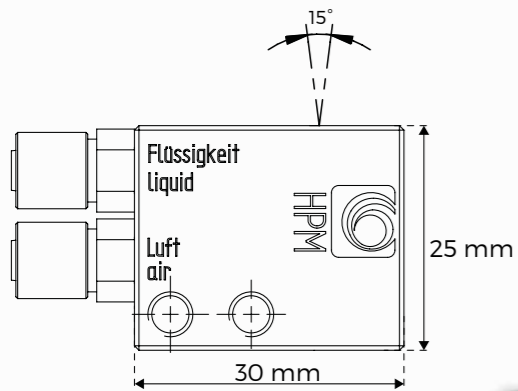
**GENERAL DESCRIPTION:** The smallest spray head available in the HPM standard range. Suitable for tight installation situations. The quantity is set on the back. The desired quantity can be reliably set using safety bolts. The supply line exits at an angle of 90° to the spray jet.

Our PSM spray head is available in two variants: The PSMR spray head has an M5 thread for fastening to a customer-side mount.

The PSMB spray head has a ball joint. This allows it to be attached flexibly and precisely with the flexible HPM Technologie mounts (page 34).

All of our spray heads are available individually or as a spray head group. The spray head group contains air and fluid connections (check valve) for the distributor.

**DIMENSIONS:** 30x25x8 mm



## PSMR SPRAY HEAD



SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
55 00 0094.001	Spray-head-PSMR-05x10-6/6	55 00 0095.001

## PSMB SPRAY HEAD



SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
55 00 0096.001	Spray-head-PSMB-05x10-6/6	55 00 0097.001

## PSMR SPRAY HEAD with attached check valve



SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
55 00 0104.001	Spray-head-PSMR-05x10-RVP0114-61	55 00 0105.001

## PSMB SPRAY HEAD with attached check valve



SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
55 00 0106.001	Spray-head-PSMB-05x10-RVP0114-61	55 00 0107.001



## ALWAYS THE RIGHT SOLUTION FOR YOUR APPLICATION

The selection of a spray head not only depends on the application area but in particular on the installation situation. In many cases, the spatial conditions, the direction of the air and fluid supply lines, or the ambient

temperature are important. For this purpose, we have developed numerous different spray heads for a wide variety of requirements over the last decades.

### QSR SPRAY HEAD



Our QSR has a similar structure to the HTR. In contrast to the HTR, the supply line exits at a 90° angle from the spray jet. The QSR is used wherever this special supply situation is necessary. The QSR is set directly at the nozzle mount.

SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
43 84 3000.103	Spray-head-QSRR050_05x10-Ø6	44 84 3001.103

### PSM 3-FOLD SPRAY HEAD



A 3-point spray head developed specially for sawing. The advantage of this spray head is that the three optimally arranged spray nozzles interrupt the normally present air cushion of the fast rotating saw blade. As a result, the lubricant always optimally arrives at the working position. Locking screws maintain the spray quantity that is set.

SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
55 00 0092.001	Spray-head-PSM3fold-05x10-lock_SW2	55 00 0093.001

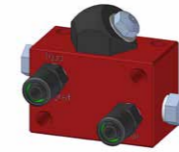
### PBMJ SPRAY HEAD



Small spray head for tight installation spaces. The quantity is set in the front at the spray jet outlet. The lines are mounted at a 90° angle or with a side exit. Due to the individual supply and the small diameters, this spray head is only suitable to a limited extent for viscous, strongly adhesive fluids.

SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
55 00 0100.001	Spray-head-PBMJR-05x10	55 00 0101.001

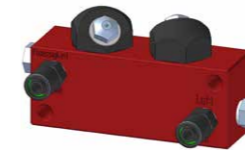
### PCJ 1-FOLD SPRAY HEAD



Spray head with a nozzle head that can be swivelled by 360°. The quantity is set in the front at the spray jet outlet. This spray head is only suitable to a limited extent for viscous, strongly adhesive fluids.

SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
55 00 0114.001	Spray-head-PCJR1fold-05x10-AL	55 00 0115.001

### PCJ 2-FOLD SPRAY HEAD



The PCJ 2-fold has two spraying points in contrast to the simple version. Universal spray head that offers enormous advantages for slow saw applications due to the double-sided spraying of the saw blades.

SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
55 00 0110.001	Spray-head-PCJR2fold-05x10-616	55 00 0111.001

Not found a suitable variant for your application? Contact us. Our technical advisers will plan your individual solution competently and with years of experience in minimum quantity technology.

**NEW PRODUCT!**

### SPRAY JET MONITORING



Play it safe and monitor your process with our proven fork light barriers of the GD series. Their robust metal housing and high degree of protection are designed for demanding applications in mechanical engineering. The control electronics are integrated in the sensor housing.

Maximum security for your process.

DESIGN	ARTICLE NUMBER	DESIGNATION
Standard	47 01 1000.001	Light_barriers_GD_series

## JOP DRIP-FEED DOSING DEVICE

The JOP precision drip-feed dosing device from HPM is the easy way to dose liquid processing media such as cooling lubricants, oils, lubricants or dispersions precisely and accurately:

economically – precisely – evenly and with a minimal impact on people and the environment.

It can be used wherever precisely defined quantities of fluids are required. In thread cutting, drilling, reaming, milling, deburring, thread forming, flow drilling, and for selective tool lubrication / die greasing, when additional lubrication is necessary.

The fluid flows without pressure out of the container directly into the dosing nozzle. After a control pulse (manually either via pedal, hand lever valve or directly from the machine control system), it is pressed out under pressure by a piston and brought straight to the point as a droplet. Even over long distances.

The best position for the drip-feed dosing device is set with the bracket. In this way, a fluid drop can be applied selectively and precisely, even over distances. The slim design of the drip-feed dosing device and the fastening with a magnetic base and brackets make it possible to mount even in narrow machine rooms with interfering edges (e.g. for automatic tool changers)

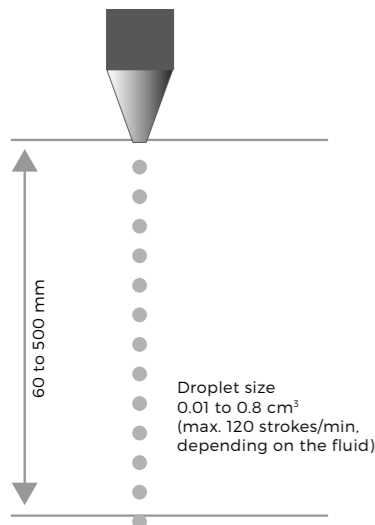
Depending on the nozzle bore, the piston pressure and the viscosity of the fluid (or the surface tension), drop sizes from approx. 0.01 to 0.8 cm<sup>3</sup> and up to approx. 120 strokes/min can be achieved per pulse/stroke. The distance between the positioning of the drip-feed dosing device and the point of impact is ideally between 60 and 500 mm – depending on the fluid. The viscosity range of the fluids to be used goes to 240 mm<sup>2</sup>/s at 40 °C.

Required compressed air connection: 6 bar filtered. The working pressure is approx. 2 to 6 bar, depending on the viscosity of the fluid.

### JOP DRIP-FEED DOSING DEVICE



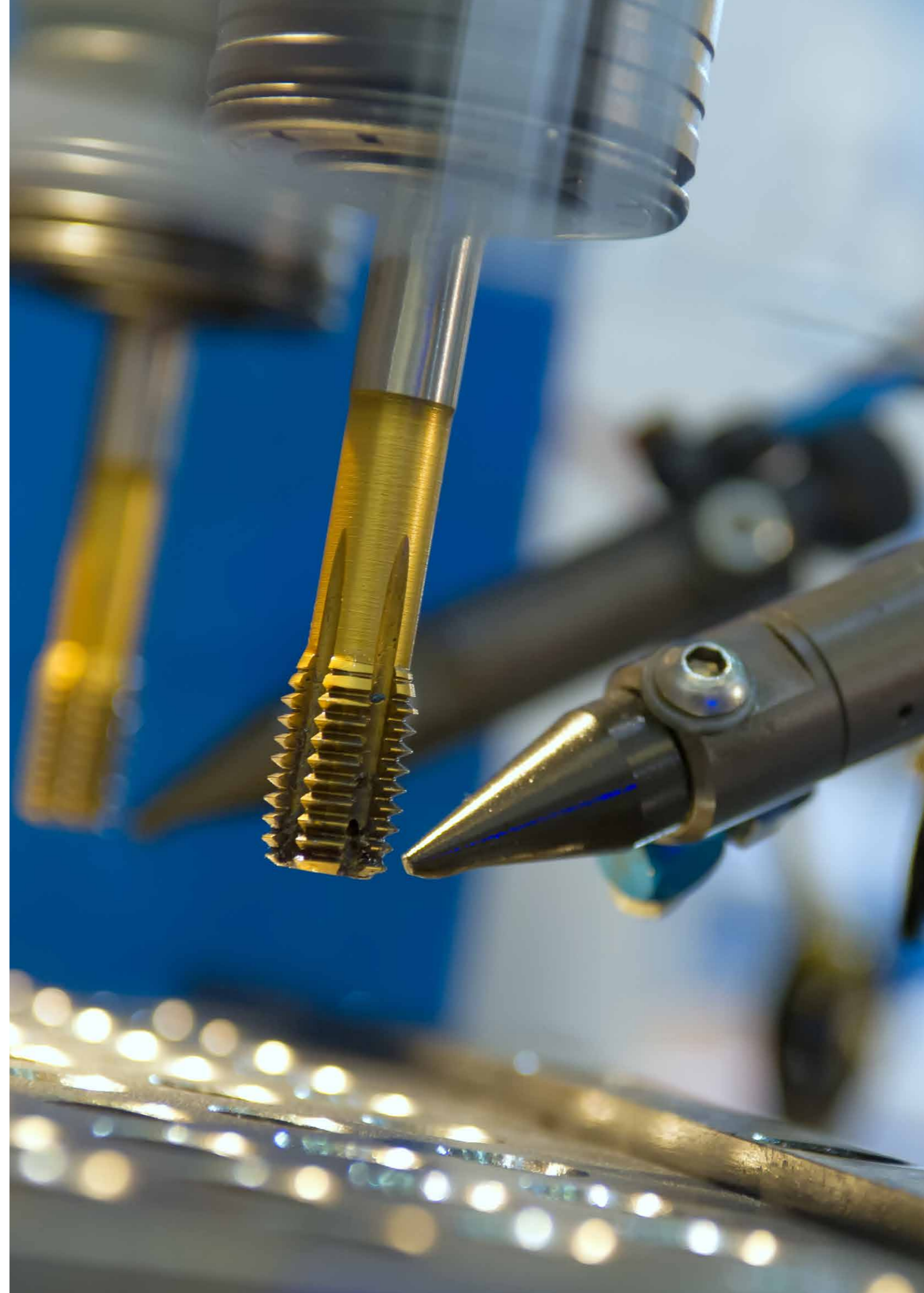
DESIGN	SPRAY HEAD	DESIGNATION	SPRAY HEAD GROUP
Standard	43 76 8000.001	Drip-feed dosing devices_04-w-conn	43 76 8000.010
with ball joint for mount	43 76 9000.001	Drip-feed-dosing-device_04-w-conn-w-ball	43 76 9000.010



