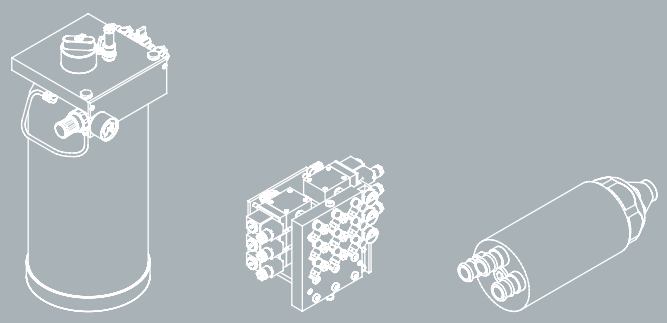
INDUTEC® MS
Minimum Quantity Cooling Lubricating Systems

INDUOIL® HL
Minimum Quantity Cooling Lubricating Mediums

MENZEL MINIMUM QUANTITY COOLING AND LUBRICATING.

mql products 3.0



Menzel Metallchemie

„We didn`t revolutionize the Cooling and Lubricating Technology.
We invented a new one."

Otto Menzel, CEO

Welcome to the future of Cooling and Lubricating Technology

Over 20 years ago, the foundations were laid at Menzel in Kuchen, Baden-Württemberg, Germany, for a system whose innovative spirit persists to this day. A milestone in metal working. The **INDU**TEC® **MS** Minimum Quantity Lubrication system.

Nowadays, minimum quantity lubrication is a must in modern metal working and in many other industries. The possibilities for cutting costs and protecting the environment make it THE cooling and lubrication technology for the 21st century.

SWABIAN WORLD CLASS

MENZEL METALLCHEMIE is, to this day, the pioneer and market leader in the development of minimum quantity lubrication technology based on biodegradable high performance oils. Furthermore, with the **INDU**TEC® **MS** systems, we offer the most widely-used and most flexible minimal quantity cooling and lubricating system in the world.

Here, our actual experience lies in – alongside constant the development of new high-performance oils and precision technology – something which is needed the most in minimum quantity lubrication: experience. The flair for the right choice of spraying heads and oils and the right dosages. Minimum quantity lubrication is invaluable, particularly when you‘re operating at the limits.

BACKGROUND AND FUTURE

This catalogue delivers you an overview about proven application technologies, starting from Standard Systems used for single spraying positions up to a modular system able to support whole production areas. He also includes various information about the **INDU**OIL® **HL** high performance oils.

If you have any questions or you have a particular application that has not been described here, give us a call. Our application engineers and our service team will be glad to help. And, who knows? Maybe we have already solved your particular problem.

Peter Sachs
CEO MENZEL METALLCHEMIE

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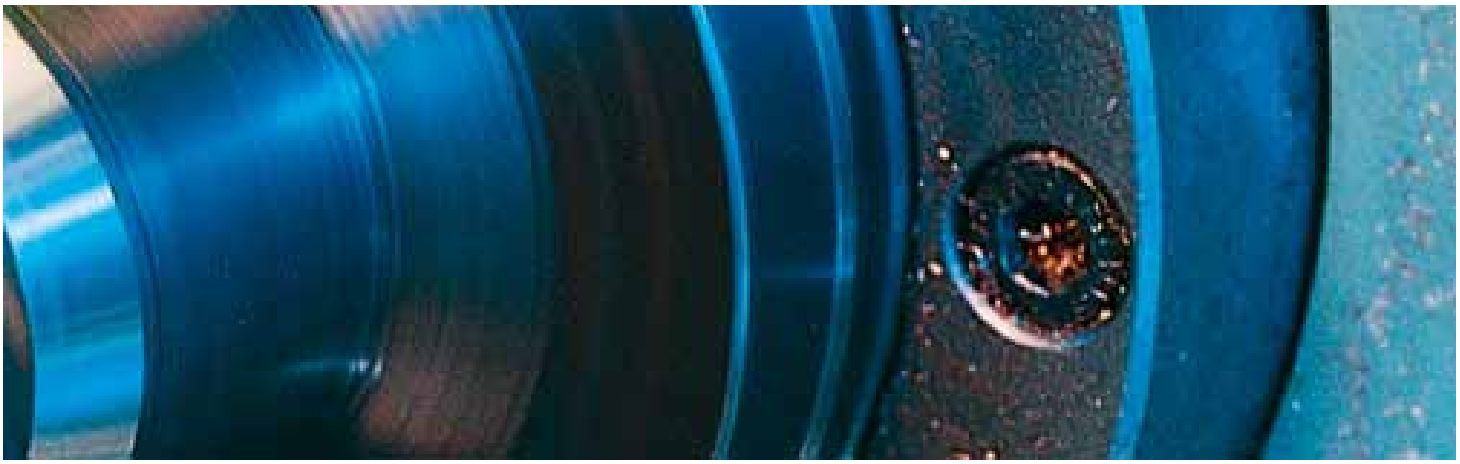
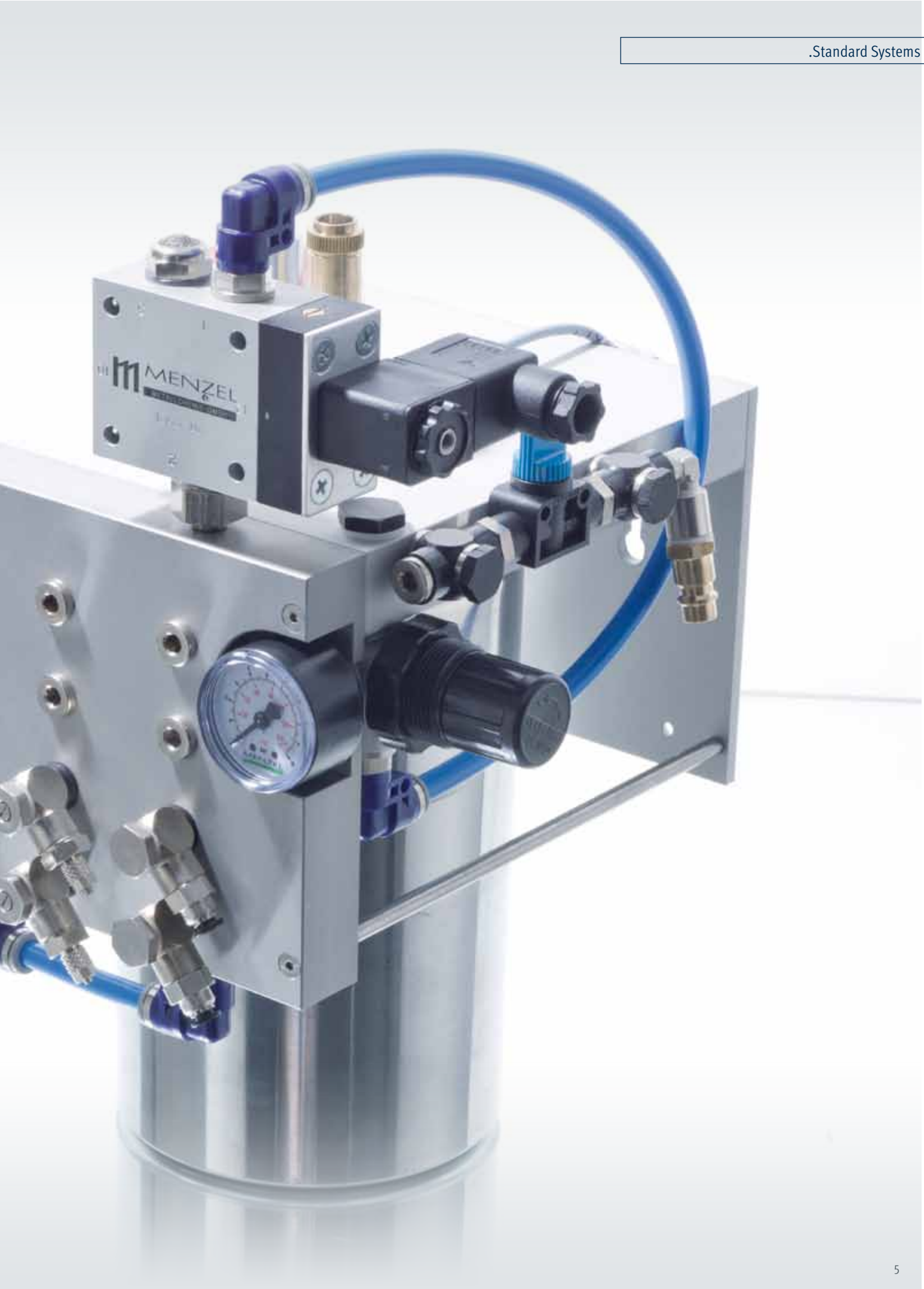


INDUOIL® **HL**
Minimum Quantity Cooling Lubricating Mediums

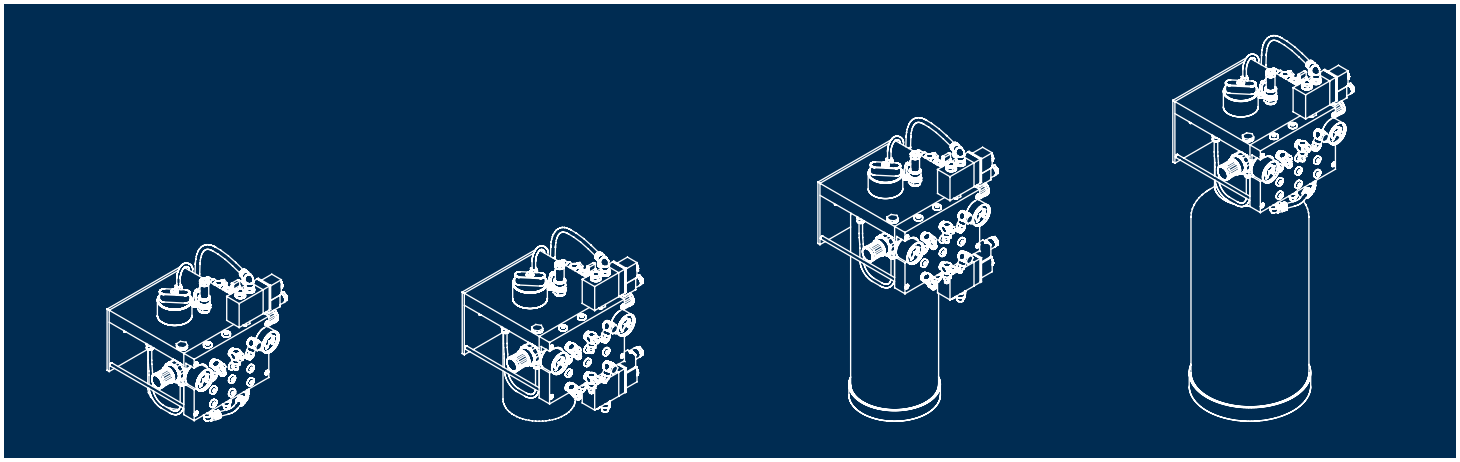
Reduced to the limits without leaving anything.

The **INDU**TEC® **MS** Standard Systems.

INDUTEC® **MS**
Minimum Quantity Cooling Lubricating Systems


MENZEL

Cooling and Lubricating gets to the Point.



THE INDUTEC® MS STANDARD SYSTEM: READY FOR OPERATION IMMEDIATELY

The most simple way of equipping a spraying point with **INDU**TEC® **MS** technology is the **INDU**TEC® **MS** Standard System.

All **INDU**TEC® **MS** Standard Systems operate in accordance with the pressure vessel principle and are triggered electro-pneumatically. They already contain all of the required components so that they can be commissioned without the need for elaborate assembly work.

THE INDUTEC® MS STANDARD SYSTEMS ARE AVAILABLE IN VARIOUS DIFFERENT DESIGNS:

1 – 4

- for the connection of 1 to 4 coaxial spraying heads
- with one or two separate spraying times
- with 1-, 2-, 6- or 10-litre capacity
- with a 24V, 110V or 230V power supply

From these three steps, you will have your order number for your **INDU**TEC® **MS** Standard System:

THIS IS HOW YOU DETERMINE THE BEST SYSTEM FOR YOU:

- Firstly specify the number of coaxial spraying heads that are required.
- Identify a reasonable size for the pressure vessel.
- Then choose a system which is designed for your type of power supply.

INDUTEC MS ___ -D___ ___ SD4 ___V

Number of spraying heads (1, 2, 3 or 4)

Size of vessel (1, 2, 6 or 10 litres)

Spraying times (2Z for 2 spraying times, for 1 leave empty)

Voltage (24, 110 or 230 V)

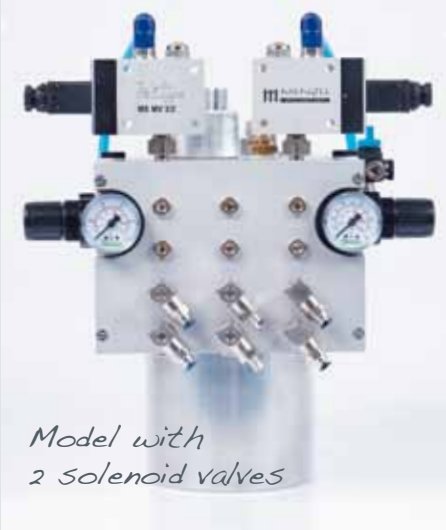
Order number examples:

INDUTEC MS 1-D2 SD4 24 V

1 coaxial spraying head, 2-litre pressure vessel, 1 spraying time, 24V power supply

INDUTEC MS 4-D6 2Z SD4 230 V

4 coaxial spraying heads, 6-litre pressure vessel, 2 spraying times, 230V power supply



TWO SOLENOID VALVES FOR EXTRA PRECISION TRIGGERING

By implementing a second solenoid valve, spraying air and control air can be triggered separately from one another. This option is available as a custom model.

STANDARD EQUIPMENT FOR ALL INDUTEC® MS STANDARD SYSTEMS

- Triggered electro-pneumatically
- Pressure vessel principle; operating pressure: 2.5 bar
- Aluminum pressure vessel incl. seal
- (2- & 6-litre vessels also available in stainless steel)
- 2m black-blue-transparent triple hose for medium, spraying air and control air
- Swivel throttle valve for stageless adjustment of the medium flow rate
- Swivel throttle valve for stageless adjustment of the spraying air flow rate
- Swivel-ring piece for control air
- Integrated valve unit
- 3/2-way solenoid valve for control air and spraying air for each spraying time
- Pressure control valve for adjusting the vessel pressure, incl. pressure gauge
- Pressure control valve for adjusting the inlet pressure, incl. pressure gauge
- Shut-off valve for air, incl. air bleeder
- Safety valve (2.5 bar)
- Delivery tube for medium with non-return valve and filter
- Filling opening
- Cap with adjustable bleeding for conveyance of continuous minimum amounts of medium
- Bracket for wall mounting
- Filling level controller (PVC), potential-free, opener, minimum contact
- User handbook with user manual in accordance with EU standards, incl. manufacturer's declaration
- Ready for operation

Spraying times

With systems with synchronised spraying times, all connected coaxial spraying heads spray at the same time. With systems with two separate spraying times, two groups of coaxial spraying heads can be triggered separately from one another.

Custom models

INDUTEC® **MS** Standard Systems with special power supplies, custom sizes and versions with longer feed lines or pneumatic control can be obtained on request.

Any questions?