#### Example of JOP drip-feed dosing device

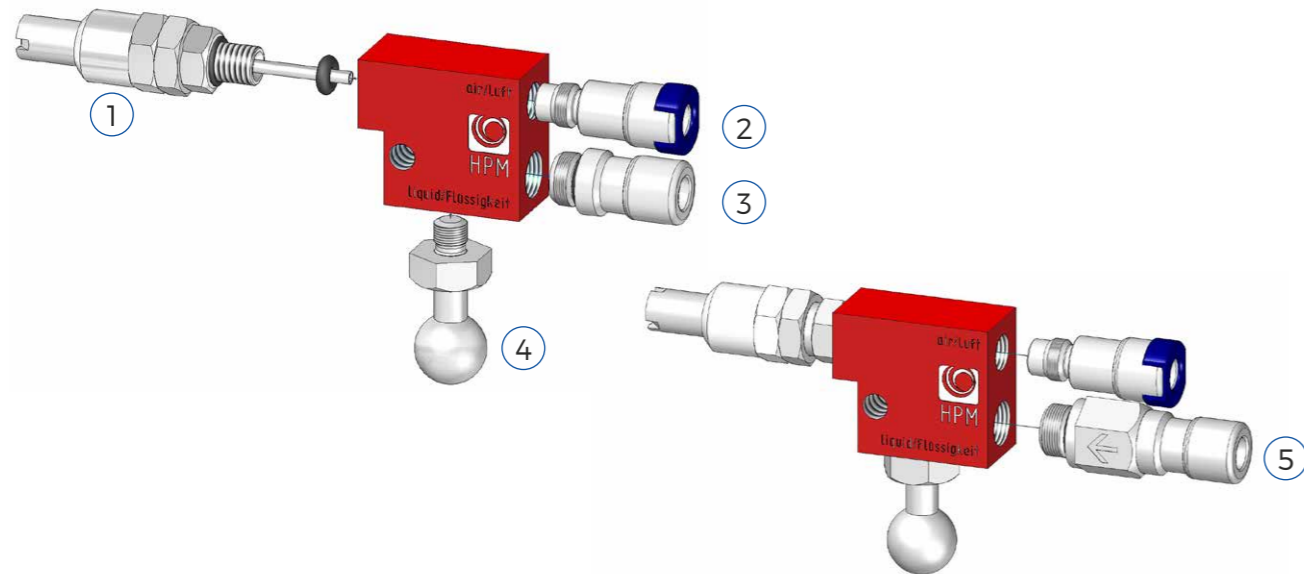
Viscosity range:  
up to 1000 mm<sup>2</sup>/s at 20 °C  
up to 240 mm<sup>2</sup>/s at 40 °C

Working pressure:  
Depending on the viscosity of the  
fluid, 4 to 6 bar

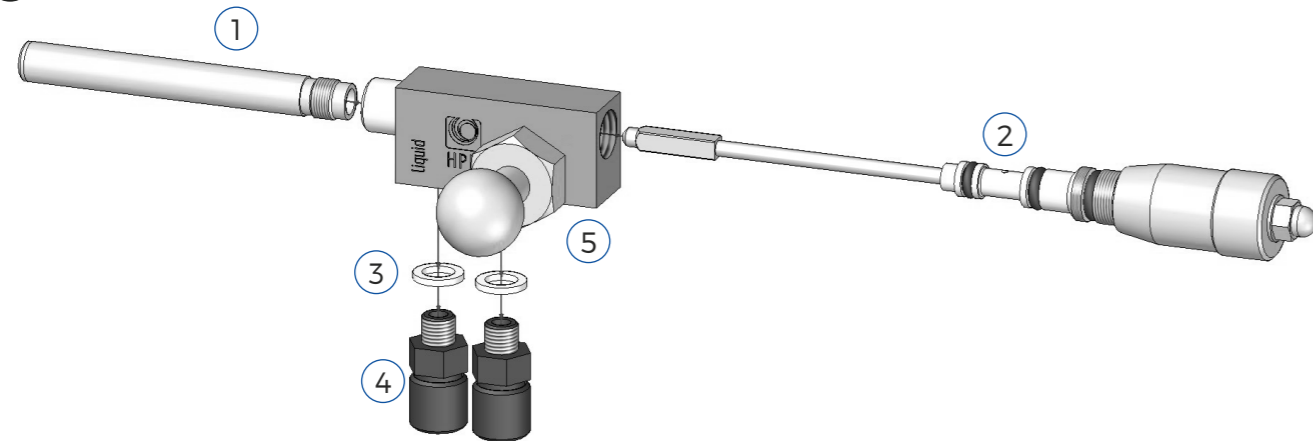


# SPARE PARTS FOR HTR, LEO, PSM SPRAY HEADS

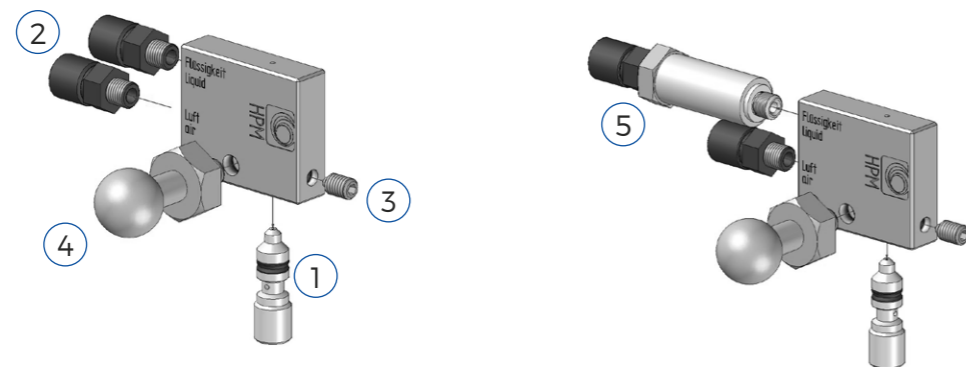
## HTR



## LEO



## PSM



# SPARE PARTS FOR HTR, LEO, PSM SPRAY HEADS

## HTR

DESIGN	ARTICLE NO	DESIGNATION
1	49 01 7000.001	HTR050-nozzle-set-compl_05x10
	49 01 7000.002	HTR050-nozzle-set-compl_07x15
	49 01 7000.011	HTR085-nozzle-set-compl_05x10
	49 01 7000.012	HTR085-nozzle-set-compl_07x15
	49 01 7000.021	HTR110-nozzle-set-compl_05x10
	49 01 7000.022	HTR110-nozzle-set-compl_07x15
	49 01 7000.031	HTR135-nozzle-set-compl_05x10
	49 01 7000.032	HTR135-nozzle-set-compl_07x15
2	49 01 6000.001	Air-connection-HTR-M8x1-Ø6-blue
3	48 00 0000.001	Straight-screw-in-fitting-G1/8-6-16k
4	45 00 0036.002	Ball-joint-SW13-M6-St
5	49 02 6000.001	Check-valve-5513F-G1/8-Ø6

## LEO

DESIGN	ARTICLE NO	DESIGNATION
1	49 02 8000.001	External-nozzle10_w-extension_tube_LEO030
	49 02 8000.002	External-nozzle10_w-extension_tube_LEO070
	49 02 8000.003	External-nozzle10_w-extension_tube_LEO105
	49 02 8000.004	External-nozzle10_w-extension_tube_LEO130
	49 02 8000.005	External-nozzle10_w-extension_tube_LEO155
2	49 02 1000.001	Internal_nozzle05_LEO030_w-measuring_unit
	49 02 1000.002	Internal_nozzle05_LEO070_w-measuring_unit
	49 02 1000.002	Internal_nozzle05_LEO105_w-measuring_unit
	49 02 1000.002	Internal_nozzle05_LEO130_w-measuring_unit
	49 02 1000.002	Internal_nozzle05_LEO155_w-measuring_unit
3	48 02 8000.001	Sealing-ring-M5-7.6x1-PA
4	41 28 1000.001	Tube-connection-Ms-M5-6-4
5	45 00 0036.003	Ball-joint-SW13-M5-St

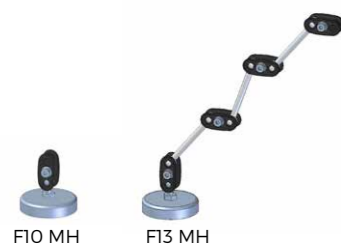
## PSM

DESIGN	ARTICLE NO	DESIGNATION
1	43 54 7000.001	Internal-nozzle-PSM-M7x05_05oR
2	41 28 1000.001	Tube-connection-Ms-M5-6-4
3	44 57 0000.001	Threaded_pinM4x6_nozzle_lock
4	45 00 0036.003	Ball-joint-SW13-M5-St
5	49 02 7000.011	Check-valve-RVP0114F-6-4

# SUPPORTS AND TUBINGS

Our tubings have been specially developed for the use of different fluids.

## JOINT HOLDER WITH MAGNETIC BASE



DESIGN	ARTICLE NO	DESIGNATION
F10 MH	27 77 2000.001	Magnetic-based-bracket-base-holder-F10MH
F11 MH	27 77 4000.001	Magnetic-based-bracket-base-arm-F11MH
F12 MH	27 77 6000.001	Magnetic-based-bracket-base-arm-F12MH
F13 MH	27 77 8000.001	Magnetic-based-bracket-base-arm-F13MH

## JOINT HOLDER WITH M8 THREAD



DESIGN	ARTICLE NO	DESIGNATION
F10	27 77 1000.001	Hinged-bracket-F10
F11	27 77 3000.001	Hinged-bracket-F11-1part
F12	27 77 5000.001	Hinged-bracket-F12-2part
F13	27 77 7000.001	Hinged-bracket-F13-3part

## HOSE PAIR



DESIGN	ARTICLE NO	DESIGNATION
2 metres	55 00 0000.002	Tubing-groupPA6-6-2metre
3 metres	55 00 0000.003	Tubing-groupPA6-6-3metre
4 metres	55 00 0000.004	Tubing-groupPA6-6-4metre
5 metres	55 00 0000.005	Tubing-groupPA6-6-5metre

## HOSE, INDIVIDUAL (piece goods, available 6 metres and longer)



DESIGN	ARTICLE NO	DESIGNATION
white	27 85 0000.001	PA11-12tube-flex6-4x1white
blue	27 84 9000.001	PA11-12tube-flex6-4x1blue
DUO hose	27 84 5000.001	PA-DUO-tube-flex6-4x1blue/white

# FLOAT SWITCH

Their sturdy and maintenance-free design make them suitable for almost all fluids. Stainless steel design.

## VSS-ADVANCED-WARN FLOAT SWITCH (standard) WITH 2 CONTACTS: CONTAINER EMPTY + EMERGENCY OFF



DESIGN	ARTICLE NO	DESIGNATION
TCJ container 2.5 l	44 84 3000.001	Float-switch-VSS-L175-adv.-warn
TCJ container 5 l	44 84 3000.002	Float-switch-VSS-L210-adv.-warn
TCJ container 10 l	44 84 3000.003	Float-switch-VSS-L265-adv.-warn
TCJ container 25 l	44 84 3000.004	Float-switch-VSS-L425-adv.-warn
MDJ pressure tank 10 l	44 84 3000.007	Float-switch-VSS-L255-adv.-warn
Float switch for PPJ	44 01 3000.100	Float-switch-VSS-L100-adv.-warn

## VSS-MIN-MAX FLOAT SWITCH WITH 2 CONTACTS: MIN./MAX. CONTACTS FOR SEQUENCE CONTROL



DESIGN	ARTICLE NO	DESIGNATION
TCJ container 2.5 l	44 84 3000.010	Float-valve-VSS-L175-Min-Max
TCJ container 5 l	-	Available upon request
TCJ container 10 l	44 84 3000.012	Float-valve-VSS-L265-Min-Max
TCJ container 25 l	44 84 3000.014	Float-valve-VSS-L425-Min-Max
MDJ pressure tank 10 l	44 84 3000.011	Float-valve-VSS-L255-Min-Max

## VS FLOAT SWITCH WITH 1 CONTACT: CONTAINER EMPTY

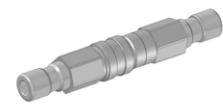


DESIGN	ARTICLE NO	DESIGNATION
MDJ pressure tank 10 l	41 26 7000.010	Float-switch-VS-L255

## COUPLERS AIR AND FLUID

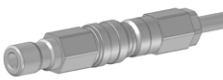
All plug connections are specially designed with a double seal for the use of fluids and our low-pressure systems.

### FLUID LINE INSTALLATION DIRECTLY IN THE LINE



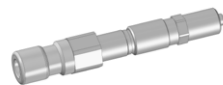
DESIGN	ARTICLE NO	DESIGNATION
Complete	44 75 3000.012	CouplerNW5_compl-G1/8-6-pluggable
Sealing coupling	43 72 5000.110	Sealing-couplingNW5-w-plug-conn-G1/8-6
Sealing nipple	43 72 6000.110	Sealing-nippleNW5-w-plug-conn-G1/8-6

### FLUID LINE MOUNTING ON DISTRIBUTOR



DESIGN	ARTICLE NO	DESIGNATION
Complete	44 75 3000.011	CouplerNW5_compl-plug-connection
Sealing coupling	43 72 5000.110	Sealing-couplingNW5-w-plug-conn-G1/8-6
Sealing nipple	43 72 6000.112	Sealing-nipple-NW5-w-screw-in-connector-G1/8-6

### AIR LINE INSTALLATION DIRECTLY IN THE LINE



DESIGN	ARTICLE NO	DESIGNATION
Complete	44 75 6000.012	CouplerNW2.7_compl-w-plug-conn-G1/8-6
Sealing coupling	96 04 7024.001	Sealing-couplNW2.7-6/4x1-MS
Sealing nipple	96 04 7024.213	Sealing-nippleNW2.7-w-plug-conn-G1/8-6

### AIR LINE MOUNTING ON DISTRIBUTOR



DESIGN	ARTICLE NO	DESIGNATION
Complete	44 75 6000.011	CouplerNW2.7_compl-plug-connection
Sealing coupling	96 04 7024.001	Sealing-couplNW2.7-6/4x1-MS-nickel-plated
Sealing nipple	96 04 7024.214	Sealing-nipple-NW2.7-w-screw-in-connector-G1/8-6

## SCREW CONNECTIONS

All plug connections are specially designed with a double seal for the use of fluids and our low-pressure systems.

### STRAIGHT SCREW-IN CONNECTION



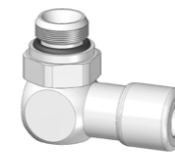
DESIGN	ARTICLE NO	DESIGNATION
G1/8-6-16k	48 00 0000.002	Straight-screw-in-fitting-G1/8-6-16k
G1/8-8-16k	48 00 0000.003	Straight-screw-in-fitting-G1/8-8-16k
G1/4-6-16k	48 00 0000.005	Straight-screw-in-fitting-G1/4-6-16k
G1/4-8-16k	48 00 0000.006	Straight-screw-in-fitting-G1/4-8-16k

### STRAIGHT SCREW-ON CONNECTION



DESIGN	ARTICLE NO	DESIGNATION
G1/8-6	48 00 5000.002	Straight-screw-on-connection-G1/8-6
G1/4-6	48 00 5000.005	Straight-screw-on-connection-G1/4-6
G1/4-8	48 00 5000.006	Straight-screw-on-connection-G1/4-8

### ANGLED SCREW-IN CONNECTION



DESIGN	ARTICLE NO	DESIGNATION
G1/8-6	48 00 1000.002	Angled-screw-in-connection-black-G1/8-6
G1/8-8	48 00 1000.003	Angled-screw-in-connection-black-G1/8-8
G1/4-6	48 00 1000.005	Angled-screw-in-connection-black-G1/4-6
G1/4-8	48 00 1000.006	Angled-screw-in-connection-black-G1/4-8

### ANGLED CONNECTOR



DESIGN	ARTICLE NO	DESIGNATION
Ø 6	48 00 3000.002	Angled-connector-6
Ø 8	48 00 3000.003	Angled-connector-8

### ANGLED CONNECTION



DESIGN	ARTICLE NO	DESIGNATION
Ø 6	48 01 3000.002	Angled-connection-6
Ø 8	48 01 3000.003	Angled-connection-8

## SCREW CONNECTIONS

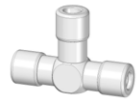
All plug connections are specially designed with a double seal for the use of fluids and our low-pressure systems.

### T SCREW-IN CONNECTION



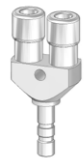
DESIGN	ARTICLE NO	DESIGNATION
G1/8-6	48 00 9000.002	T-screw-in-connection-black-G1/8-6
G1/8-8	48 00 9000.003	T-screw-in-connection-black-G1/8-8
G1/4-6	48 00 9000.005	T-screw-in-connection-black-G1/4-6
G1/4-8	48 00 9000.006	T-screw-in-connection-black-G1/4-8

### T CONNECTION



DESIGN	ARTICLE NO	DESIGNATION
3x6	48 01 0000.002	T-connection-3x6
3x8	48 01 0000.003	T-connection-3x8

### Y CONNECTOR



DESIGN	ARTICLE NO	DESIGNATION
Ø 6	48 01 2000.002	Y-connector-Ø6
Ø 8	48 01 2000.003	Y-connector-Ø8

### DOUBLE CONNECTOR



DESIGN	ARTICLE NO	DESIGNATION
Ø 6	48 00 2000.002	Double-connector-Ø6
Ø 8	48 00 2000.003	Double-connector-Ø8

### DOUBLE CONNECTION



DESIGN	ARTICLE NO	DESIGNATION
Ø 6	48 00 2100.001	Double-connection-Ø6
Ø 8	48 00 2100.002	Double-connection-Ø8

### REDUCER PLUG



DESIGN	ARTICLE NO	DESIGNATION
Ø6-Ø5	48 03 1000.002	Reducer-plug-Ø6-Ø5
Ø8-Ø6	48 03 1000.003	Reducer-plug-Ø8-Ø6

## CHECK VALVES

All plug connections are specially designed with a double seal for the use of fluids and our low-pressure systems.

### CHECK VALVE (ON THE DISTRIBUTOR)



ARTICLE NO	DESIGNATION
49 01 4000.001	TC-check-valve-1/8-6

### CHECK VALVE (FOR HTR SPRAY HEAD)



ARTICLE NO	DESIGNATION
49 02 6000.001	Check-valve-5513F-G1/8-Ø6

### CHECK VALVES (FOR PSM, PCJ, PBMJ AND LEO SPRAY HEADS)



ARTICLE NO	DESIGNATION
49 02 7000.011	Check-valve-RVP0114F-6-4

### CHECK VALVE (IN THE FLUID LINE)



ARTICLE NO	DESIGNATION
44 91 0000.001	Check-valve5313F-2xØ6

## ALL APPLICATION IS NOT THE SAME!



MQL spraying systems from HPM – the finest way of applying oils and other fluids (emulsions, solvents, rust protection, lubricant oils and release agents).

### **Precisely – thinly – evenly – sparingly – ecologically!**

The HPM spraying bar solutions are adapted to each task:

Our spraying bar technology is designed for the constant, even application of thin oil films on belts, coils, boards or geometric surfaces such as profiles, round bars, pipes, cables etc.

Our spraying bar solutions allow you to completely ignore negative influences such as the condition

of cutting edges, uneven material strength, rough structures of surfaces or imprints from dirt particles that have to be considered during contact application.

In contrast to other application types, our HPM spraying bar systems are nearly wear-free, immediately ready for use at any time, and do not require any special maintenance effort.

Using our spraying bars will therefore pay off for you within a very short time! For initial equipment as well as for upgrading or retrofitting.

# NO SUCH THING AS IMPOSSIBLE

We approach all our tasks according to this principle. As the result of our modular system, we can find the optimum solution for your process together with you.

Whether it is a transfer system with individually controllable spraying points, as in figure 1, that guarantees a reliable supply of all spraying points via a central pressure tank system.