We look forward to inform you about our MQL Standard Systems. Just give us a call on

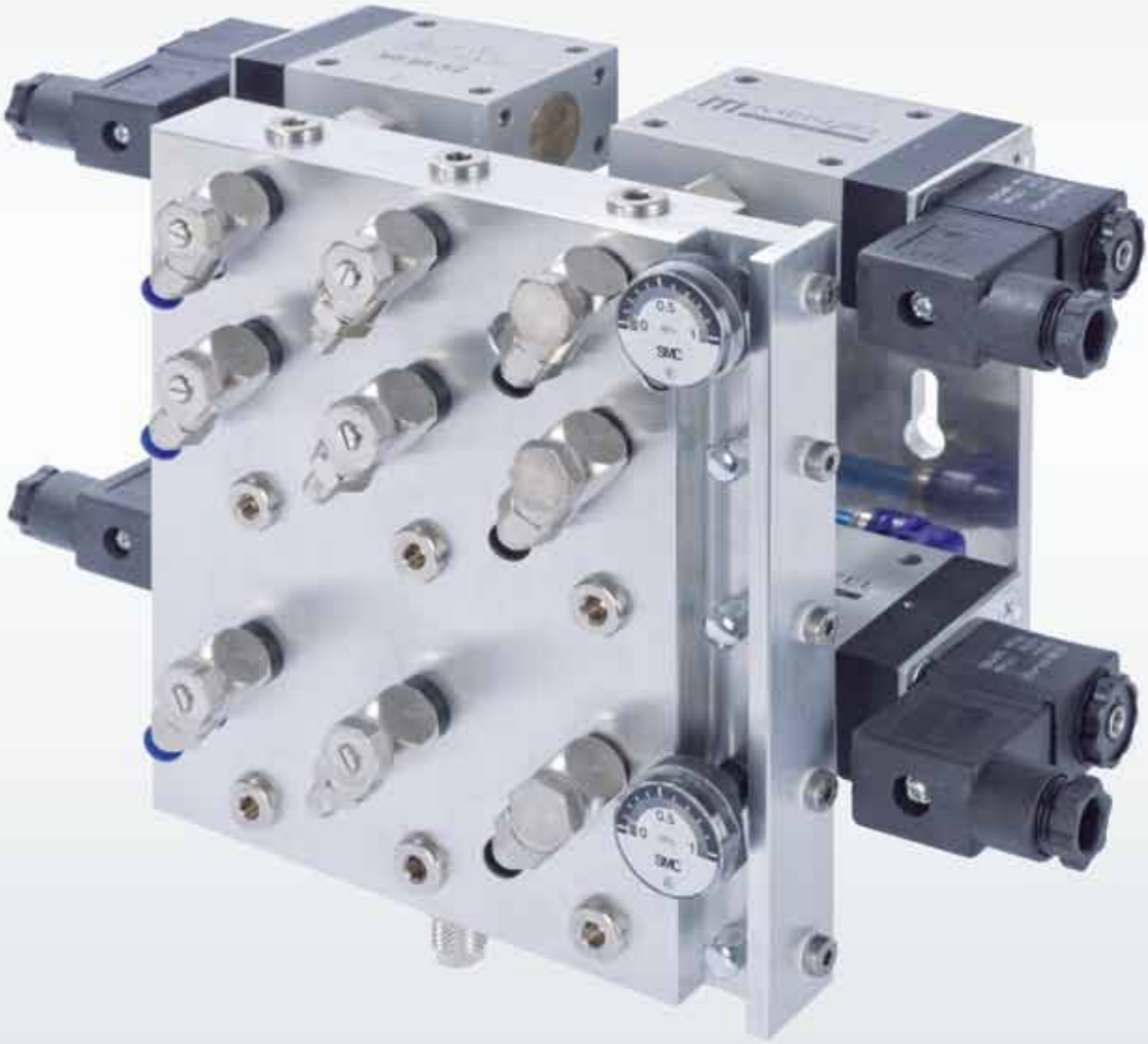
+49 (0) 7331 98 78-0

We will be glad to help.

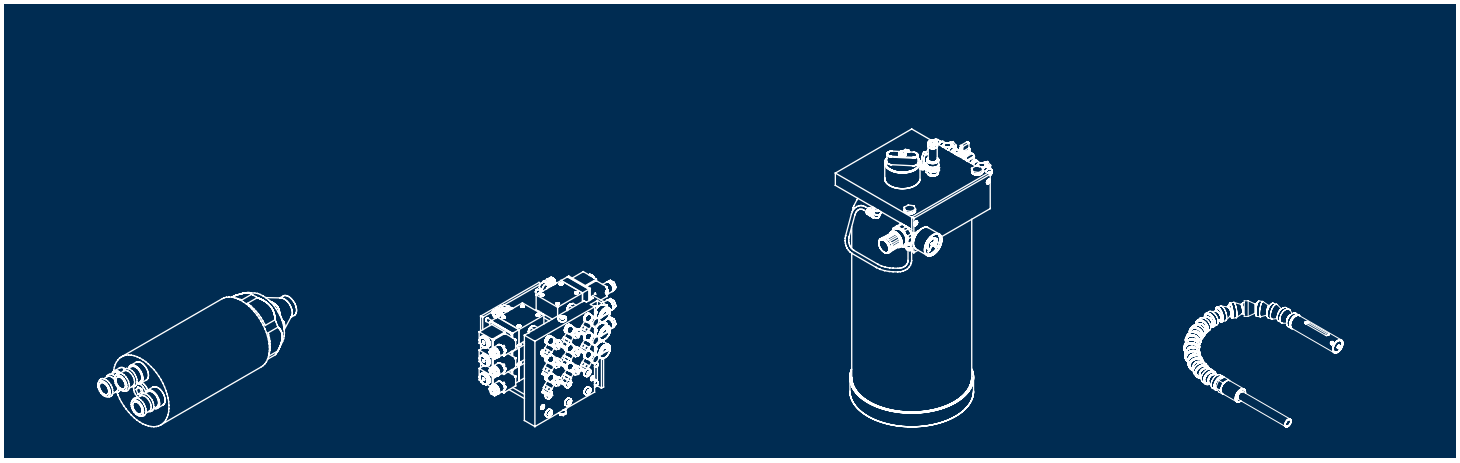
From Professionals. For Professionals.

The **INDU**TEC® **MS** Modular System.

INDUTEC® **MS**
Minimum Quantity Cooling Lubricating Systems



One Solution for all Applications.



INDUTEC® MS GROWS WITH YOUR PRODUCTION SYSTEM

With the **INDU**TEC® **MS** Modular System, you can equip larger and more complex systems with a central pressure vessel and several valve units and also add to this system at a later date as and when required.

To supply complex production lines with different spraying points, a whole range of valve units can be connected to one pressure vessel unit in parallel and each separate spraying point can be equipped with one or more coaxial spraying heads.

1. THE COAXIAL SPRAYING HEADS

Firstly you need to specify where the spraying points need to be located and how many coaxial spraying heads are needed for this. The type of coaxial spraying head must be selected in accordance with the respective circumstances and, if necessary, modified with appropriate accessories so as to adjust the spraying form and spraying strength etc. to the conditions.

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2. THE VALVE UNITS

The second step is to decide which coaxial spraying heads should be spraying at the same time and can therefore be grouped together. A spraying time is needed for each of these groups. These are then controlled by the valve units. You can choose from versions with a 24V, 110V or 230V power supply.

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3. THE PRESSURE VESSEL

A pressure vessel unit then has to be chosen with the help of the number of coaxial spraying heads and the number of valve units, as well as depending on the choice of spraying interval and the spraying amount. 1-, 2-, 6-, 10- or 40-litre versions are available.

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4. THE ACCESSORIES

There are many different possibilities for installing and modifying your **INDU**TEC® **MS** system available under accessories. Here, you can choose between different mounting devices, extensions, etc. in accordance with the type of installation selected.

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Modular System

PLANNING EXAMPLE WITH VARIOUS APPLICATIONS

INDUTEC® **MS** external cooling

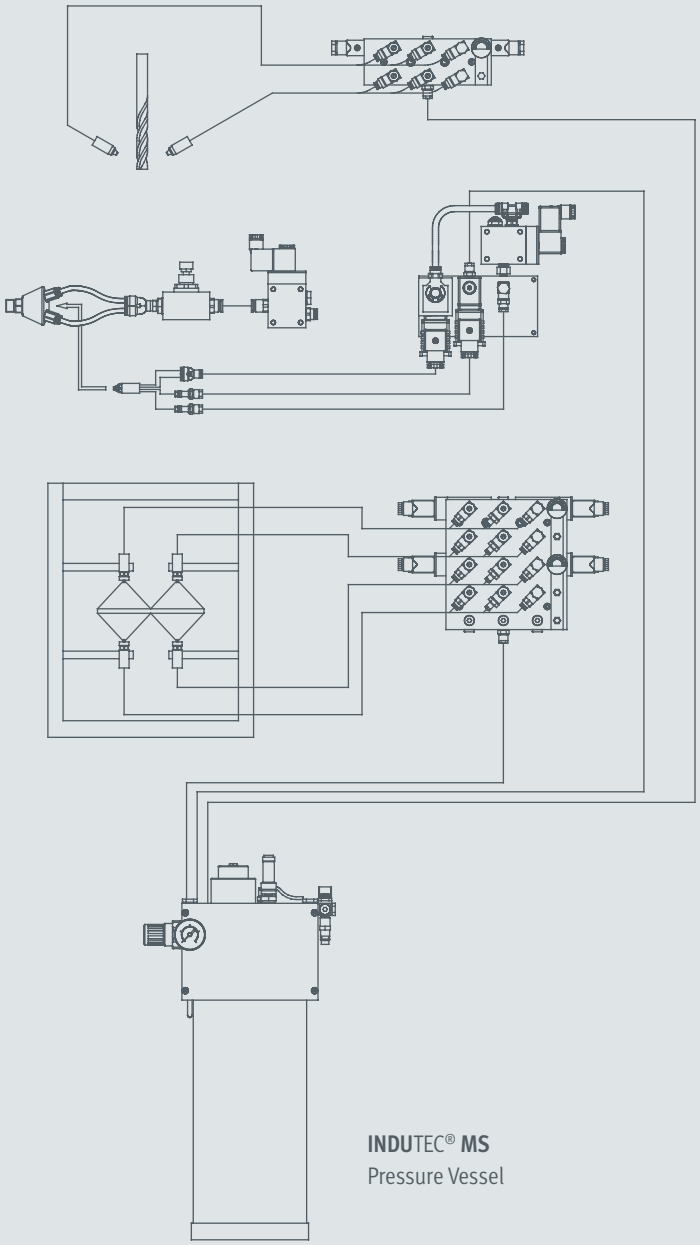
e.g. milling

INDUTEC® **MS** internal cooling

e.g. drilling

INDUTEC® **MS** spraying gate

e.g. coil greasing



INDUTEC® **MS**
Pressure Vessel

Spraying times

With systems with synchronised spraying times, all connected coaxial spraying heads spray at the same time. With systems with two separate spraying times, two groups of coaxial spraying heads can be triggered separately from one another.

Custom models

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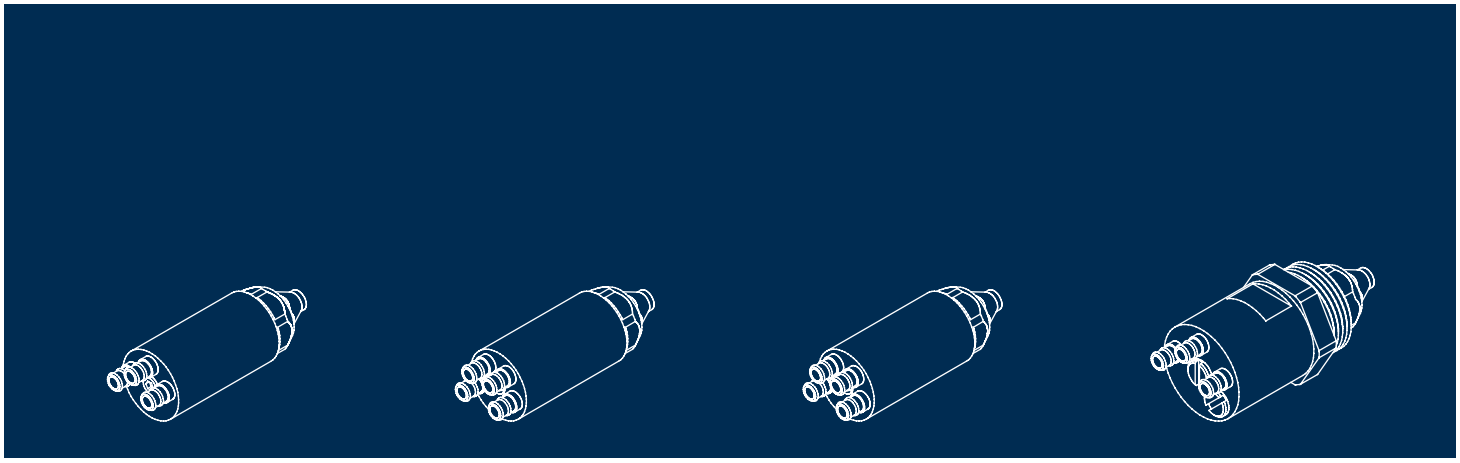
Core pieces. The **INDU**TEC® **MS** Coaxial Spraying Heads.



INDUTEC® **MS** SD stands for a spraying head concept which can fulfil the widest range of requirements. The system is based on a coaxial spraying head which generates a round jet with a 5° spraying angle. Using special accessories, a range of different spray patterns and spraying angles can be generated for practically any type of application.

Due to its extremely small size, the coaxial spraying heads only require a small space to be installed into. They can be extended with a flexible attachment for spraying areas which are difficult to access.

Modular variety

Because of the different combinations of modules, a whole range of SD3/SD4 Coaxial Spraying Head variations can be set up. This means that the optimum coaxial spraying head can be put together for any application.

THIS IS HOW AN **INDU**TEC® **MS** COAXIAL SPRAYING HEAD WORKS

A coaxial spraying head of this kind operates using compressed air. The spraying head is closed by a needle pressed against the spraying opening by a spring. The needle is pushed back by controlling compressed air, thereby releasing the spray opening. The medium is fed to the coaxial spraying head from a separate pressure vessel. The compressed spraying air is fed from a third pressure hose. The spraying air shapes the medium emitted by the coaxial spraying head and concentrates it into a precise, directionally-stable and haze-free jet.

PRACTICALLY ANYTHING CAN BE SPRAYED

Due to the stageless adjustable pressure, any medium can be sprayed – from water-based cooling lubricants to extremely viscid cutting and drawing oils. The spraying head can be modified with alternative sealing materials for the use of more aggressive mediums.

MINIMUM QUANTITIES CAN ALSO BE PRECISELY CONTROLLED

Depending on the application, the respective coaxial spraying head must be adjusted to the special requirements through targeted modifications. The following overview gives you an insight into to what extent the different parts can be reasonably combined with possible areas of application

Conversion with the SID special in-head cartridges allows the material flow rate to be changed. By using different attachments, the spray pattern and the spraying angle can be altered.

The theoretical spraying angles are approximate values. The decisive factor is always the interaction between the medium and the compressed spraying air. These two elements must always be in a optimal relationship with one another. Therefore, on-site trials are necessary in all cases in order to find the exact values.

Coaxial Spraying Heads

INDUTEC® **MS SD4**

Coaxial spraying head for practically any application.