Or a 1660 mm wide and sectorisable spraying gate, as in figure 2, for the oiling of coils or boards with integrated suctioning and automatic filling.

As you see, there are no limits to your requirements.

Take advantage of our decades of experience in planning special systems. Simply contact us.

Together, we will find the best solution for you.

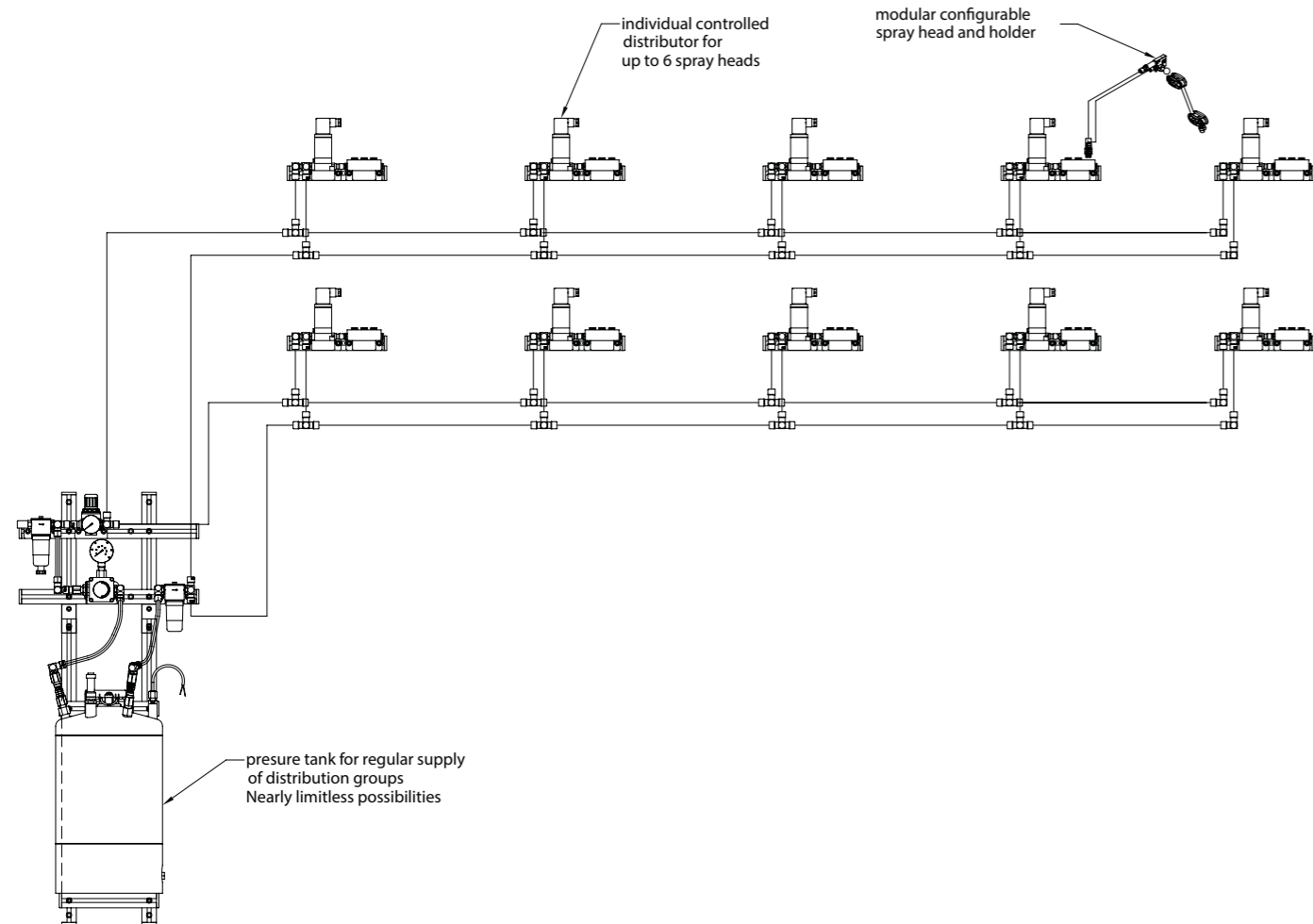


Figure 1

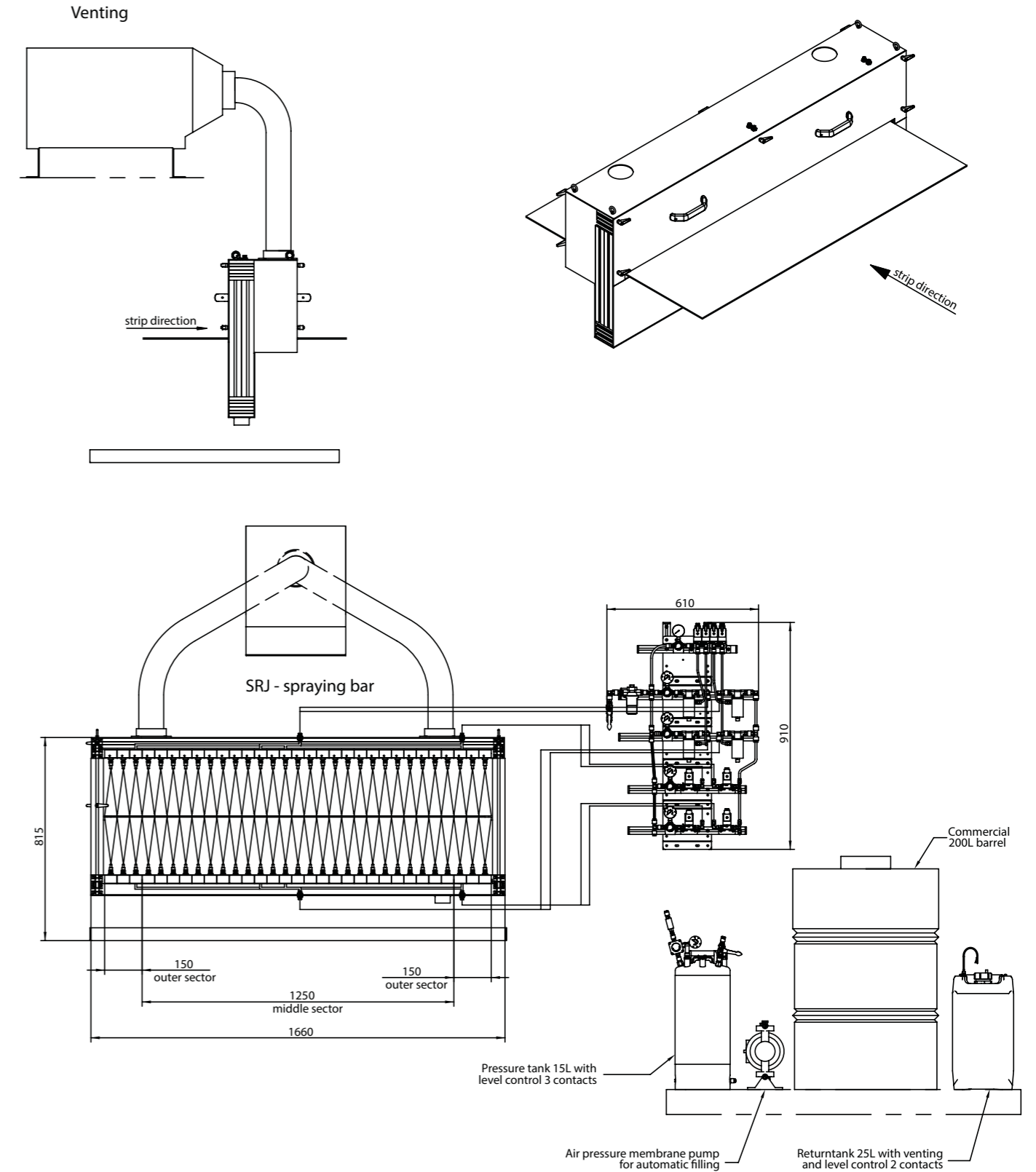


Figure 2



## HPM TECHNOLOGIE BREEZE SERIES

### ALWAYS THE PRECISE QUANTITY THAT YOUR PROCESS REQUIRES!

#### The future of your machining task starts right here!

The current discussions regarding more energy-efficient and more resource-saving manufacturing are bringing MQL technology back into the focus of possible machining strategies.

For more and more companies, the topic of MQL machining is becoming increasingly important when considering costs, efficiency and environmental compatibility. This applies to original equipment manufacturers and end users equally.

Since this topic has been around for almost 70 years, there are enough developments in MQL machining to consider when seriously evaluating the available possibilities. There is now a perfect spraying technology based on minimum fluid consumption, especially for metal cutting.

In addition, the high sulphur content and other health-related considerations cause many companies to hesitate when it comes to the use of oils or emulsions with additives.

Many companies look for alternatives in other lubricants. Fluids without additives or even emulsions with biocide are the most commonly used alternative media in a work environment in which it has been long known that cooling lubricants are among the main causes of work-related skin disorders.

The fact that there are other options and that machining is even possible in a nearly dry operation is shown by the current technological developments in the area of MQL technology.

#### The HPM Breeze method!



## ECONOMICAL AND ECOLOGICAL MACHINING WITH HPM BREEZE

Our Breeze technology has many enormous advantages over the previous classic lubrication applications.

For the machining process, an average of between 5 and 50 ml of lubricant is used per process hour and tool. These consumption values can also be briefly – depending on the requirements of the individual operation – increased to up to 200 ml per process hour.

In addition to this excellent advantage over the previous method, the HPM Breeze method offers further enormous advantages from an economic and ecological point of view.

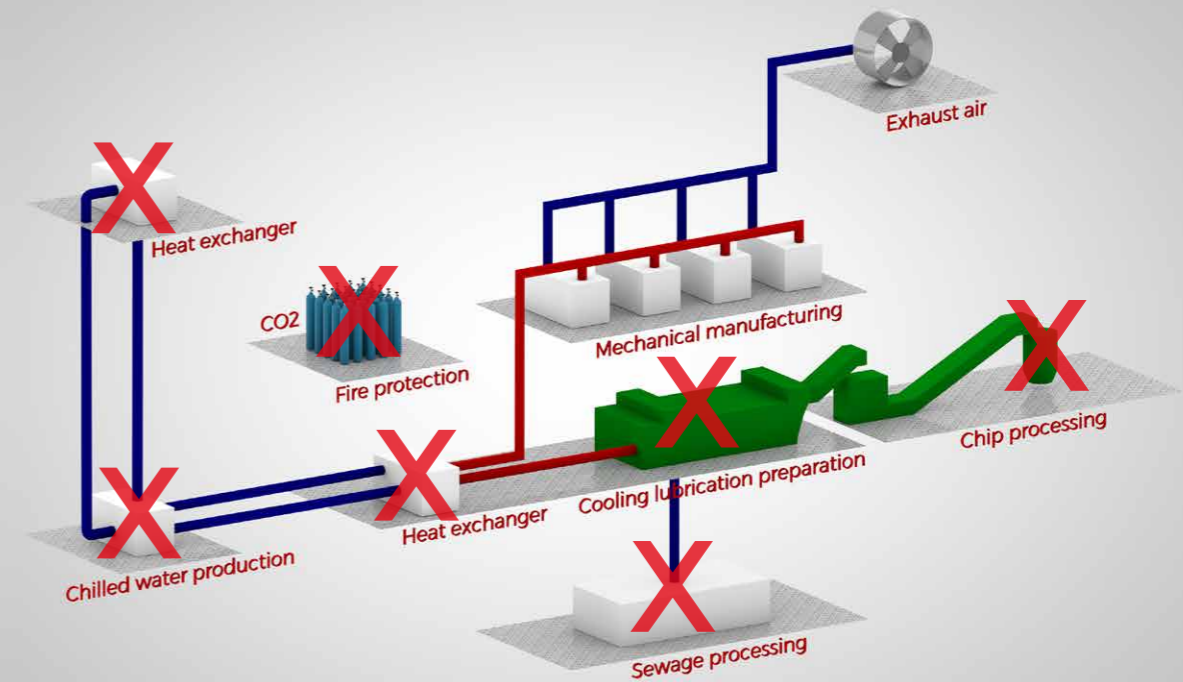


## COST POTENTIALS IN SERIES PRODUCTION

Dry machining according to the HPM Breeze method offers enormous savings potentials in series production.

Traditional quantity lubrication requires numerous systems, e.g., to cool and clean the emulsion, process the chips, and treat the waste water, but these can be eliminated when machining with the HPM Breeze method.

The savings potential is tremendous.



### ECONOMIC ADVANTAGES:

- Reduction of the lubricant consumption many times over
- Reduction of the cleaning effort
- Reduction of emissions
- Reduction of skin irritations
- Always fresh medium in the process

### ECOLOGICAL ADVANTAGES:

- Always fresh medium in the process
- Dry workpieces – dry chips
- Elimination of disposal costs for chips
- Higher cutting speeds
- No costs for emulsion treatment
- Better surface qualities.

### GREY: Water-soluble cooling lubricant - emulsion

### BLUE: HPM Breeze



With HPM Breeze, the feed rate is increased by approx. 30%



With HPM Breeze, the tool life is nearly doubled



With HPM Breeze, the spindle load is decreased by approx. 30%

## ADVANTAGES OF HPM BREEZE

Can be used on portal milling machines, turning and milling centres, multi-revolver turning centres, multi-spindle machines and all other machining centres.

### Retrofittable

Only one axial spindle rotary transmission or similar is needed. No change to the spindle is necessary due to our 1-channel technology.

### Integrated control

Interface: Profibus,  
ProfiNet, Ethernet

24 V DC power supply via the  
machine control system



### Optional switchover between CL/MQL

Different pressures can be controlled via NC machine program

Oil saturation can also be set via the injection nozzles

Fill quantity approx. 4 litres

### Flexible

Response times < 0.1 s

Can be used between 4 - 16 bar  
(tool-dependent)

Air volume flow from 70 - 800 NI/min  
(tool-dependent)

Consumption between 5 - 100 ml/h

Several spindles can be supplied simultaneously

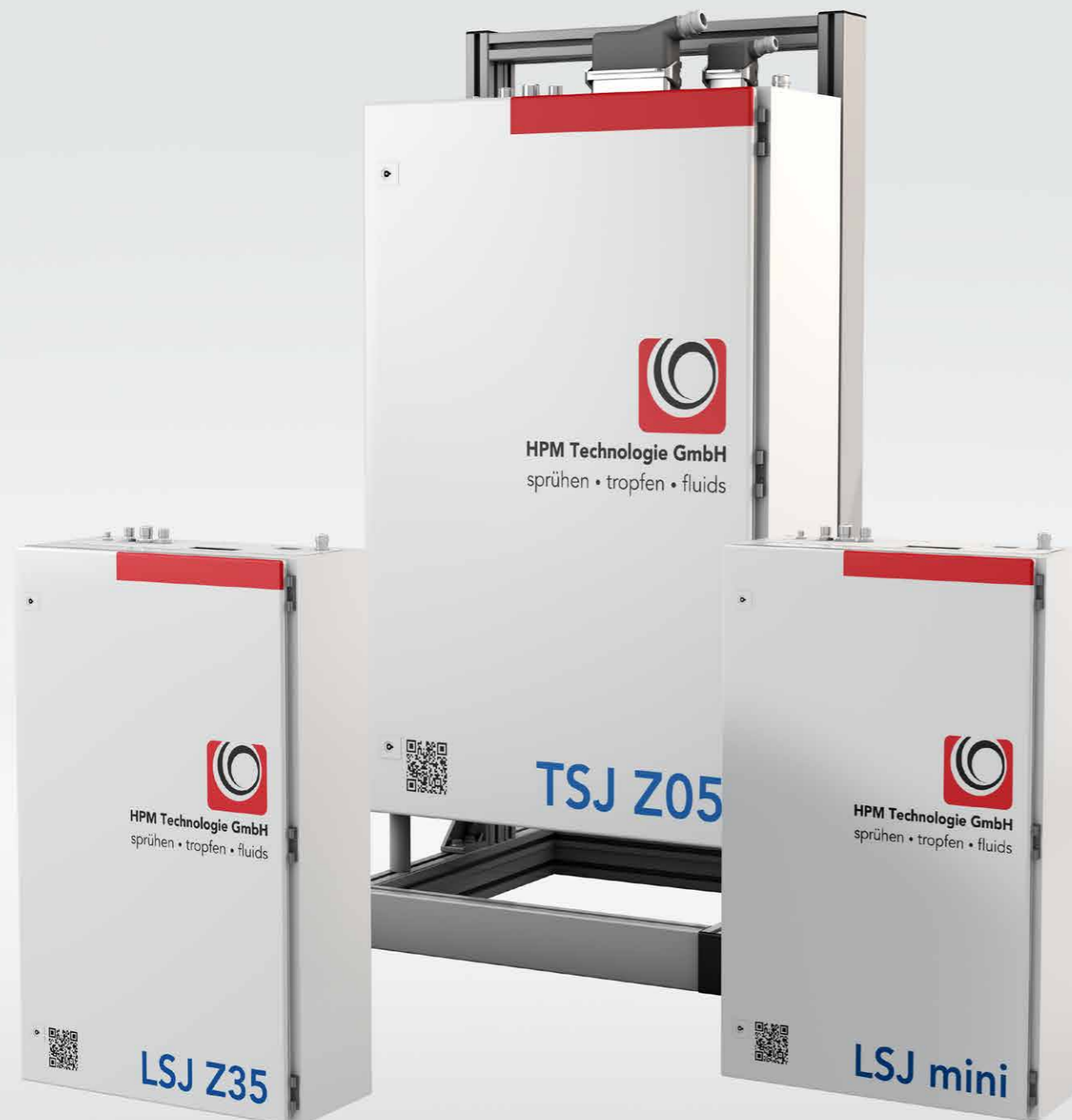
The spindles should be able to run dry

## HPM BREEZE DEVICES

### Applications of HPM Breeze

The devices of the HPM Breeze series are used to lubricate tools in machining operations. They are suitable for original equipment as well as retrofitting or

upgrading of machine tools. The complete encapsulation of the machine with a suitable extraction system is recommended.



## TSJ Z05

### For internal and external lubrication

#### Application area:

The HPM Breeze TSJ Z05 is used in simple processing machines (e.g. boom drills, manual lathes or milling machines) and with tools  $\phi \geq 5$  mm.

The HPM Breeze Z05 mist mixing nozzle is suitable for highly dynamic and complex processes, since the medium and the air are combined and mixed close to the process.

Due to the process-oriented MQL production, a short "chip to chip" time can be realized. The individual parameters can be set independently of the speed.

If the tool machine does not have an internal lubricant supply, the HPM Breeze TSJ Z05 can also be used for external lubrication supply.

#### Application:

Internal lubrication with coolant adapter via internal coolant supply, internal coolant supply tools with at least  $0.3 \text{ mm}^2$  cross sectional area. External lubrication via mist pressure nozzles.

#### Function:

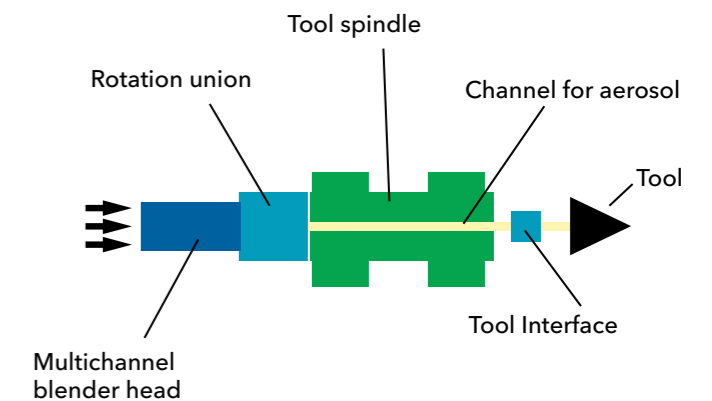
Even aerosol production using regulated compressed air.

No clogging at the aerosol outlet.

Switching on and off via 3/2-way valve.

### MULTI-CHANNEL SYSTEM (HPM TSJ Z05)

- Extremely short response times
- Single- or multi-channel rotary transmission
- Low installation requirements
- Defined transfer situation



DESIGN	ARTICLE NO	DESIGNATION
TSJ Z05-16	75 05 0000.001	TSJ-Z05-12L-16bar-2Z-024DC-1nozzle

## LSJ MINI

**NEW PRODUCT!**

### Your entry into internal lubrication with MQL.

**Concentrated power paired with easy operation and an attractive price. In our LSJ Mini, we have combined all the advantages of the big brother LSJ Z35 with a compact design.**

The pressure can be optimally adjusted to your requirements with manually adjustable pressure controllers. The additional option of regulating the aerosol saturation directly at the container always yields an optimum

spray result. The unique possibility of using our Mini LSJ up to an operating pressure of 15 bar makes even demanding machining possible.