› External medium feed

INDUTEC® **MS FD4 Z2**

Even better jet concentration for increased spraying distances or for internal cooling.

› External or internal medium feed (internal cooling)
› Increased air flow rate due to a second spraying air connection
› Max. spraying air quantity approx. 18ol/min**

INDUTEC® **MS SD4 M2**

For spraying unmixed mediums which are stored and fed to the spraying head separately.

› External medium feed
› Medium circulation with unmixed mediums
› Two different mediums

INDUTEC® **MS SD3**

Special spraying head with grid setting for medium and flow control valve for spraying air directly to the main spraying head body.

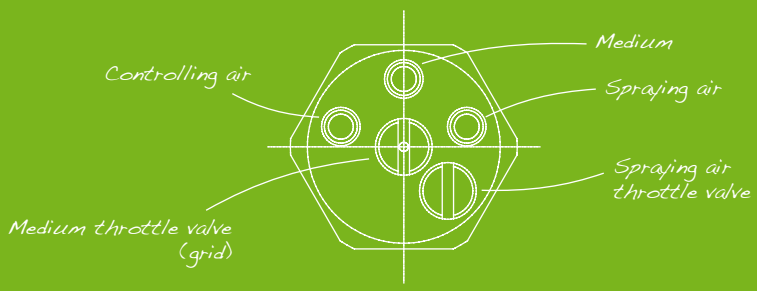
› External medium feed
› Medium quantity adjustable on the main body (grid)
› Spraying air quantity adjustable on the main body

STANDARD EQUIPMENT FOR ALL **INDU**TEC® **MS** COAXIAL SPRAYING HEADS

› Main body: NIRO steel
› Coaxial spraying head and needle: NIRO steel
› O-ring: Viton
› Control air pressure: min. 5.5 – max. 6 bar
› Spraying air pressure: max. 6 bar
› Medium pressure: max. 6 bar
› Max. spraying air quantity: approx. 106 l/min*

THE NEXT GENERATION OF COAXIAL SPRAYING HEADS: THE **INDU**TEC® **MS SD3**

› The integrated M16 thread on the housing means that the coaxial spraying head can be screwed directly onto a corresponding device without the need for any additional brackets
› Throttle valves on the main body of the INDUTEC® MS SD3 itself allow the spraying air and the medium to be controlled directly at the spraying head. Here, the medium quantity can even be repeatedly fine-tuned using a screw-in union.



* inlet pressure of spraying air : 6 bar, hose length: 1m

** inlet pressure for spraying air: 6 bar, hose length: 1 x 1m ø 6mm, 2 x 0.5m ø 4mm)

Spray Patterns and Spraying Angles

Standard jet

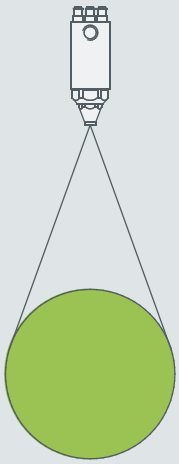
Round jet with
5° spraying angle

RA 4.30

Round jet with
30° spraying angle

RA 4.70

Round jet with
70° spraying angle



V 4.50VA
V 4.100VA

Round jet with
5° spraying angle
50mm or 100mm
stainless steel extension

VA 4.100
VA 4.200

Round jet with
5° spraying angle
100mm or 200mm
extension

FA 4.20

Flat jet with 20°
spraying angle
Rotatable 360°

FA 4.50 D

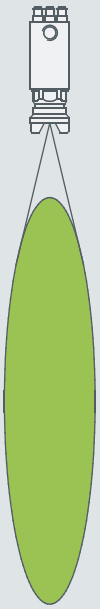
Flat jet with 50°
spraying angle
Rotatable 360°

FA 4.90 D

Flat jet with 90°
spraying angle
Rotatable 360°

FA 4.140 D

Flat jet with 140°
spraying angle
Rotatable 360°



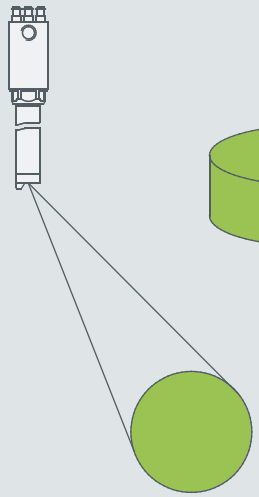
FA 4.60
FA 4.60.100

Flat jet with 60°
spraying angle
Length: 17mm or 100mm
ø 8mm

Spray Patterns and Spraying Angles

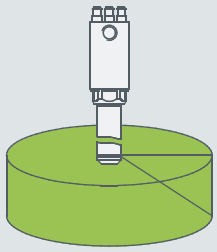
RA 4.20.A45.100

Round jet with 20° spraying angle, Offset by 45°



RS 4.75
RS 4.75.100

Annular jet with 75° spraying angle
Length: 20mm or 100mm
ø 8mmm



SWA 4

Round jet with 5° spraying angle, Pivotable by 220°, Rotatable by 360° on its axis

SWA 4.100

Round jet with 5° spraying angle, Pivotable by 220°, Rotatable by 360° on its axis with 100mm spraying head extension

SWA 4.100.50

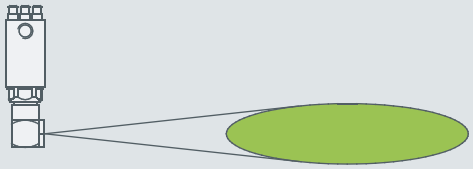
Round jet with 5° spraying angle, Pivotable by 220°, Rotatable by 360° on its axis with 100mm and 50mm spraying head extension

WD 4.90.03

Round jet with 5° spraying angle, Offset by 90°, Nozzle ø 0.3mm

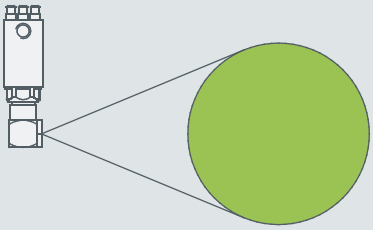
WD 4.90.03/60-90RM

Flat jet with 60° spraying angle, Offset by 90°, Nozzle ø 0.3mm



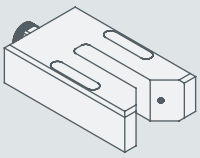
WD 4.90.05/70-90RM

Round jet with 70° spraying angle, Offset by 90°, Nozzle ø 0.5mm



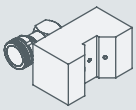
Spray Block 68
Spray Block 94

Spraying block for band saws with 3 medium openings



Short Spray Block W

Short spray block, offset, for circular saws, with 3 openings for the medium



For products, which are needed with special lengths or diametres or wich must be bended, please call our team on

+49 (0) 7331 98 78-0

We will be glad to help.

Rate of Flow

MATERIAL FLOW RATES

Depending on the flow control valve settings or the precision screw-in union settings and the technical requirements, the **INDU**TEC® **MS** SD3 & SD4 Coaxial Spraying Heads can produce the following material flow rates:

Control air pressure: 6 bar (without spraying air)

Medium: Water

Hoses: 1 m each

Medium pressure in bars	In-head cartridge	0,5	1,0	1,5
Flow rate in ml/min (adjustable)	ø 0,1 mm	0 – 2,2	0 – 3,5	0 – 4,5
	ø 0,2 mm	0 – 18	0 – 26	0 – 32
	ø 0,3 mm	0 – 42	0 – 62	0 – 72
	ø 0,4 mm	0 – 61	0 – 93	0 – 114
	ø 0,5 mm	0 – 92	0 – 140	0 – 180
	ø 0,6 mm	0 – 124	0 – 188	0 – 232
	ø 1,0 mm	0 – 190	0 – 270	0 – 342

Depending on the viscosity and the consistency of the medium, as well as on the adjustable vessel pressure (up to 2.5 bar with standard models and 6.0 bar with custom models), a variety of flow rates can be achieved.

AIR FLOW RATE

Depending on the flow control valve settings or the precision screw-in union settings and the technical requirements, the **INDU**TEC® **MS** SD3 & SD4 Coaxial Spraying Heads can produce the following (spraying air) current volume flow rates:

Hoses: 1 m each

Spraying air pressure in bars	0,5	1,0	1,5	2,0	2,5	3,0	3,5	4,0	4,5	5,0	5,5	6,0
Flow rate in ml/min (adjustable)	0 – 12	0 – 24	0 – 34	0 – 44	0 – 51	0 – 58	0 – 65	0 – 73	0 – 80	0 – 88	0 – 97	0 – 106

A spraying air rate of approx. 180 l/min can be achieved by adding the **INDU**TEC® **MS** FD4 Z2 Coaxial Spraying Head.

Sealing Materials

Sealing material	Standard elastomer	Area of application and use Specific details
As standard, all seals which come into contact with the medium are made from fluoroelastomers (trade name „Viton“).	Viton FKM fluoroelastomer	Mineral oils and fats, aliphatic, aromatic and chlorinated hydrocarbons, petrol, premium petrol, diesel fuels, flame retardant fluids with a phosphite ester base, acids, lyes, silicone oils and fats. Suitable for high vacuums!
Usage of other mediums For the use of many other mediums with the **INDU**TEC® **MS** Minimum Quantity Cooling and Lubricating system, a whole range of different sealing materials can be used in place of the Viton sealing material. As a result, there is a suitable sealing material for almost any application.	Ethylene propylene diene Monomer EPDM	Peroxide crosslinked, hot water, steam, braking fluids, detergents, alcohols, ketones, vehicle coolant, flame retardant fluids with a phosphoric acid ester base, organic and inorganic acids and bases. Not mineral oil-resistant!
	Nitrile butadiene rubber NBR	Standard material for hydraulics and pneumatics. Mineral oil-based pressurised fluid, animal and plant oils and fats, flame retardant fluids (HFA, HFB, HFC), aliphatic hydrocarbons (propane, butane, petrol). Silicon oils and fats, water up to +80°C, bio oils made from synthetic ester and plant oils.
	Perfluorelastomer ISOLAST FFKM	Possesses the widest chemical resistance available and can therefore be applied for practically all chemical process technology operating in temperatures between -25°C and +240°C. Excellent resistance against almost all inorganic and organic acids, ketones, esters, solvents, amines, hot water/steam as well as ethylene and propylene oxides.

Any questions?

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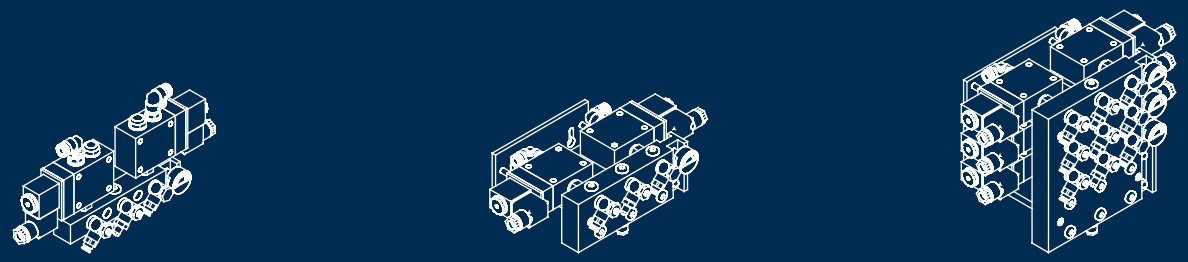
Valve Units.



EXACT METERING OF MINIMUM MEDIUM QUANTITIES

At a valve unit spraying point in time and duration can be controlled. You may chose voltages of 24, 110 or 230 V.

MODULAR EXPANSION

To supply more than one spraying point, a whole range of valve units can be connected to one pressure vessel in series with the help of distribution blocks and each separate spraying point can be equipped with one or more coaxial spraying heads.

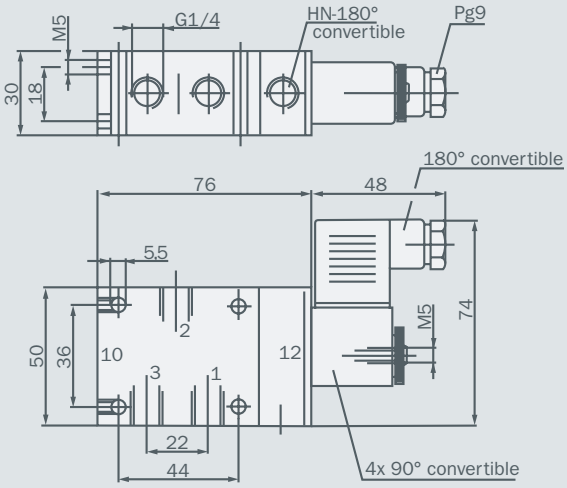
POSITIONING

The valve units can be positioned wherever you like. The connection kits and the coaxial spraying heads must be assembled separately.

SOLENOID VALVES

3/2-way solenoid valve, electrically triggered

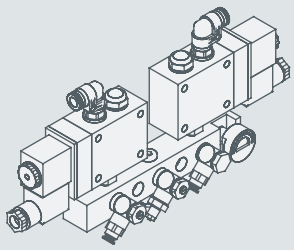
Mounting	G1/4“
Working pressure	2,5 – 10 bar
Response time at 6 bars	on 15 ms, off 19 ms
Temperature range	-10°C – +70°C
Standard voltages	DC: 12 V, 24 V
	AC: 24 V, 230 V, 50 – 60 Hz
Power consumption	DC: 2,2/4,2 VA
	AC: 7,0/4,0 VA
Safety class	IP 65 following VDE 0470 / EN 60529



Valve Units

VALVE UNITS FOR CONNECTING 1 **INDU**TEC® **MS** SD4 COAXIAL SPRAYING HEAD

SD4



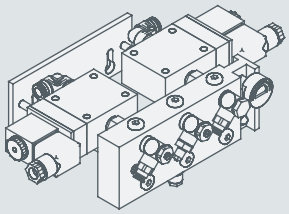
Valve unit for medium, spraying air and control air, electro-pneumatic triggered, with

- 1 spraying time
- Separate air supply for spraying air and control air
- 1 x 3/2-way solenoid valve for spraying air
- 1 x 3/2-way solenoid valve for medium and control air
- 1 x gauge for compressed air pressure (0-10 bar)
- 5m medium hose to pressure vessel / valve unit module (transparent, ø 6mm)
- 2 x 2m spraying air feed line (blue, ø 8mm)

Order no.: **INDU**TEC® **MS** VT1-1 24/110/230 V

VALVE UNITS FOR CONNECTING UP TO 2 **INDU**TEC® **MS** SD4 COAXIAL SPRAYING HEADS

SD4



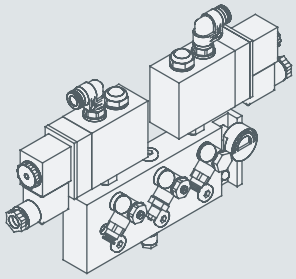
The illustration shows an **INDU**TEC® **MS** VTR2-1 with a pre-assembled spraying time.

Valve unit for medium, spraying air and control air, electro-pneumatic triggered, with

- X spraying times*
- Separate air supply for spraying air and control air
- X x 3/2-way solenoid valve for spraying air
- X x 3/2-way solenoid valve for medium and control air
- X x gauge for compressed air pressure (0-10 bar)
- 5m medium hose to pressure vessel / valve unit module (transparent, ø 6mm)
- X x 2 x 2m spraying air feed line (blue, ø 8mm)
- Rear panel with wall bracket

Designed for connecting up to 2 x **INDU**TEC® **MS** SD4 Coaxial Spraying Heads

Order no.: **INDU**TEC® **MS** VTR2-X* 24/110/230 V



The illustration shows an **INDU**TEC® **MS** VT2-1 with a pre-assembled spraying time.