This system is optimally used with uniform tool operations. Once optimally set, the system is absolutely reliable.

For optimum use with a cooling channel diameter of 0.9 mm<sup>2</sup> and up.

DESIGN	ARTICLE NO	DESIGNATION
LSJ Mini	75 40 0000.001	Mini-LSJ-Cpl-6L-visual

## LSJ Z35

**NEW PRODUCT!**

### High performance for internal lubrication

#### Application area:

The HPM Breeze air spraying injector LSJ Z35 can be used in 95 percent of all machining processes, e.g. turning, milling, drilling, reaming, threading. With tools that have a diameter larger than 2 mm. And also where 2-channel solutions were previously used.

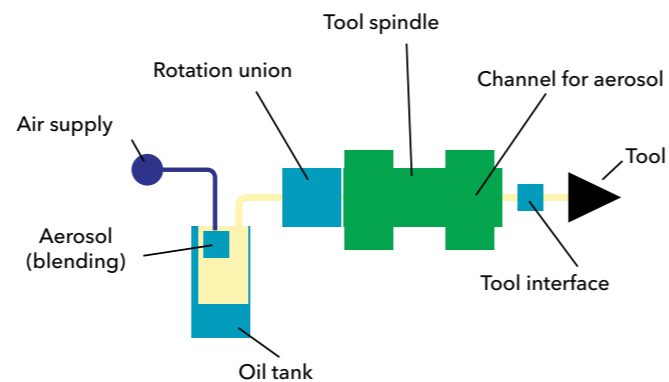
The LSJ Z35 is offered in 2 versions. 10 bar is standard. For more demanding applications, the LSJ Z35 is available in a version with 16 bar.

#### Application:

Internal lubrication with coolant adapter via internal coolant supply. Internal coolant supply tools with at least 0.15 mm<sup>2</sup> cross sectional area. External lubrication via mist pressure nozzles.

#### Function:

Even aerosol production using regulated compressed air (proportional technology). Transport via aerosol diverter, selection of HPM Breeze programs via ProfiBus/ProfiNet with Ethernet interface.



### SINGLE-CHANNEL SYSTEM

- Simple installation
- CL/MQL switchover possible
- Fastest response time
- No oil wall fraction with optimum configuration

DESIGN	ARTICLE NO	DESIGNATION
LSJ Z35-10	75 30 0000.100	LSJ-Z35-6L-10bar-ProfiBus-exit-top
LSJ Z35-16	75 30 0000.200	LSJ-Z35-6L-16bar-ProfiBus-exit-top

## AUTOMATIC FILLING

### Reduced refilling effort and process reliability

The automatic filling unit from HPM Technologie reduces effort and costs. Direct filling from the 200 litre barrel or the 1000 litre IBC. No manual refilling necessary anymore.

The automatic filling can be used wherever the HPM Breeze air spraying injector is used and may only be used in connection with an HPM Breeze air spraying

injector or MDJ device. The lubricant supply is automatically refilled upon request from the HPM Breeze air spraying injector via a pneumatic compressed air pump.

The automatic filling can supply several systems at the same time. A level control in the tank/IBC allows the tank to be changed in time.



## AFS AIRFILTER

AFS individual devices offer tailored solutions for extraction and exhaust air cleaning directly at machine tools and machining centres. They can be directly mounted on them or completely integrated.

AFS individual devices are used to recirculate air throughout the year; the cleaned exhaust air is blown out directly into the production hall. Legal regulations for the cooling lubricant concentration at the workplace are observed at all times.

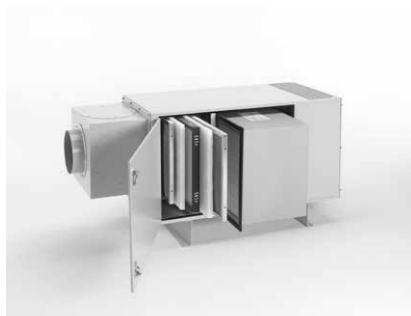
AFS air cleaning devices are available in different sizes with specific air extraction volumes. Since the devices can be combined with each other as desired, very high extraction capacities are possible. The modular structure allows a flexible and customised design. Depending on the installation situation, the devices can be individually adapted to the customer requirements.

### AFS 400 C AIR CLEANING UNIT



Scope of supply: Modular unit with suction opening left/right, ready for installation, with installation supports (U-profile 120 mm), incl. intake funnel, all separation and filter elements as well as with connection for the cooling lubricant return

### AFS 600 AIR CLEANING UNIT



Scope of supply: Modular unit with suction opening left/right, ready for installation, with installation supports (U-profile 120 mm), incl. intake funnel, all separation and filter elements as well as with connection for the cooling lubricant return

DEVICE	ARTICLE NO.	AIR PERFORMANCE	COLOUR	ELECTRICAL CONNECTION	WEIGHT
AFS 400C	44 82 3001.001	400 m <sup>3</sup> /h	Light grey, RAL 7035 or customer request	3-, 230/400 V ± 10%, D/Y 50 Hz 0.50 kW intake, 1.5/0.88 A, IP 54, CL F. Special voltages / frequencies upon request	approx. 70 kg
AFS 600	44 82 3000.001	600 m <sup>3</sup> /h	Light grey, RAL 7035 or customer request	3-, 230/400 V ± 10%, D/Y 50 Hz 0.50 kW intake, 1.5/0.88 A, IP 54, CL F. Special voltages / frequencies upon request	approx. 50 kg

## PH CLEANTEC

### SRK PICO (UNIVERSAL LOW-PRESSURE HOT CLEANER)

The SRK Pico is characterised by the patented low-pressure hot cleaning procedure, which allows a gentle and efficient brake cleaning, machine cleaning and part cleaning.

The SRK Pico impresses with a high functionality as well as a simple and sturdy structure. It is ergonomic and allows a great degree of mobility and flexibility.

The SRK Pico. Mobile, compact and with no tank. Allows fluids to be suctioned from a separate container. The pressure performance is approx. 4.0 bar at 60 °C working temperature.



DESIGN	ARTICLE NO	DESIGNATION
SRK Pico	70 00 1000.001	SRK Pico

### TECHNICAL DATA

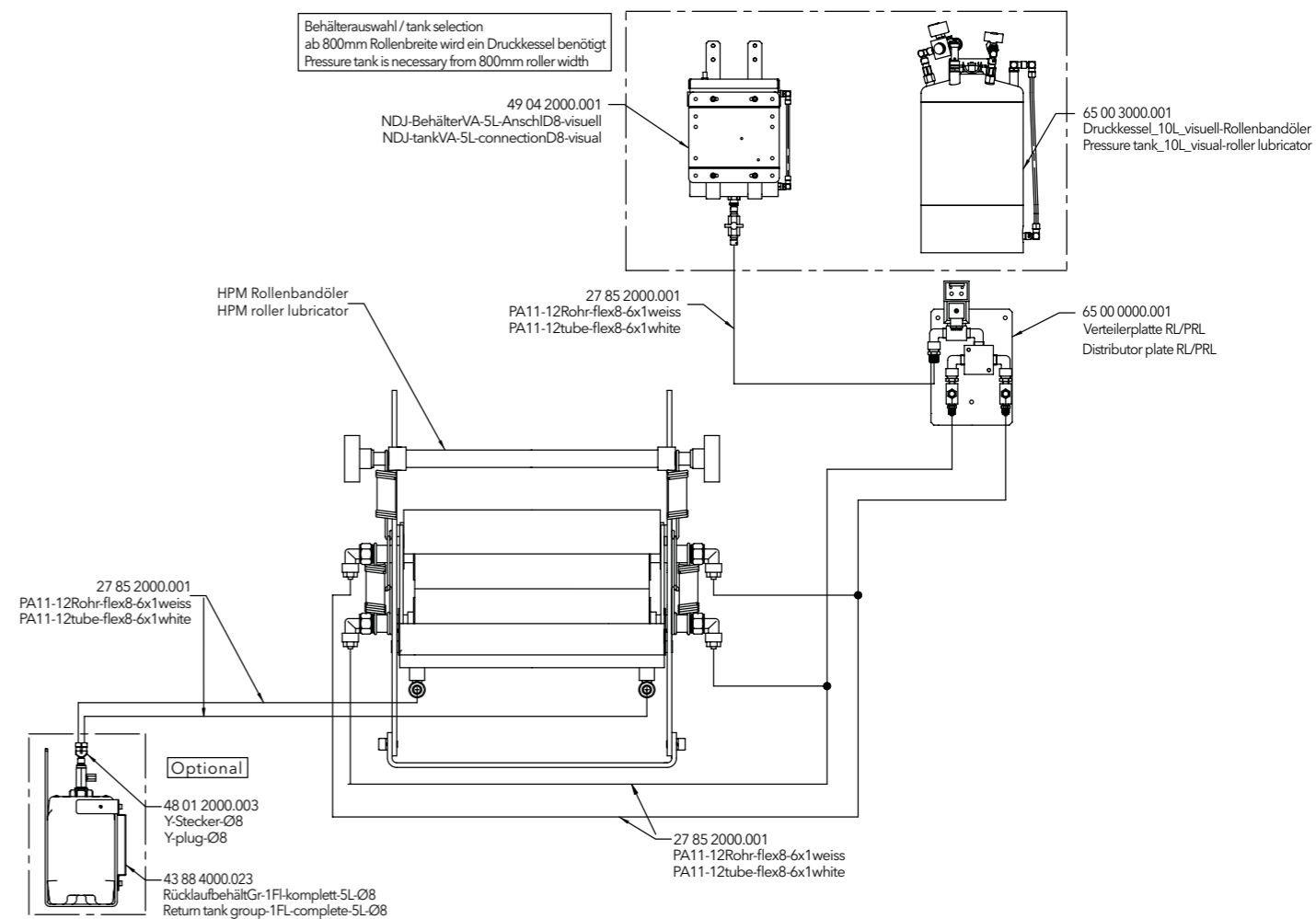
Working pressure	approx. 4.0 bar
Spray/water quantity	~ 1.0 l/min
Operating temperature	~ 60 °C
Current type	1P-N-PE/230V/50Hz/16A
Nominal consumption of heater	3.3 KW
Connection cable	7.5 m
Spray hose lance	5 m
Pistol with quick-change coupler	Standard with 600 m lance
Dimensions (WxDxH)	530x250x800 mm
Water supply	Suction from sep. container
Weight empty	approx. 25 kg
Filtering	n.a.
Noise level	<70 dBA
Pressure adjustment	n.a.
Temperature adjustment	n.a.
Separate ventilation circuit	n.a.
Cleaning agent dosing	n.a.
Interchangeable inserts	Option
Suction hose	3 m



# HPM ROLLER LUBRICATORS

The alternative to our proven spraying and drip-feed dosing systems! Perfect for all applications (e.g. punching, bending, deep drawing, etc.)