Also available without a rear panel and with valves mounted on the top part:

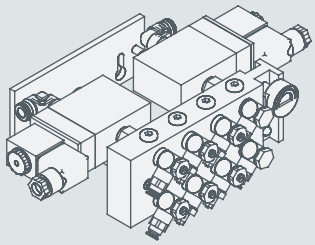
Order no.: **INDU**TEC® **MS** VT2-X* 24/110/230 V

* Here, X stands for the number of spraying times prepared in the factory. A choice can be made in advance between 1 and 2.

Valve Units with 2 separate medium channels

VALVE UNITS WITH 2 SEPARATE MEDIUM CHANNELS FOR CONNECTING 2 **INDU**TEC® **MS** SD4 M2 COAXIAL SPRAYING HEADS

SD4 M2



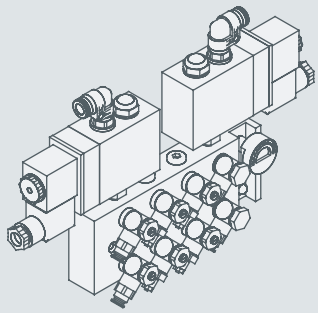
The illustration shows an **INDU**TEC® **MS** VTR2-1 M2 with a pre-assembled spraying time.

Valve unit for medium, spraying air and control air with 2 separate medium channels, electro-pneumatic triggered, with

- 1 or 2 spraying times
- Separate air supply for spraying air and control air
- 1 x 3/2-way solenoid valve for spraying air
- 1 x 3/2-way solenoid valve for medium and control air
- 1 x gauge for compressed air pressure (0-10 bar)
- 2 x 5m medium feed lines to pressure vessel / valve unit module (transparent, ø 6mm), complete with 2 x GEV 6 1/8“ with union nut
- 2 x 2m air feed line (blue, ø 8mm)
- Rear panel with wall bracket

Designed for connecting up to 2 x **INDU**TEC® **MS** SD4 M2 Coaxial Spraying Heads

Order no.: **INDU**TEC® **MS** VTR2-1 M2 24/110/230 V with one spraying time
Order no.: **INDU**TEC® **MS** VTR2-2 M2 24/110/230 V with two spraying times



Also available without a rear panel and with valves mounted on the top part for one spraying time:

Valve unit for medium, spraying air and control air with 2 separate medium channels, electro-pneumatic triggered, with

- 1 spraying time
- Separate air supply for spraying air and control air
- 1 x 3/2-way solenoid valve for spraying air
- 1 x 3/2-way solenoid valve for medium and control air
- 1 x gauge for compressed air pressure (0-10 bar)
- 2 x 5m medium feed lines to pressure vessel / valve unit module (transparent, ø 6mm), complete with 2 x GEV 6 1/8“ with union nut
- 2 x 2m air feed line (blue, ø 8mm)

Designed for connecting up to 2 x **INDU**TEC® **MS** SD4 M2 Coaxial Spraying Heads

Order no.: **INDU**TEC® **MS** VT2-1 M2 24/110/230 V

Why have two medium channels?

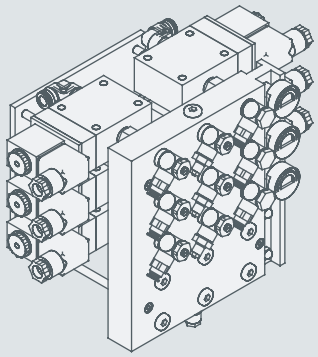
With machining sequences which require a change of medium, two different mediums can be implemented using the same spraying head with the help of an **INDU**TEC® **MS** SD4 M2 Coaxial Spraying Head and a corresponding valve unit. This saves space and ensures the ideal spraying angles to the tool cutting edges.

If, for example, adhesive mediums are being used, a second medium can be implemented as a suitable cleaning agent to clean the coaxial spraying head and therefore prevent the spraying head becoming blocked.

Valve Units

VALVE UNITS FOR CONNECTING UP TO 5 **INDU**TEC® **MS** SD4 COAXIAL SPRAYING HEADS

SD4



The illustration shows an **INDU**TEC® **MS** VTR5-3 with three pre-assembled spraying times.

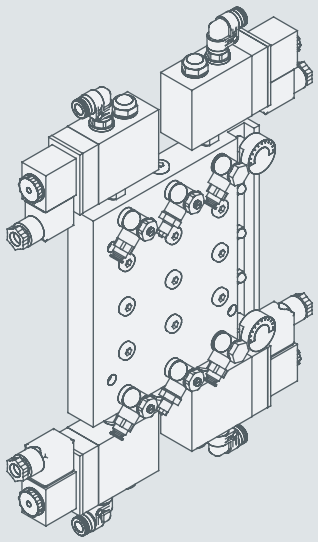
Valve unit for medium, spraying air and control air, electro-pneumatic triggered, with

- X spraying times*
- Separate air supply for spraying air and control air
- X x 3/2-way solenoid valve for spraying air
- X x 3/2-way solenoid valve for medium and control air
- X x gauge for compressed air pressure (0-10 bar)
- 5m medium hose to pressure vessel / valve unit module (transparent, ø 6mm)
- X x 2 x 2m spraying air feed line (blue, ø 8mm)
- Rear panel with wall bracket

Designed for connecting up to 5 x **INDU**TEC® **MS** SD4 Coaxial Spraying Heads

Order no.: **INDU**TEC® **MS** VTR5-X* 24/110/230 V

* Here, X stands for the number of spraying times prepared in the factory. A choice can be made in advance between 1 and 5.



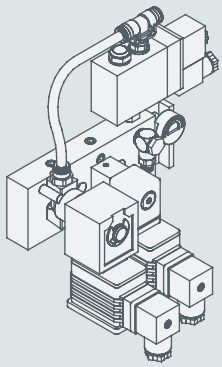
The illustration shows an **INDU**TEC® **MS** VT5-2 with two pre-assembled spraying times.

Also available without a rear panel and with valves mounted on the top part:

Order no.: **INDU**TEC® **MS** VT5-1 24/110/230 V with one spraying time
Order no.: **INDU**TEC® **MS** VT5-2 24/110/230 V with two spraying times

VALVE UNITS WITH MICRO PROPORTIONAL VALVES FOR MEDIUM AND/OR SPRAYING AIR

SD4



Valve unit for medium, spraying air and control air, electro-pneumatic triggered, with

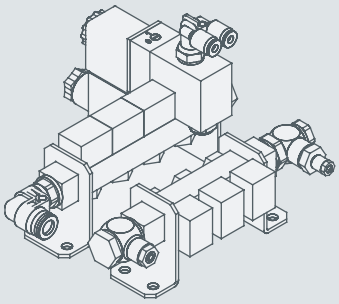
- 1 spraying time
- Separate air supply for spraying air and control air
- 1 x 2/2-way micro proportional valve for spraying air
- 1 x 2/2-way micro proportional valve for medium
- 1 x 3/2-way solenoid valve for control air, mounted above
- 1 x gauge for compressed air pressure (0-10 bar)
- 5m medium feed line to pressure vessel / valve unit module (transparent, ø 6mm), complete with GEV 6 1/8“ with union nut
- 1 x 2m spraying air feed line (blue, ø 8mm)
- Rear panel with wall bracket

Designed for connecting an **INDU**TEC® **MS** SD4 Coaxial Spraying Head

Order no.: **INDU**TEC® **MS** VT2-1 MPV-MZ 24/110/230 V

VALVE UNITS FOR CONNECTING UP TO 4 **INDU**TEC® **MS** SD3 COAXIAL SPRAYING HEADS

SD3



Distribution unit for air feed and medium feed, with

- 1 x medium rail
- 1 x air rail
- 4 x mounting brackets

Designed for connecting up to 4 x **INDU**TEC® **MS** SD3 Coaxial Spraying Heads

Order no.: **INDU**TEC® **MS** VTE SD3

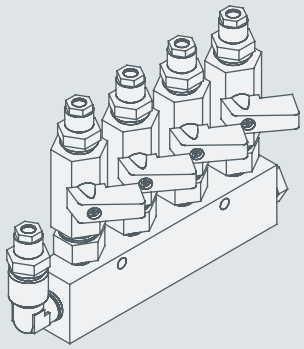
Spraying head connection kit for mounting onto a valve unit for air and medium supply consisting of:

- 1 x 3/2-way solenoid valve, complete with coil and connector plug as well as a pre-mounted Y-distributor
- 2m, three-way hose ø 4mm [**INDU**TEC® **MS** SBT4]

Order no.: **INDU**TEC® **MS** SD3 AP3 MV

Accessories for Valve Units

DISTRIBUTION BLOCKS FOR CONNECTING MORE THAN ONE VALVE UNIT TO A PRESSURE VESSEL



The illustration shows an **INDU**TEC® **MS** MVB4 AVM with four connectable valve units.

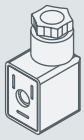
Four-way distribution block, for hose feed line ø 6mm to connect up to 4 x medium feed lines consisting of:

- 1 x 4-way distribution block, made from aluminum
- 1 x elbow piece 1/4“ IG + 1/4“ AG with mounted GEV6 - 1/4“ for medium, ø 6mm with union nut for the medium inlet
- X* x detachable double nipple 1/4 - 1/8
- X* x medium shut-off valve
- X* x GEV6-1/4“ for medium, ø 6mm with union nut for medium outlet
- 1/8“ screw plugs for the remaining connection openings
- 0.2m medium feed line ø 6mm

Order no.: **INDU**TEC® **MS** MVB2 AVM	(factory-prepared for 2 valve units)
Order no.: **INDU**TEC® **MS** MVB3 AVM	(factory-prepared for 3 valve units)
Order no.: **INDU**TEC® **MS** MVB4 AVM	(factory-prepared for 4 valve units)

* Here, X stands for the number of valve units able to be connected. A choice can be made in advance between 2 and 4.

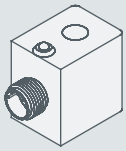
CONNECTOR PLUG



Connector plug with LED and VDR (varistor) to protect against voltage surges caused by the power supply and by loads when opening.

Order no.: **INDU**TEC® **MS** LED

SOLENOID



24V/DC solenoid (plastic) with an M-12 plug connection, pins in the socket, double-pole, with protective circuit and LED

Order no.: **INDU**TEC® **MS** SP24 M12

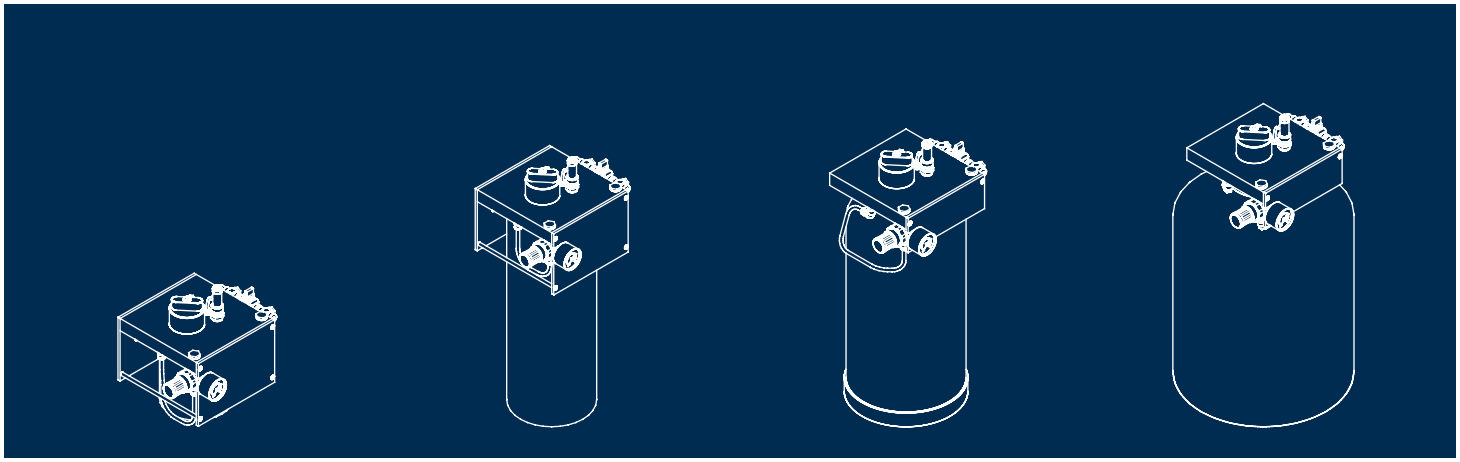
Do you have any questions?

We look forward to inform you about our valve units. Call us on

+49 (0) 7331 98 78-0

We will be glad to help.

Pressure Vessels.



FROM SMALL TO LARGE

A pressure vessel unit then has to be chosen with a suitable capacity depending on the number of coaxial spraying heads and the number of valve units, as well as depending on the choice of spraying interval and the spraying amount.

Vessels with capacities of 1, 2, 6, 10 or 40 litres are available.

All pressure vessel units with capacities up to 20 litres are fitted with a potential-free filling level controller This controller can give a signal when the filling level falls below the minimum which triggers automatic shut-off and an alarm or something similar.

A pneumatic stirring unit is also available as an accessory which guarantees a constant viscosity of the medium.