- Durable felt rollers
- Adjustable manually or via pneumatic cylinders
- Fast and easy roller changing
- Can be set to a viscosity of up to 150 mm<sup>2</sup>/s at 40 °C
- Available in different sizes
- Very robust in use
- Easy adaption and belt insertion



DESIGN	ARTICLE NO	DESIGNATION
HPM roller lubricators	65 00 1000.xxx	HPM roller lubricator HPM-RL-60
NDJ container	49 04 2000.001	NDJ-containerVA-5L-connD8-visual
Pressure tank	65 00 3000.001	Pressure_tank_10L_Nw5_visual-roller-lubricator
Distribution plate	65 00 0000.001	Distribution plate RL/PRL
Y connector Ø8	48 01 2000.003	Y connector Ø8
Return container	43 88 4000.023	Return-container-gr-1FL-compl-5L-Ø8

## HPM TECHNOLOGIE INDUSTRIAL LUBRICANTS

Offering the best solution for your process has always been our motivation. Protecting the environment and people is our passion. With our state-of-the-art fluids from the SURVOS, SENTOS and SAMNOS series, we are optimally equipped for this goal.

We make the highest demands on our products. Our lubricants are ultrapure and fulfil all requirements for lubricity and evaporation time. In addition, our SURVOS Plus L and SENTOS V-LR3 high-performance lubricants meet the strict food law requirements of the FDA US regulations in acc. with 21 CFR 178.3620 (b) and 178.3120.

Lubricants from HPM Technologie are developed and produced according to the highest ecological standards. People and the environment are sustainably protected.

With products from the SAMNOS series, you will also find biological lubricants in our range.

On the following pages, we give you an overview of our product range. Detailed information as well as product information and safety data sheets can be found on the Internet at: [www.hpmsysteme.de](http://www.hpmsysteme.de)

### UNIQUE ADVANTAGES OF OUR INDUSTRIAL LUBRICANTS

- Specially developed for MQL
- Elimination of cleaning processes
- Extremely high cutting speed without reduction in tool life
- Increase in material throughput
- Better product quality
- Clean parts / products
- Built-up edges are effectively prevented
- Optimal lubricity with residue-free drying
- Good biological degradability
- Can be used for almost all metals as well as plastics

### APPLICATION AREAS OF HPM INDUSTRIAL LUBRICANTS

	DRILLING	TURNING <sup>(a)</sup>	SAWING	MILLING <sup>(b)</sup>	THREAD CUTTING	ENGRAVING	PROFILING	PUNCHING	FORMING
General steel	5,6	5,6	5,6	5,6	5,6	5,6	8	6	8
Heat-treatable steels	5,6	5,6	5,6	5,6	5,6	5,6	8	6	8
Stainless steel	5,6	5,6	5,6	5,6	5,6	5,6	8	5,6	8
Aluminium	1,2,3,4,5,6	1,2,3,4,5,6	1,2,3,4,5,6	1,2,3,4,5,6	1,2,3,4,5,6	1,2,3,4,5,6	1,2,3,4	1,2,3,4	1,2,3,4
Non-ferrous metals	1,2,3,4,5,6	1,2,3,4,5,6	1,2,3,4,5,6	1,2,3,4,5,6	1,2,3,4,5,6	1,2,3,4,5,6	1,2,3,4	1,2,3,4	1,2,3,4
Woodworking	1,2,3	1,2,3	1,2,3	1,2,3	1,2,3	1,2,3			
Plastic	5,6	5,6	5,6	5,6	5,6	5,6			
Titanium	7	7	7	7		7			

1 SURVOS Standard | 2 SURVOS Rapid D | 3 SURVOS Plus L | 4 SENTOS V-LR3 | 5 SAMNOS Standard | 6 SAMNOS ZM-22W | 7 SAMNOS Plus | 8 SAMNOS TZ-W

<sup>(a)</sup> Depending on the delivery (chip removal)

<sup>(b)</sup> Depending on, among others, the machined material, tools, delivery (chip removal), etc.

The above information consists of empirical values of HPM Technologie GmbH and does not establish a contractual basis. Practical tests are necessary on site depending on the requirement profile.





## SURVOS AND SENTOS INDUSTRIAL LUBRICANTS

### 100% RESIDUE-FREE EVAPORATION\*

**SURVOS products are optimally suited to sheet metal forming, machining and assembly technology. Our SURVOS has also been successfully used in cutting and punching aluminium sheets, steel sheets, copper and brass sheets, in cold profiling, bending, embossing, sawing and drilling aluminium profiles for decades.**

SURVOS – 100% residue-free\* evaporating metal processing oil. With the SURVOS variants "STANDARD", "RAPID D" and "PLUS L", we offer extremely progressive processing media that meet the highest requirements.

#### SURVOS Standard

SURVOS detaches from a workpiece with 100% residue-free evaporation even when the parts lie flat on top of each other.

Only selected raw materials of the highest purity are used for SURVOS. One of the main components is dearomatized hydrocarbons of the highest quality. As a metal processing medium that evaporates residue-free, SURVOS combines optimum lubricity with favourable values for evaporation speed, toxicology and environmental protection.

All SURVOS products are classified according to REACH (EC 1907/2006) and do not contain any substance that is on the list of candidates for SOVHC.

SURVOS does not contain any CFC, PCP or PCT. In addition, all SURVOS products are free of nitrite, chlorine, halogens, nitrosamines, amines and amides.

#### SURVOS Rapid D

SURVOS Rapid D evaporates considerably faster than the "Standard" formulation (with a somewhat lower lubricity). SURVOS Rapid D impresses, however, with short evaporation times and is 100% residue-free\*. The fluid is used in particular when operations follow each other in a short cycle sequence and no residue is allowed to remain.

#### SURVOS Plus L

SURVOS Plus L meets the strict food law requirements of the FDA US regulations in acc. with 21 CFR 178.3620 (b) and 178.3120. SURVOS Plus has a high lubricity and quickly evaporates 100%.

#### SENTOS V-LR3

Our high-performance machining oil SENTOS V-LR3 has a somewhat higher lubricity compared to our SURVOS products. This product also consists of volatile components that evaporate down to a lubrication residue of 3%.

The long and varied experience of HPM Technologie with processing media, above all in connection with micro-praying systems, has led to an excellent product with very good results.

All components are approved according to USA-FDA §178.3910 as surface residues for the manufacture of food packaging.

This makes our SENTOS optimally suited as a lubricant and drawing agent for punching and deep drawing (even with high contact pressures), for cutting and perforation of sheets (aluminium, steel, copper, brass, zinc-plated), including transformer and electric sheets, as well as for painted and coated sheets in particular.

In addition, our SENTOS is especially well suited for cold profiling, bending and embossing, as a cooling lubricant for sawing, drilling, milling and engraving as well as a lubricant for cutting non-metallic materials.

Current safety sheets can be found at:  
[www.hpmsysteme.de](http://www.hpmsysteme.de)

\* According to the specifications of the DAB (German Pharmacopoeia), an evaporation residue of < 0.01% is considered to be residue-free. The evaporation residue of SURVOS Plus L is 0.0045% or 45 ppm.

## SURVOS AND SENTOS INDUSTRIAL LUBRICANTS

### TECHNICAL DATA

	SURVOS STANDARD.	SURVOS RAPID D	SURVOS PLUS L	SENTOS V-LR3
Initial boiling point C	180	180	180	180
Ignition point C	250	250	250	250
Flashpoint C	61	63	61	63
Lower exposure limits vol. %	0.6	0.6	0.6	0.6
Upper exposure limits vol. %	6.5	6.5	6.5	6.5
Smell	light	weak	mild	weak
Acute toxicity (critical)	low	low	low	low
Evaporation rate (ether = 1)	180	105	120	105
Water hazard class	1	1	1	1
VOC	91.5% (EU) / 100% (CH)	100% (EU/CH)	100% (EU/CH)	97% (EU/CH)

ARTICLE	ARTICLE NO	QUANTITY
SURVOS Standard	44 16 9000.002	10 l
	44 16 9000.003	25 l
	44 16 9000.004	200 l



SURVOS Rapid D	44 16 8000.002	10 l
	44 16 8000.003	25 l
	44 16 8000.004	200 l



SURVOS Plus L	44 16 7000.002	10 l
	44 16 7000.003	25 l
	44 16 7000.004	200 l



SENTOS V-LR3	44 16 6000.002	10 l
	44 16 6000.003	25 l
	44 16 6000.004	200 l



## WATER-BASED HIGH-TECH INDUSTRIAL LUBRICANTS

### SAMNOS

Our SAMNOS fluids are almost 100% biologically degradable fluids that do not require labelling. No work-related dermatological illnesses have occurred to our knowledge. The lubricity is very high, and it has a very effective cooling ability. All SAMNOS fluids form a thin, water-soluble film that protects against corrosion.



**SAMNOS**  
Standard

**SAMNOS Standard** is a processing medium that evaporates up to 97% residue-free. This fluid can be used with all materials, including plastic. Due to the special cooling properties of the fluid, SAMNOS Standard is used especially with very demanding machining processes.

**Application areas:** Sawing, drilling, engraving, reaming, turning, milling with very high machining parameters and lifetimes of high-alloy steel and stainless steel as well as aluminium, non-ferrous metals and plastic.



**SAMNOS**  
ZM - 22W

**SAMNOS ZM-22W** is a universal cooling lubricant that can be used with almost all materials and machining processes and evaporates up to 95% residue-free.

**Applications:** Sawing, drilling, engraving, reaming, turning, milling steel, stainless steel, aluminium, non-ferrous metals and plastics, deburring of pressure casting, as a lubricant e.g. in O ring mounting, rubber cutting, light forming, punching up to 1 mm material thickness.