Vessel pressure

INDUTEC® **MS** Pressure Vessels with 6.0 bar vessel pressure (4.0 bar with 40 litres) are used in the following applications:

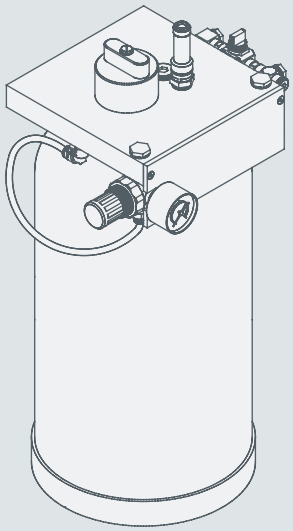
- Drop lubrication
- Internal cooling
- Mediums with high viscosity
- Application of large quantities of medium in a short amount of time

STANDARD EQUIPMENT FOR ALL **INDU**TEC® **MS** PRESSURE VESSELS

- Suitable for connecting **INDU**TEC® **MS** Valve Units
- Pressure regulator for controlling vessel pressure, includes gauge [**INDU**TEC® **MS** DRV35/10MAN]
- Plug-in socket for the compressed air inlet
- Medium connection for a 6mm hose
- Shut-off valve for air, incl. rapid exhaust [**INDU**TEC® **MS** AV L]
- Safety valve (2.5/6 bar) [**INDU**TEC® **MS** SV2.5 / SV 6.0]
- Delivery tube for medium with non-return valve and filter
- Filling opening
- Cap with adjustable bleeding for conveyance of continuous minimum amounts of medium [**INDU**TEC® **MS** DEC]
- Wall bracket (for 1-6 litre models)
- PVC filling level controller (1 to 20 litre models), potential-free, break contact, contact [**INDU**TEC® **MS** FD...Ö PVC]
- Operating pressure: 2.5/4.0/6.0 bar (depending on design)
- Removable pressure vessel
- Ready for operation

Pressure Vessels

PRESSURE VESSEL UNITS FOR 1 TO 40 LITRES OF MEDIUM



The illustration shows a **INDU**TEC® **MS** 0-D10 pressure vessel unit with a capacity of 10 litres

Integrated vessel [**INDU**TEC® **MS** DB-X*] with vessel seal [**INDU**TEC® **MS** BD]

Pressure vessel unit for 1 litre of medium

Vessel material: aluminum, Operating pressure: 2.5 bar

Order no.: **INDU**TEC® **MS** 0-D1 AL

Pressure vessel unit for 2 litres of medium

Vessel material: aluminum or stainless steel 4301, Operating pressure: 2.5 / 6.0 bar

Order no.: **INDU**TEC® **MS** 0-D2 AL (operating pressure 2,5 bar)
Order no.: **INDU**TEC® **MS** 0-D2 VA (operating pressure 2,5 bar)
Order no.: **INDU**TEC® **MS** 0-D2.6 VA (operating pressure 6,0 bar)

Pressure vessel unit for 6 litres of medium

Vessel material: aluminum or stainless steel 4301, Operating pressure: 2.5 bar or 6.0 bar

Order no.: **INDU**TEC® **MS** 0-D6 AL / VA (operating pressure 2,5 bar)
Order no.: **INDU**TEC® **MS** 0-D6.6 AL / VA (operating pressure 6,0 bar)

Pressure vessel unit for 10 litres of medium

Vessel material: aluminum, Operating pressure: 2.5 bar or 6.0 bar

Order no.: **INDU**TEC® **MS** 0-D10 AL (operating pressure 2,5 bar)
Order no.: **INDU**TEC® **MS** 0-D10.6 AL (operating pressure 6,0 bar)

Pressure vessel unit for 20 litres of medium

Vessel material: stainless steel 4301, Operating pressure: 2.5 bar or 6.0 bar

Order no.: **INDU**TEC® **MS** 0-D20 VA (operating pressure 2,5 bar)
Order no.: **INDU**TEC® **MS** 0-D20.6 VA (operating pressure 6,0 bar)

Pressure vessel unit for 40 litres of medium

Vessel material: stainless steel 4301, Operating pressure: 2.5 bar or 4.0 bar

Order no.: **INDU**TEC® **MS** 0-D40 VA (operating pressure 2,5 bar)
Order no.: **INDU**TEC® **MS** 0-D40.4 VA (operating pressure 4,0 bar)

Advantages of a removable vessel

- Easy to clean
- Easy to change the medium
- Easy to swap the pressure vessel

Positioning

With this model, the valve units can be positioned wherever you like. The connection kits and the coaxial spraying heads must be assembled separately.

Do you have any questions?

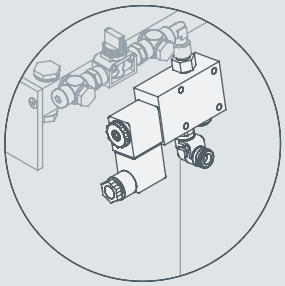
We look forward to inform you about our pressure vessels. Call us on

+49 (0) 7331 98 78-0

We will be glad to help.

Accessories for Pressure Vessels

AUTOMATIC CONVERSION FOR TWO VESSELS



Conversion kit for automatic conversion without any interruption of processes consisting of:

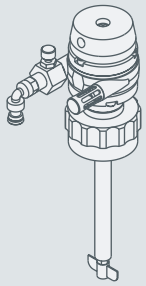
- 3/2-way solenoid valve (M04) including sound absorber, 1/8“ with seal, detachable 1/8“ - 1/8“ double nipple (already stuck in place)
- 1 x WEV-8 1/8, 1/8“ elbow male connector, rotatable, for Ø 8mm hoses (input air) complete with 24V/DC coil, incl. connector plug and counter nut

Already assembled onto the pressure vessel head at the factory to enable automatic disconnection/ switchover of input air.

Important: Standpipe with non-return valve must be present in both vessels.
Filling level controller with 1 point is sufficient

Order no.: **INDU**TEC® **MS** MV 3/2 SP AUTO

PNEUMATIC STIRRING UNIT



For pressure vessel units with capacities between 1 litre and 20 litres

Order no.: **INDU**TEC® **MS** RW1	for 1-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** RW2	for 2-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** RW6	for 6-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** RW10	for 10-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** RW20	for 20-litre pressure vessel unit

MEDIUM POURING DEVICE

Pouring device with filter for all pressure vessel unit. Mesh size: 0.2mm

Order no.: **INDU**TEC® **MS** EH N

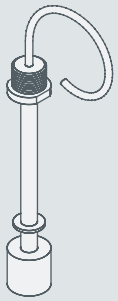
VISUAL FILLING LEVEL CONTROLLER, ON THE SIDE

Filling level controller, visual, mounted on the side
For vessels with capacities between 1 litre and 40 litres

Order no.: **INDU**TEC® **MS** D1 VS	for 1-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** D2 VS	for 2-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** D6 VS	for 6-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** D10 VS	for 10-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** D20 VS	for 20-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** D40 VS	for 40-litre pressure vessel unit

Accessories for Pressure Vessels

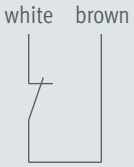
POTENTIAL-FREE FILLING LEVEL CONTROLLER



PVC filling level controller, potential-free, break contact, contract
For vessels with capacities between 1 litre and 20 litres

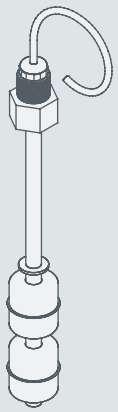
Technical details:

- Switching voltage 230 V
- Switching current 1 A
- Switching capacity 50 W / VA
- Contact type Break contact
- Protection class IP 67 (IEC 529)
- Temperature range -10 °C ... + 65 °C



Order no.: **INDU**TEC® **MS** D1 Ö PVC	for 1-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** D2 Ö PVC	for 2-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** D6 Ö PVC	for 6-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** D10 Ö PVC	for 10-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** D20 Ö PVC	for 20-litre pressure vessel unit

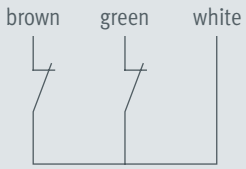
POTENTIAL-FREE FILLING LEVEL CONTROLLER WITH TWO CONTACTS



Stainless steel filling level controller, potential-free, break contact, contract
For vessels with capacities between 1 litre and 40 litres

Technical details:

- Switching voltage 230 V
- Switching current 1 A
- Switching capacity 50 W / VA
- Contact type 2x break contacts
- Protection class IP 67 (IEC 529)
- Temperature range -25 °C ... + 75 °C



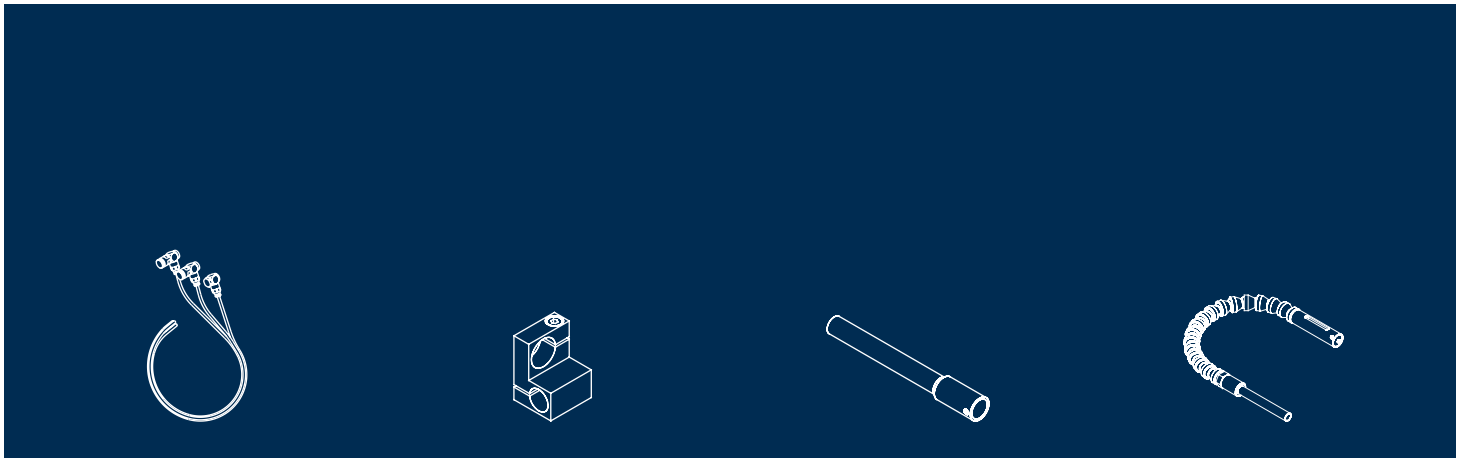
Order no.: **INDU**TEC® **MS** D1 Ö2	for 1-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** D2 Ö2	for 2-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** D6 Ö2	for 6-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** D10 Ö2	for 10-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** D20 Ö2	for 20-litre pressure vessel unit
Order no.: **INDU**TEC® **MS** D40 Ö2	for 40-litre pressure vessel unit

By implementing filling level controllers, falling below minimum quantities can be avoided.

Potential-free filling level controllers can trigger a warning signal (light/alarm/control of the machinery) as well as promptly shut off the machinery (e.g. to avoid tool breakage).

Filling level controllers with two break contacts allow the system to be switched to reserve operations when the first contact is reached and the system to be shut off completely when the second is reached.

Accessories.



ONE SOLUTION FOR EVERYTHING

There are many assembly, mounting and extension possibilities available for the **INDU**TEC® **MS** MQL system. Here, you can choose between different connection variations, mounting devices, extensions, etc. in accordance with the type of installation selected.

SPRAYING HEAD CONNECTION KITS

Spraying head connection kits are needed to connect the coaxial spraying heads with the valve units. There are many variations available with adjustment possibilities for medium and spraying air.

› Page 29 – 31

HOSES

Hoses are available in various diameters and designs with suitable accessories for assembly and extension for larger distances or special applications.

› Page 32 – 33

EXTENSIONS

The range of extensions contains rigid and flexible variations so that difficult to access spraying points can be reached or to make carrying out adjustments easier.

› Page 34 – 35

BRACKETS

In the ‘Brackets’ section, there are a whole range of possibilities for fixing the coaxial spraying heads to the machinery or for places which are hard to access.

› Page 36 – 38

FITTED CABINETS

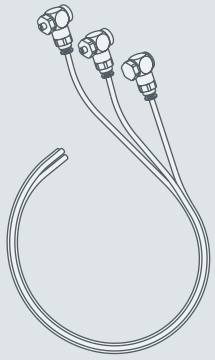
Fitted cabinets for valve units serve to protect the units from dirt and from authorised or unintended adjustment of the air or medium amounts.

› Page 39

Spraying Head Connection Kits

SPRAYING HEAD CONNECTION KITS WITH STAGELESS ADJUSTMENT OF MEDIUM AND SPRAYING AIR FLOW RATE

SD4



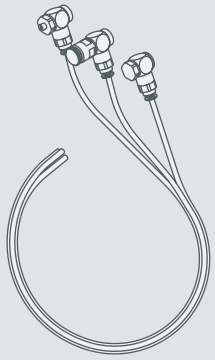
Standard spraying head connection kit for mounting a coaxial spraying head onto the valve unit with stageless adjustment of medium and spraying air flow rate consisting of:

- Swivel throttle valve for stageless adjustment of the medium flow rate [**INDU**TEC® **MS** SDV-M]
- Swivel throttle valve for stageless adjustment of the spraying air flow rate [**INDU**TEC® **MS** SDV-Z]
- Swivel-ring piece [**INDU**TEC® **MS** SRS]
- 2m triple hose ø 4mm or ø 6mm black-blue-transparent, for medium, spraying air and control air [**INDU**TEC® **MS** SBT4 or **INDU**TEC® **MS** SBT6]

Order no.: **INDU**TEC® **MS** AP4	For hose lines with a 4mm diameter
Order no.: **INDU**TEC® **MS** AP6	For hose lines with a 6mm diameter

SPRAYING HEAD CONNECTION KIT WITH REPRODUCIBLE FINE ADJUSTMENT OF THE MEDIUM AMOUNT

SD4



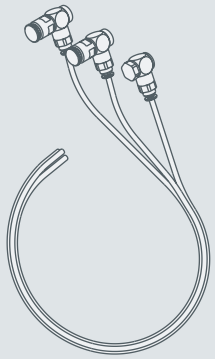
Spraying head connection kit for mounting a coaxial spraying head onto the valve unit with reproducible fine adjustment of the medium amount consisting of:

- Precision screw-in union for reproducible fine adjustment of the medium flow rate [**INDU**TEC® **MS** RV10]
- Swivel throttle valve for stageless adjustment of the spraying air flow rate [**INDU**TEC® **MS** SDV-Z]
- Swivel-ring piece [**INDU**TEC® **MS** SRS]
- 2m triple hose ø 4mm or ø 6mm black-blue-transparent, for medium, spraying air and control air [**INDU**TEC® **MS** SBT4 or **INDU**TEC® **MS** SBT6]

Order no.: **INDU**TEC® **MS** AP4.RV10	For hose lines with a 4mm diameter
Order no.: **INDU**TEC® **MS** AP6.RV10	For hose lines with a 6mm diameter

SPRAYING HEAD CONNECTION KIT WITH REPRODUCIBLE FINE ADJUSTMENT OF THE MEDIUM AND SPRAYING AIR FLOW RATES

SD4



Spraying head connection kit for coaxial spraying head valve unit assembly with reproducible fine adjustment of the medium and spraying air flow rates consisting of:

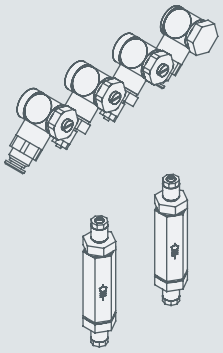
- Precision screw-in union for reproducible fine adjustment of the medium flow rate
- [**INDU**TEC® **MS** RV10]
- Precision screw-in union for reproducible fine adjustment of the spraying air flow rate
- [**INDU**TEC® **MS** RV25]
- Swivel-ring piece [**INDU**TEC® **MS** SRS]
- 2m triple hose ø 4mm or ø 6mm black-blue-transparent, for medium, spraying air and control air [**INDU**TEC® **MS** SBT4 or **INDU**TEC® **MS** SBT6]

Order no.: **INDU**TEC® **MS** AP4.RV1025	For hose lines with a 4mm diameter
Order no.: **INDU**TEC® **MS** AP6.RV1025	For hose lines with a 6mm diameter

Spraying Head Connection Kits for Special Purposes

SPRAYING HEAD CONNECTION KITS FOR 2 MEDIUM CHANNELS FOR **INDU**TEC® **MS** SD4 M2 COAXIAL SPRAYING HEADS

SD4 M2



Spraying head connection kit for coaxial spraying head valve unit assembly consisting of:

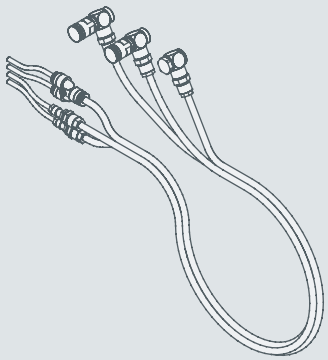
- 2 x swivel throttle valve for stageless adjustment of the medium flow rate [**INDU**TEC® **MS** SDV-M]
- Swivel throttle valve for stageless adjustment of the spraying air flow rate [**INDU**TEC® **MS** SDV-Z]
- Swivel-ring piece for control air [**INDU**TEC® **MS** SRS]
- 2 x non-return valves for medium, complete with straight male connectors on both sides, incl. union nut for hoses with ø 4 mm, supplied separately [**INDU**TEC® **MS** RSV4 ÜM]

Hoses [**INDU**TEC® **MS** SBT4] must be ordered separately.

Order no.: **INDU**TEC® **MS** AP4 M2 OS

SPECIAL SPRAYING HEAD CONNECTION KIT FOR INTERNAL COOLING

FD4 Z2



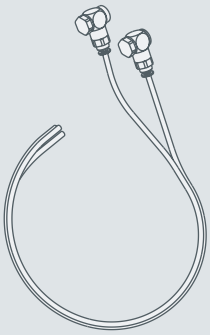
For **INDU**TEC® **MS** FD 4 Z2 Coaxial Spraying Head valve unit assembly, consisting of:

- Precision screw-in unions to adjust the medium flow rate incl. GEV6 with union nut
- Precision screw-in unions to adjust the spraying air flow rate incl. GEV6 with union nut
- Swivel-ring piece incl. GEV 6 union nut
- 2 x reducers for control air and medium hoses ø 6/4mm incl. union nut
- Y-reducer-plug connection with 1 x inlet for hose with ø 6mm and
- 2 x outlet for ø 4 mm hose for spraying air hose
- each with 3m hose feed line, ø 6mm for medium, spraying air and control air
- 0.5m hose feed line, ø 4mm for 1 x medium, 2 x spraying air and 1 x control air

Order no.: **INDU**TEC® **MS** AP6 RV1025 (IK)

SPECIAL SPRAYING HEAD CONNECTION KIT FOR DROP LUBRICATION

SD4



Special spraying head connection kit for drop lubrication for coaxial spraying head valve unit assembly
consisting of:

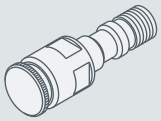
- Swivel-ring piece with straight male connectors for medium
- Swivel-ring piece with straight male connectors for control air
- 2m black-transparent double hose ø 4mm for medium, spraying air and control air

Order no.: **INDU**TEC® **MS** AP4.TDD

Retrofitting Parts | Spraying Head Connection Kits for SD3 Coaxial Spraying Heads

PRECISION SCREW-IN UNION FOR RETROFITTING

SD4



Precision screw-in union for reproducible fine adjustment of the medium flow rate

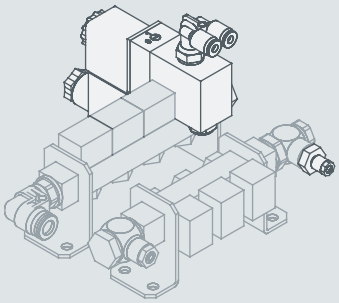
Order no.: **INDU**TEC® **MS** RV10

Precision screw-in union for reproducible fine adjustment of the spraying air flow rate

Order no.: **INDU**TEC® **MS** RV25

SPRAYING HEAD CONNECTION KIT FOR **INDU**TEC® **MS** SD3 COAXIAL SPRAYING HEADE

SD3



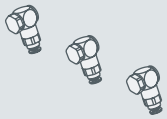
Spraying head connection kit for valve unit assembly for air and medium supply consisting of:

- 3/2-way solenoid valve, complete with coil and connector plug and Y-distributor assembled at the factory
- 1/8“ swivel-ring piece with straight male connectors incl. union for medium
- 2 x IG 1/8“ socket
- 2m triple hose feed line ø 4mm [**INDU**TEC® **MS** SBT4]

Order no.: **INDU**TEC® **MS** SD3 AP3 MV

SPRAYING HEAD CONNECTION KIT FOR CONNECTING AN **INDU**TEC® **MS** SD3 COAXIAL SPRAYING HEAD TO AN **INDU**TEC® **MS** STANDARD SYSTEM

SD3



Spraying head connection kit for coaxial spraying head valve unit assembly consisting of:

- 1/8“ swivel-ring piece with straight male connectors for control air
- 1/8“ swivel-ring piece with straight male connectors for spraying air
- 1/8“ swivel-ring piece with straight male connectors incl. union for medium

Pre-assembled valve unit hoses [**INDU**TEC® **MS** SBT4] must be ordered separately.

Order no.: **INDU**TEC® **MS** AP3/2 OS M

Do you have any questions?

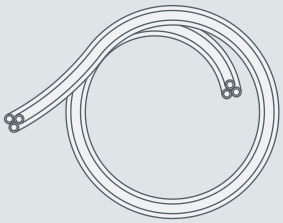
We look forward to inform you about our accessories program. Call us on

+49 (0) 7331 98 78-0

We will be glad to help.

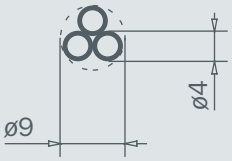
Hoses

HOSE WITH 4MM DIAMETER

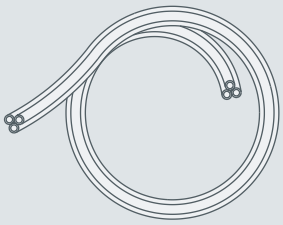


Triple PUR hose ø 4mm, black-blue-transparent, welded
UV- and hydrolysis-resistant, calibrated
Minimum bending radius: 30mm
Clear width for pipe installation: 9mm
Tensile strength: MPA 50 according to DIN 53504
Provided length: 50m

Order no.: **INDU**TEC® **MS** SBT4

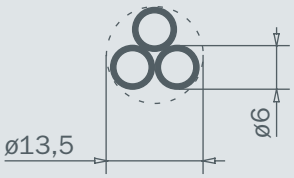


HOSE WITH 6MM DIAMETER



Triple PUR hose ø 6mm, black-blue-transparent, welded
UV- and hydrolysis-resistant, calibrated
Minimum bending radius: 60mm
Clear width for pipe installation: 13.5mm
Tensile strength: MPA 50 according to DIN 53504
Provided length: 50m

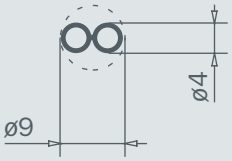
Order no.: **INDU**TEC® **MS** SBT6



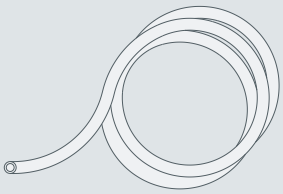
HOSE WITH 4MM DIAMETER

Double PUR hose ø 4mm, black-transparent, welded
UV- and hydrolysis-resistant, calibrated
Minimum bending radius: 30mm
Clear width for pipe installation: 9mm
Tensile strength: MPA 50 according to DIN 53504
Provided length: 50m

Order no.: **INDU**TEC® **MS** ST4



HOSE FOR CONNECTING THE VALVE UNITS TO THE PRESSURE VESSEL UNIT FOR MEDIUM

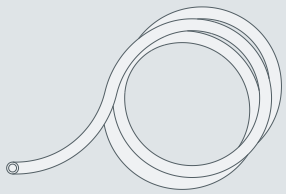


PUR hose ø 6mm medium – transparent
UV- and hydrolysis-resistant, calibrated
Tensile strength: MPA 50 according to DIN 53504
For connecting the pressure vessel unit with the valve units
Provided length: 50m

Order no.: **INDU**TEC® **MS** SM6

Hoses

HOSE FOR CONNECTING THE COMPRESSED AIR SUPPLY TO THE PRESSURE VESSEL UNIT AND THE VALVE UNITS



PUR hose ø 6mm spraying air – blue
UV- and hydrolysis-resistant, calibrated
Tensile strength: MPA 50 according to DIN 53504
For connecting the compressed air supply with the pressure vessel unit and the valve units
Provided length: 50m

Order no.: **INDU**TEC® **MS** SZ6

QUICK RELEASE COUPLING FOR HOSES

Quick release coupling ø 4mm for medium, spraying air or control air
two-way shut-off
Material: nickel brass
Seal: Viton
consisting of:

› 1 x seal coupling [**INDU**TEC® **MS** VK4]
› 1 x seal spout [**INDU**TEC® **MS** VN4]

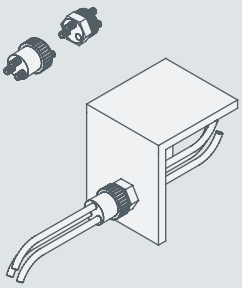
Order no.: **INDU**TEC® **MS** STK 4

Quick release coupling ø 6mm for medium supply
two-way shut-off
Material: Nickel brass
Seal: Viton
consisting of:

› 1 x seal coupling [**INDU**TEC® **MS** VK6]
› 1 x seal spout [**INDU**TEC® **MS** VN6]

Order no.: **INDU**TEC® **MS** STK 6 M

SPECIAL HOSE COUPLING FOR TRIPLE HOSE



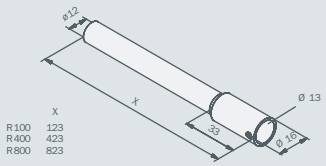
Special hose coupling for triple hose ø 4mm [**INDU**TEC® **MS** SBT 4]
two-way detachable, non shut-off

Order no.: **INDU**TEC® **MS** SK-SBT 4

Extensions

RIGID EXTENSIONS WITH SPRAYING HEAD ADAPTER FOR **INDU**TEC® **MS** SD4 COAXIAL SPRAYING HEADS

SD4

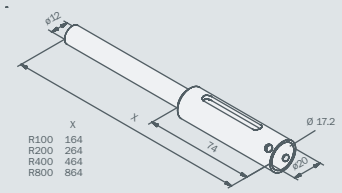


Rigid extensions with spraying head adapter
incl. adjustment
Lengths: 123mm, 423mm or 823mm

Order no.: **INDU**TEC® **MS** R 100	Length 123mm
Order no.: **INDU**TEC® **MS** R 400	Length 423mm
Order no.: **INDU**TEC® **MS** R 800	Length 823mm

RIGID EXTENSIONS WITH SPRAYING HEAD ADAPTER FOR **INDU**TEC® **MS** SD3 COAXIAL SPRAYING HEADS

SD3

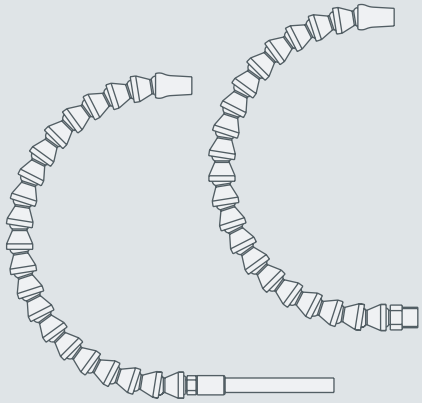


Rigid extensions with spraying head adapter
incl. adjustment
Lengths: 164mm, 264mm, 464mm or 864mm

Order no.: **INDU**TEC® **MS** KH3 R100	Length 164mm
Order no.: **INDU**TEC® **MS** KH3 R200	Length 264mm
Order no.: **INDU**TEC® **MS** KH3 R400	Length 464mm
Order no.: **INDU**TEC® **MS** KH3 R800	Length 864mm

FLEXIBLE BALL-JOINTED EXTENSIONS

SD4

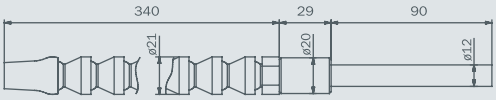


Flexible ball-jointed extensions, approx. 300mm, incl. spraying head adapter with adjustment and 3/8“ threaded connector

Order no.: **INDU**TEC® **MS** KGV 300

Flexible ball-jointed extensions, approx. 300mm, incl. spraying head adapter with adjustment and 3/8“ threaded connector – M12x1 as well as 100mm pipe extension

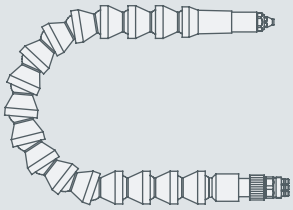
Order no.: **INDU**TEC® **MS** KGV 300R



Extensions

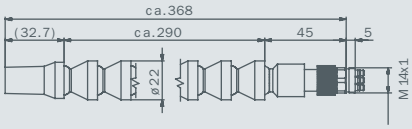
FLEXIBLE BALL-JOINTED EXTENSION WITH HOSE COUPLING

SD4



Flexible ball-jointed extension, approx. 300mm,
incl. spraying head adapter with adjustment and hose coupling
incl. **INDU**TEC® **MS** SD4 Coaxial Spraying Head

Order no.: **INDU**TEC® **MS** SK KGV SD4



FLEXIBLE BALL-JOINTED EXTENSION WITH RIGID PIPE EXTENSION

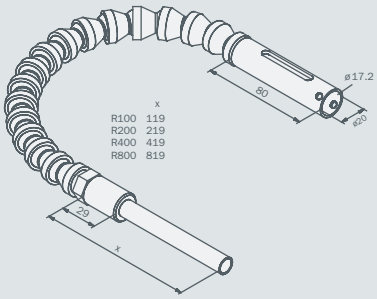
SD4

Flexible ball-jointed extension with 2 joints, incl. spraying head adapter
with adjustment, 3/8“ threaded connector, 3/8“ reducer and a
200mm, 400mm or 800mm rigid extension.

Order no.: **INDU**TEC® **MS** KGV 2G R200 incl. approx. 200mm rigid extension
Order no.: **INDU**TEC® **MS** KGV 2G R400 incl. approx. 400mm rigid extension
Order no.: **INDU**TEC® **MS** KGV 2G R800 incl. approx. 800mm rigid extension

FLEXIBLE BALL-JOINTED EXTENSION WITH CLAMP MOUNTING FOR **INDU**TEC® **MS** SD3 COAXIAL SPRAYING HEADS

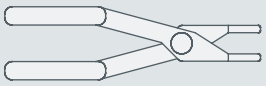
SD3



Flexible approx. 300mm ball-jointed extension with clamp mounting
for mounting an INDUTEC® MS SD3 Coaxial Spraying Head
incl. approx. 100mm, 200mm, 400mm or 800mm rigid extension.