ARTICLE	ARTICLE NO.	QUANTITY
SAMNOS Standard	44 13 2000.010	10 l
	44 13 2000.025	25 l
	44 13 2000.200	200 l

ARTICLE	ARTICLE NO.	QUANTITY
SAMNOS ZM-22W	44 13 5000.010	10 l
	44 13 5000.025	25 l
	44 13 5000.200	200 l



**SAMNOS**  
PLUS

**SAMNOS Plus** is a cooling lubricant specially optimised for titanium and super-alloys (Inconel, Hastelloy etc.) that is used for very demanding machining processes.



**SAMNOS**  
TZ-W

**SAMNOS TZ-W** is a fluid for thread spinning and for forming high-alloy steel. It is a good alternative for avoiding fluids that contain zinc and chlorine.

ARTICLE	ARTICLE NO.	QUANTITY
SAMNOS Plus	44 13 6000.010	10 l
	44 13 6000.025	25 l
	44 13 6000.200	200 l

ARTICLE	ARTICLE NO.	QUANTITY
SAMNOS TZ-W	44 13 7000.010	10 l
	44 13 7000.025	25 l
	44 13 7000.200	200 l



## SERVICE PACKAGES & MAINTENANCE CONTRACTS

### SERVICE CONTRACTS

An HPM Technologie service package puts the maintenance and the lifetime of your systems and spray heads into the best hands and keeps your costs under control. We ensure that not a single inspection is missed in daily business and make sure your machine is continually maintained as required.

The HPM service contracts offer you decisive advantages:

- Reduction of downtimes with costs that can be calculated in advance
- Service from a single source
- Performance of inspections, maintenance and repair by trained service personnel
- Use of original replacement parts

### MAINTENANCE CONTRACTS

Our service professionals punctually and reliably plan and implement regular maintenance work on your HPM systems. Within the scope of this work, we take care of the following, among others:

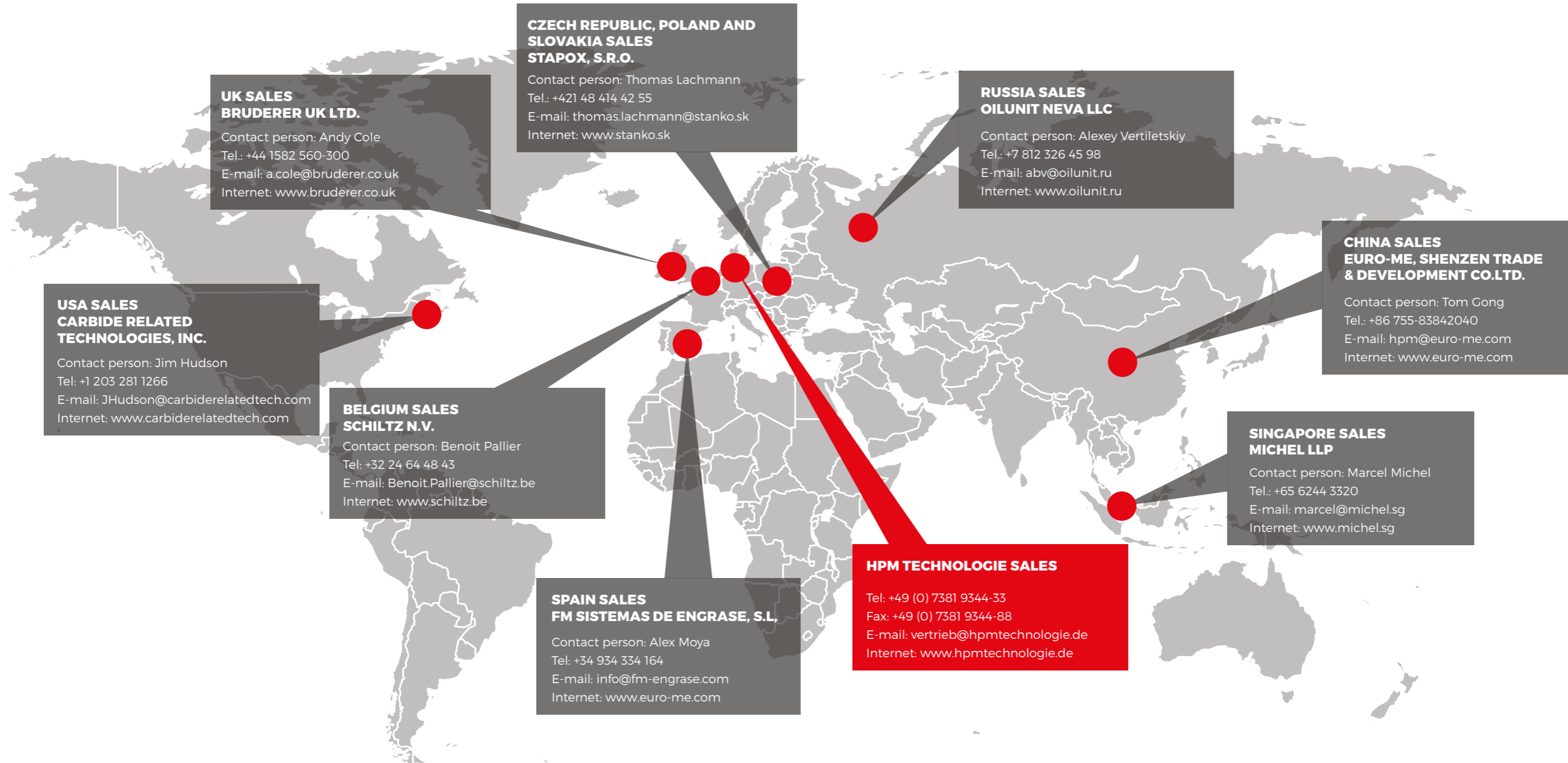
- Functional testing of the system
- Comparison of the permanently set values
- Checking the safety equipment
- Replacement of all relevant filter elements
- Checking and if nec. repair of the pressure generation
- Refilling or replacing processing media or consumables
- Scheduled replacement of wearing parts
- Replacement of valves

Together with you, we develop an individual package of measures tailored to your system, plan the implementation of the maintenance work and the availability of all original replacement and wearing parts.

**Call us or use the contact form on our homepage to arrange a consultation appointment with us.**



**REGULAR INSPECTION OF YOUR HPM SYSTEMS IS THE BEST RISK INSURANCE AND PRESERVES THE VALUE OF YOUR SYSTEMS IN THE LONG TERM.**



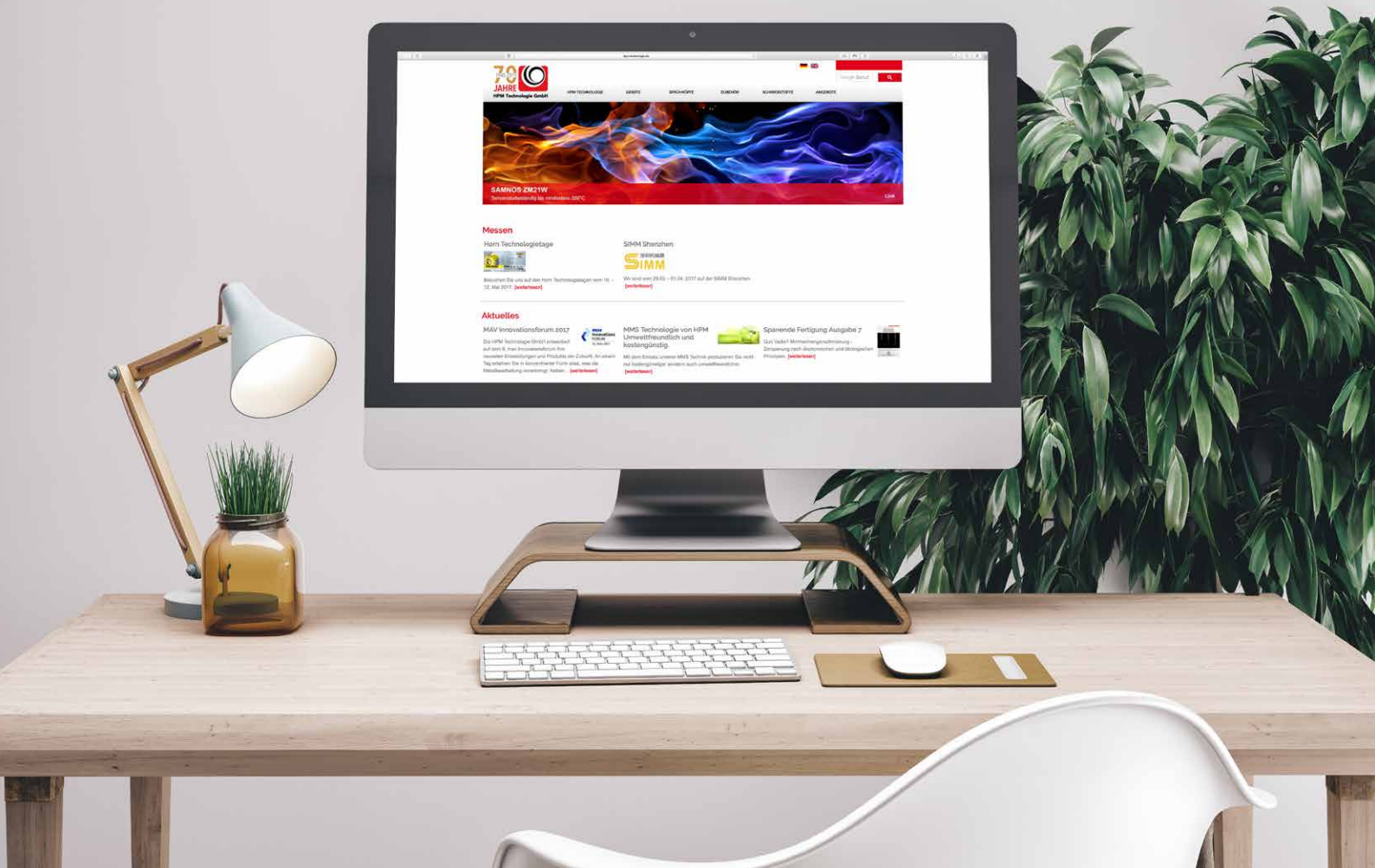
# HPM TECHNOLOGIE INTERNATIONAL

Always being there for our customers on site and in the same time zone as well. This has been our motivation for over 70 years. For this reason, we try to offer you technically excellent support for all problems on site through the consistent expansion of our worldwide sales activities. Regardless of whether in China, Poland, the USA or England.

Our sales partners know all the technical details of our systems through constant education and training. This way, you are always in the best hands.

# NEWS, TRADE FAIRS, DOWNLOADS, SAFETY DATA SHEETS ETC.

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spraying · trickling · lubricants

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