Order no.: **INDU**TEC® **MS** KH3 KG R100 incl. approx. 100mm rigid extension
Order no.: **INDU**TEC® **MS** KH3 KG R200 incl. approx. 200mm rigid extension
Order no.: **INDU**TEC® **MS** KH3 KG R400 incl. approx. 400mm rigid extension
Order no.: **INDU**TEC® **MS** KH3 KG R800 incl. approx. 800mm rigid extension

ASSEMBLY PLIERS FOR BALL-JOINTED EXTENSIONS



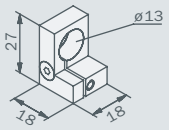
Assembly pliers for ball-jointed extensions

Order no.: **INDU**TEC® **MS** MZ-KGV

Brackets

CLAMP BRACKET FOR **INDU**TEC® **MS** SD4 COAXIAL SPRAYING HEADS

SD4

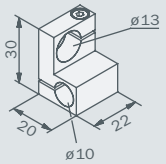


Clamp bracket for mounting an **INDU**TEC® **MS** SD4 Coaxial Spraying head

Order no.: **INDU**TEC® **MS** KH5

CLAMP BRACKET FOR **INDU**TEC® **MS** SD4 COAXIAL SPRAYING HEADS WITH PIPE ADAPTER

SD4

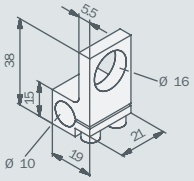


Clamp bracket for mounting an **INDU**TEC® **MS** SD4 Coaxial Spraying Head incl. ø 10mm pipe adapter

Order no.: **INDU**TEC® **MS** KH5-10

CLAMP BRACKET FOR **INDU**TEC® **MS** SD3 COAXIAL SPRAYING HEADS WITH PIPE ADAPTER

SD3

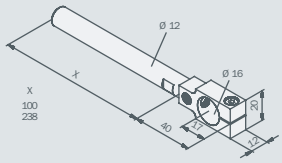


Clamp bracket for mounting an **INDU**TEC® **MS** SD3 Coaxial Spraying Head incl. ø 10mm pipe adapter

Order no.: **INDU**TEC® **MS** KH3-10

CLAMP BRACKET FOR **INDU**TEC® **MS** SD3 COAXIAL SPRAYING HEADS

SD3



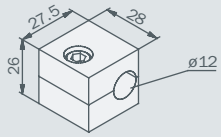
Clamp bracket with 2 x M8 threading and internal diameter of 17mm for mounting an **INDU**TEC® **MS** SD3 Coaxial Spraying Head, incl. M4x10 Allen screw

Order no.: **INDU**TEC® **MS** KH3-M8

CLAMP BRACKET FOR RIGID SPRAYING HEAD EXTENSIONS

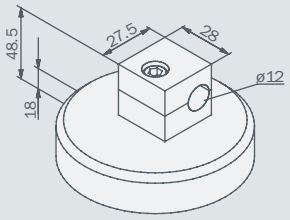
SD4

SD3



Clamp bracket for mounting rigid spraying head extensions ø 12mm

Order no.: **INDU**TEC® **MS** KH5-12



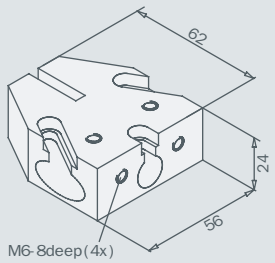
Clamp bracket for mounting rigid spraying head extensions ø 12mm with solenoid

Order no.: **INDU**TEC® **MS** MH

Brackets

CLAMP BRACKET FOR MOUNTING UP TO THREE **INDU**TEC® **MS** SD4 COAXIAL SPRAYING HEADS

SD4



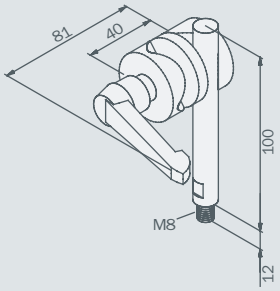
Clamp brackets for mounting up to 3 **INDU**TEC® **MS** SD4 Coaxial Spraying Heads for using band saws, circular saws, etc.

Order no.: **INDU**TEC® **MS** KH35

RIGID JOINT BRACKET FOR RIGID SPRAYING HEAD EXTENSIONS

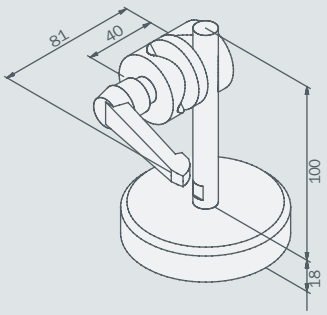
SD4

SD3



Rigid joint bracket with 100mm / 250mm mounting bar (M8) and adapter for rigid spraying head extensions, adjustable in all directions

Order no.: **INDU**TEC® **MS** SGH100 with 100mm mounting bar
Order no.: **INDU**TEC® **MS** SGH250 with 250mm mounting bar

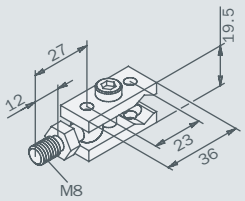


Rigid joint solenoid bracket with 100mm / 250mm mounting bar (M8) and adapter for rigid spraying head extensions, adjustable in all directions

Order no.: **INDU**TEC® **MS** SGMH100 with 100mm mounting bar
Order no.: **INDU**TEC® **MS** SGMH250 with 250mm mounting bar

CLAMP FOR **INDU**TEC® **MS** SD4 COAXIAL SPRAYING HEADS

SD4



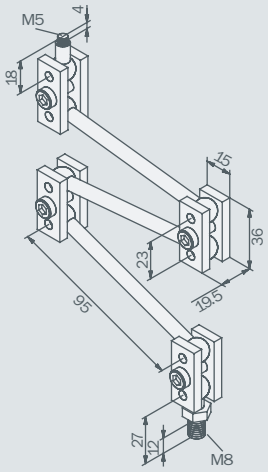
Clamp with M8 ball joint,
incl. adapter for rigid spraying head extension

Order no.: **INDU**TEC® **MS** KS M8

Brackets

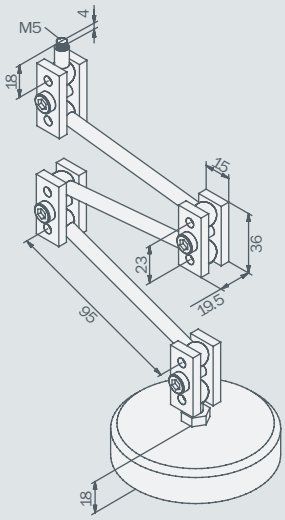
TRIPLE JOINT BRACKET FOR **INDU**TEC® **MS** SD4 COAXIAL SPRAYING HEADS

SD4



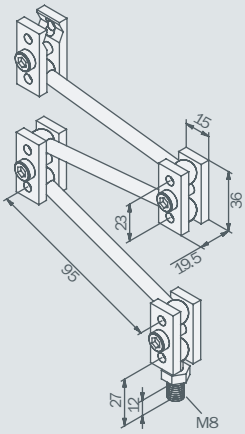
Triple joint bracket with M5 ball joint for spraying head assembly and M8 ball joint for mounting the bracket

Order no.: **INDU**TEC® **MS** GM8



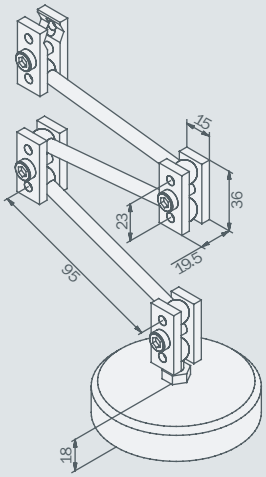
Triple joint bracket with M5 ball joint for spraying head assembly and solenoid for mounting the bracket

Order no.: **INDU**TEC® **MS** GMH



Triple joint bracket with clamp for rigid spraying head extension and M8 ball joint for mounting the bracket

Order no.: **INDU**TEC® **MS** KM8R



Triple joint bracket with clamp for rigid spraying head extension and solenoid for mounting the bracket

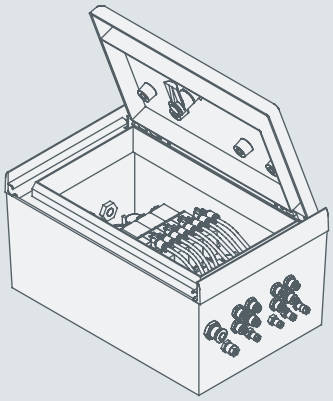
Order no.: **INDU**TEC® **MS** GMHR

Fitted Cabinets for Valve Units | Manuals

FITTED CABINETS FOR VALVE UNITS

SD3

SD4



Fitted cabinet for valve unit pre-assembly for the air and medium supply of the **INDU**TEC® **MS** SD4 / SD3 Precision Coaxial Spraying Heads to protect against dirt and unintended adjustment of the settings.

Order no.: **INDU**TEC® **MS** Fitted Cabinet

The fitted cabinets can be used for all valve units.

Custom models

The fitted cabinets can be used for all valve units and are available in various different sizes on request.

Manuals

EU standard manual, incl. EC Declaration of Conformity available in all EU languages and Turkish

The manual is included in delivery with the Standard System.

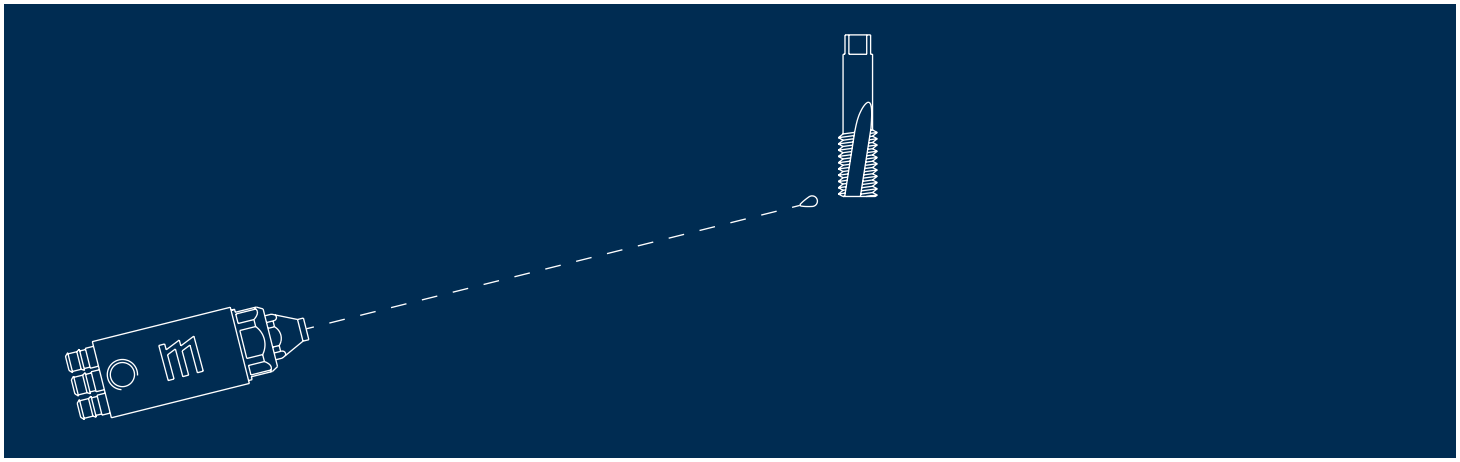
Do you have any questions?

We look forward to inform you about our accessories program. Call us on

+49 (0) 7331 98 78-0

We will be glad to help.

Process-safe Drop Lubrication.



DROP BY DROP EXACTLY ON TARGET

For the exact and precise application of a defined quantity of medium over a distance of up to 600mm, it makes sense to implement oil-haze-free **INDU**TEC® **MS** technology.

This technology does not use spraying air at all and the medium is applied in drops to the lubrication point.

The in-head cartridge of the coaxial spraying head can be adjusted to the viscosity of the medium. The size of the drops can be determined using the control unit.

Example

Viscosity	42mm²/s 40°C
Distance	max. 600mm

The proportion of the medium does not just depend on the viscosity, but also on the special qualities of the product which is to be used. Therefore, we recommend practical trials so we can determine exact values.

SPECIAL COAXIAL SPRAYING HEAD FOR DROP LUBRICATION

Precision coaxial spraying head with pre-assembled special in-head cartridge ø 0.2mm with 5° round jet spraying angle, drop-free, self-cleaning, nozzle ø 0.2mm, connections for medium, spraying air and control air on the rear side, incl. cap on the spraying air inlet
Dimensions: 35mm x ø 13mm, weight: approx. 30g
Main body, head and needle: NIRO
Seals: Viton
with stroke adjustment screw and manual

Order no.: **INDU**TEC® **MS** SD4 TDD

Positioning

With this model, the valve units can be positioned wherever you like. The connection kits and the coaxial spraying heads must be assembled separately.

Custom models

INDUTEC® **MS** systems with special power supplies, custom sizes and versions with longer feed lines or pneumatic control can be obtained on request.

Do you have any questions?

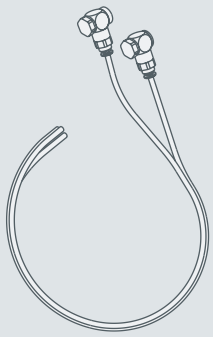
We look forward to inform you about the process-safe drop lubrication. Call us on

+49 (0) 7331 98 78-0

We will be glad to help.

Drop Lubrication

SPECIAL SPRAYING HEAD CONNECTION KIT FOR DROP LUBRICATION

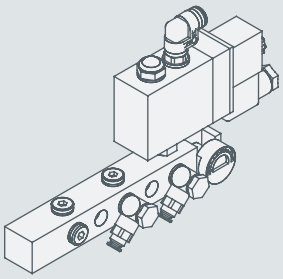


Special spraying head connection kit for drop lubrication for coaxial spraying head valve unit assembly consisting of:

- Swivel-ring piece with straight male connectors for medium
- Swivel-ring piece with straight male connectors for control air
- 2m black-transparent double hose ø 4mm for medium, spraying air and control air

Order no.: **INDU**TEC® **MS** AP4.TDD

VALVE UNITS FOR DROP LUBRICATIONS FOR THE CONNECTION OF 1 COAXIAL SPRAYING HEAD



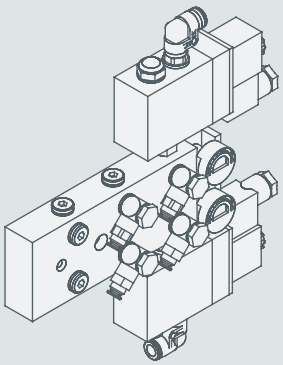
Valve unit for medium, spraying air and control air, electro-pneumatically triggered, with

- 1 spraying time
- 1 x 3/2-way solenoid valve for control air
- 1 x gauge for compressed air pressure (0-10 bar)
- 5m medium hose to pressure vessel / valve unit module (transparent)
- 2m spraying air hose (blue, ø 8mm)

Designed for connecting 1 x **INDU**TEC® **MS** SD4 coaxial spraying head

Order no.: **INDU**TEC® **MS** VT1-1 TDD 24/110/230 V

DROP LUBRICATION VALVE UNITS FOR THE CONNECTION OF UP TO 2 COAXIAL SPRAYING HEADS



The illustration shows an **INDU**TEC® **MS** VT2-2 TDD with two pre-assembled spraying times.

Valve unit for medium, spraying air and control air, electro-pneumatically triggered, with

- X spraying times*
- X x 3/2-way solenoid valve for control air
- X x gauge for compressed air pressure (0-10 bar)
- 5m medium hose to pressure vessel / valve unit module (transparent)
- X x 2 x 2m spraying air feed line (blue, ø 8mm)

Designed for connecting up to 2 x **INDU**TEC® **MS** SD4 Coaxial Spraying Heads

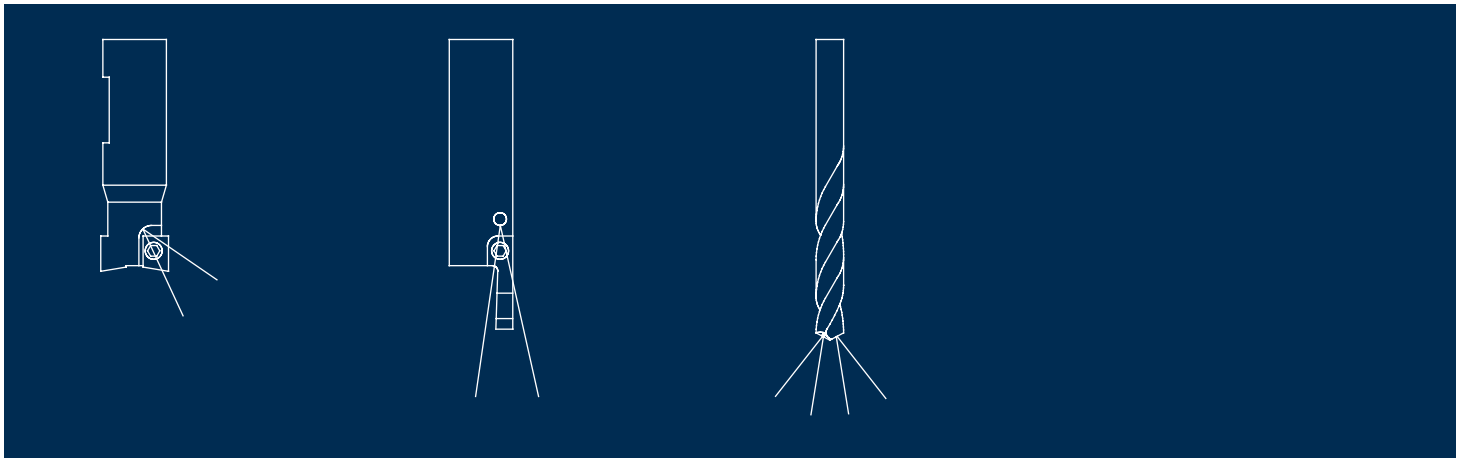
Order no.: **INDU**TEC® **MS** VT2-X* TDD 24/110/230 V

* Here, X stands for the number of spraying times prepared in the factory. A choice can be made in advance between 1 and 2.

DROP LUBRICATION PRESSURE VESSELS

Pressure vessel units with operating pressure of 6.0 bar must be used (see page 25).

Internal Medium Supply (Internal Cooling)



FOR NARROW AND UNREACHABLE POINTS OF CHIPPING

Depending on the intended purpose and the assembly space available, it may be sensible to lead the lubricant directly through the tool to the cutting edges.

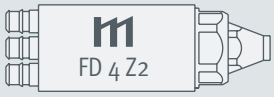
For the purposes of this, an adapter sleeve is mounted onto a rotary feedthrough, where the coaxial spraying head can simply be attached. In this way, you are able to use the spraying head with the same adapter sleeve in various different tools – without the need for complex assembly work.

Viscosity up to 45mm²/s 40°C

Applications

Internal cooling can be implemented with drilling, threading, milling, turning, etc.

SPECIAL COAXIAL SPRAYING HEAD FOR INTERNAL COOLING



Precision coaxial spraying head with 5° round jet spraying angle, drop-free, self-cleaning, nozzle ø 0.3mm, connections for medium, spraying air and control air on the rear
Dimensions: 35mm x ø 13mm, weight: approx. 30g
Main body, head and needle: NIRO
Seals: Viton
For use with rotary feedthroughs

Order no.: **INDU**TEC® **MS** FD 4 Z2

Do you have any questions?

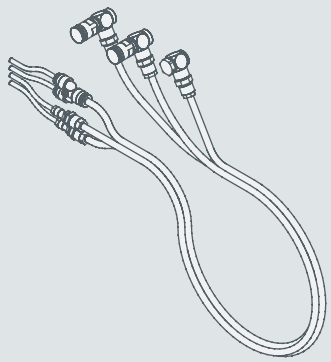
We look forward to inform you about the internal medium supply. Call us on

+49 (0) 7331 98 78-0

We will be glad to help.

Internal Medium Supply (Internal Cooling)

SPECIAL SPRAYING HEAD CONNECTION KIT FOR INTERNAL COOLING

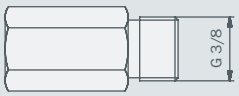


For **INDU**TEC® **MS** FD 4 Z2 Coaxial Spraying Head valve unit assembly, consisting of::

- Precision screw-in unions to adjust the medium flow rate incl. GEV6 with union nut
- Precision screw-in unions to adjust the spraying air flow rate incl. GEV6 with union nut
- Swivel-ring piece incl. GEV 6 union nut
- 2 x reducers for control air and medium hoses ø 6/4mm incl. union nut
- Y-reducer-plug connection with 1 x inlet for hose with ø 6mm and
- 2 x outlet for ø 4mm hose for spraying air hose
- each with 3m hose feed line, ø 6mm for medium, spraying air and control air
- 0.5m hose feed line, ø 4mm for 1 x medium, 2 x spraying air and 1 x control air

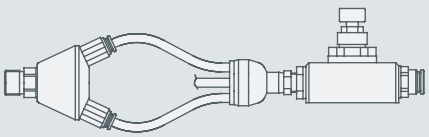
Order no.: **INDU**TEC® **MS** AP6 RV1025 (IK) FD4 Z2

SPECIAL ACCESSORIES FOR INTERNAL COOLING



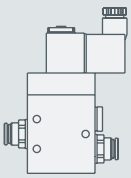
Stainless steel adapter, 6-edge SW19, G 3/8“ outer threading, O-ring, incl. M4 x 10 Allen screw in accordance with DIN912 assembled for rotary feedthrough use

Order no.: **INDU**TEC® **MS** ADA FD4



Special air accelerator chamber
Air spraying head adapter (G3/8)
Adapter for 4 x air and 1 **INDU**TEC® **MS** FD 4 Z2 Coaxial Spraying Head
incl. compressed air connection and throttle check valve

Order no.: **INDU**TEC® **MS** LV5 N



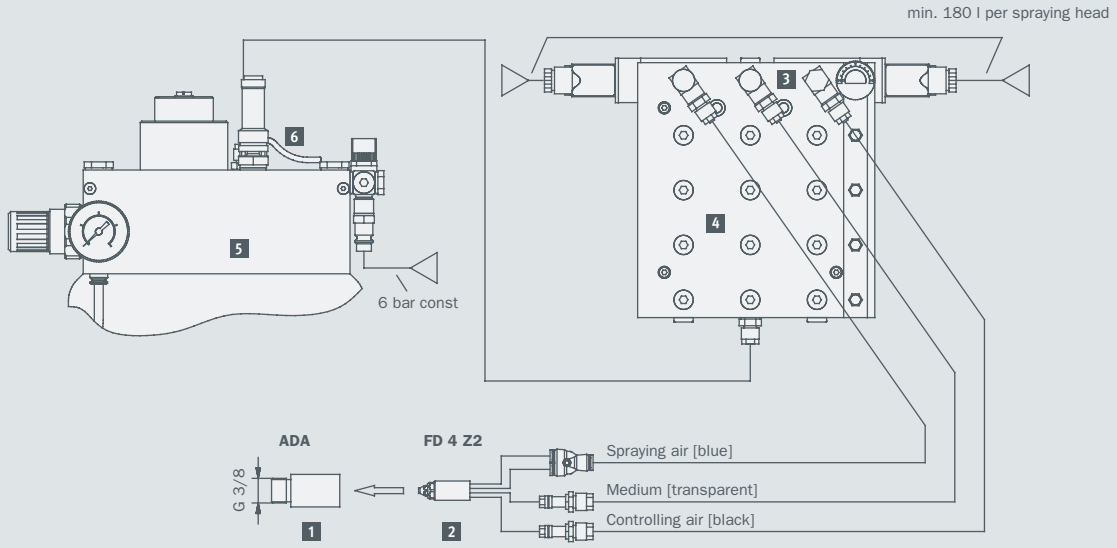
2/2-way solenoid valve for spraying air (IK) incl. 1/4“ screw plug with seal, double-sided with GEV10 for ø 10mm hose incl. 2m SZ10 hose (PUR) for spraying air, blue, complete with 24V/DC solenoid, connector plug and counter nut

The solenoid valve serves to control the LV5 N special air accelerator chamber.

Order no.: **INDU**TEC® **MS** MV 2/2 SP

Internal Medium Supply (Internal Cooling)

PLANNING EXAMPLES FOR INTERNAL MEDIUM SUPPLY (INTERNAL COOLING)

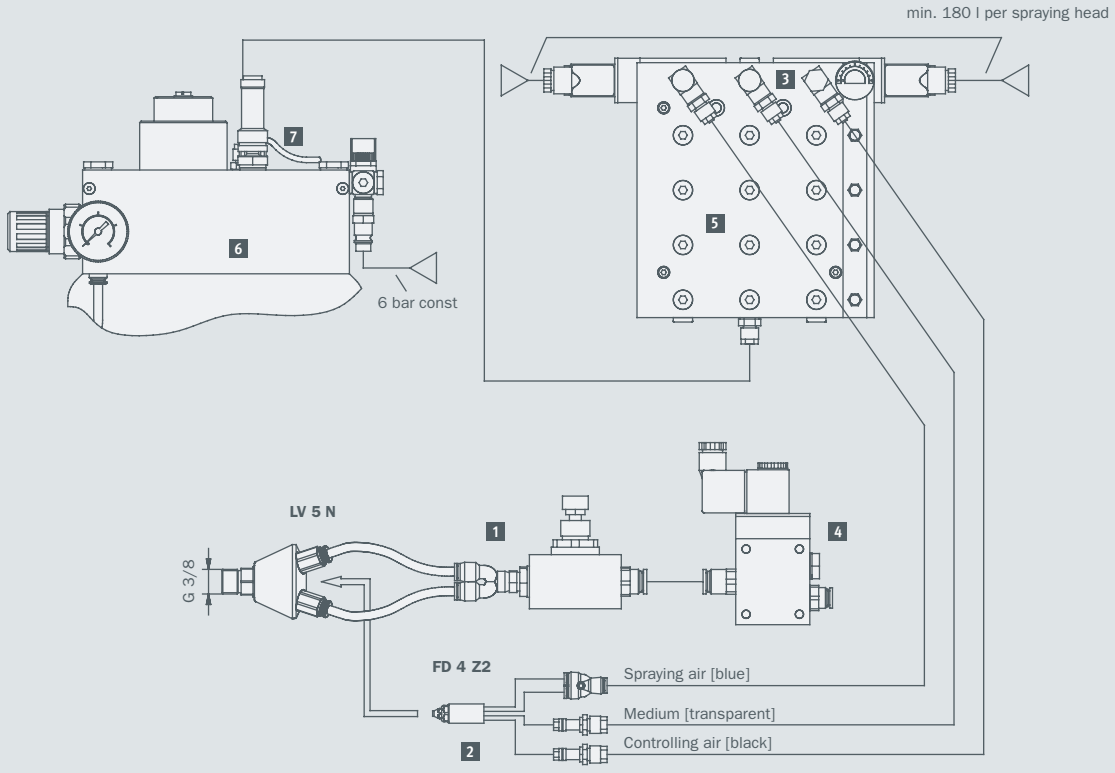


PRODUCTS USED:

1	Adapter for rotary feedthrough	Order no.: **INDU**TEC® **MS** ADA IK FD4 (AL)
2	Precision coaxial spraying head	Order no.: **INDU**TEC® **MS** FD4 Z2
3	Spraying head connection kit for valve unit assembly	Order no.: **INDU**TEC® **MS** AP6 RV1025 (IK) FD4 Z2
4	Valve unit for medium, spraying air and control air	Order no.: **INDU**TEC® **MS** VT5-1 24/110/230V
5	6-litre pressure vessel unit	Order no.: **INDU**TEC® **MS** 0-D6.6
6	Filling level controller	Order no.: **INDU**TEC® **MS** F D6 Ö 2 M

Internal Medium Supply (Internal Cooling)

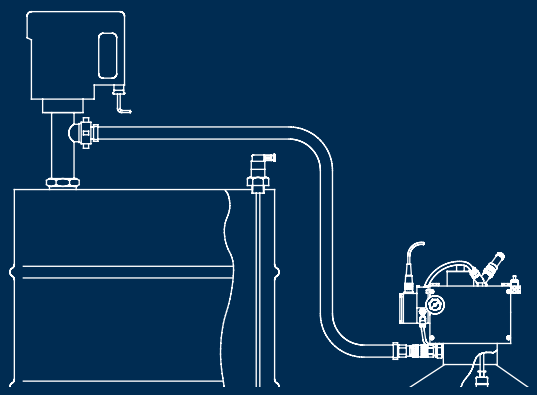
PLANNING EXAMPLES FOR INTERNAL MEDIUM SUPPLY (INTERNAL COOLING)



PRODUCTS USED:

1	Special air acceleration chamber air spraying head adapter (G3/8)	Order no.: **INDU**TEC® **MS** LV5 N
2	Precision coaxial spraying head	Order no.: **INDU**TEC® **MS** FD4 Z2
3	Spraying head connection kit for valve unit assembly	Order no.: **INDU**TEC® **MS** AP6 RV1025 (IK) FD4 Z2
4	2/2-way solenoid valve incl. coil	Order no.: **INDU**TEC® **MS** MV 2/2 SP
5	Valve unit for medium, spraying air and control air	Order no.: **INDU**TEC® **MS** VT5-1 24/110/230V
6	6-litre pressure vessel unit	Order no.: **INDU**TEC® **MS** 0-D6.6
7	Filling level controller	Order no.: **INDU**TEC® **MS** F D6 Ö 2 M

Automated filling systems



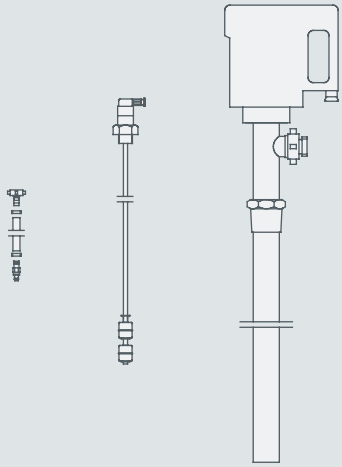
ON DUTY ALL AROUND THE CLOCK

With the help of an automated filling system, an **INDU**TEC® **MS** system can run without any downtime at all. This allows the full production capacity of the machinery to be utilised without any downtime being caused by needing to fill up the lubricant.

PRESSURE VESSELS

The specially-prepared pressure vessel units from this section are to be used for automated filling.

MATERIAL CONVEYANCE UNIT



Material conveyance unit for use with 200-litre standard metal barrels consisting of

- 1 x pump with collector motor incl. 2“ barrel screw fastening
- 1 x VA filling level controller, potential-free, opener with 2 floating contacts (reserve/shut-off), 3/4“ incl. connector plug
- 5m special medium hose for material supply incl. hose connections and clamps for connecting the pump with the pressure vessel unit

Order no.: **INDU**TEC® **MS** MFE

Do you have any questions?

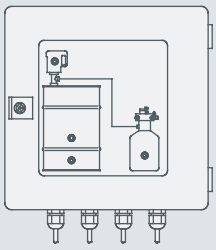
We look forward to inform you about the automated filling systems. Call us on

+49 (0) 7331 98 78-0

We will be glad to help.

Automated filling systems

CONTROL DEVICE FOR AUTOMATED FILLING SYSTEM

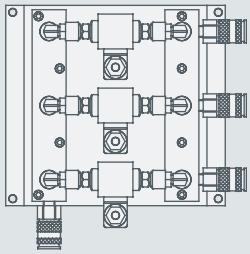


Control device for material management between the **INDU**TEC® **MS** 0-D20.6 AUTO SPS Pressure Vessel Unit and the **INDU**TEC® **MS** MFE Material Conveyance Unit with 200-litre standard metal barrel during operation.

Incl. all necessary components such as circuit layout, complete wiring, the programming of the mini-controller and manual

Order no.: **INDU**TEC® **MS** UE1

OIL DISTRIBUTION PANEL FOR AUTOMATED FILLING SYSTEM

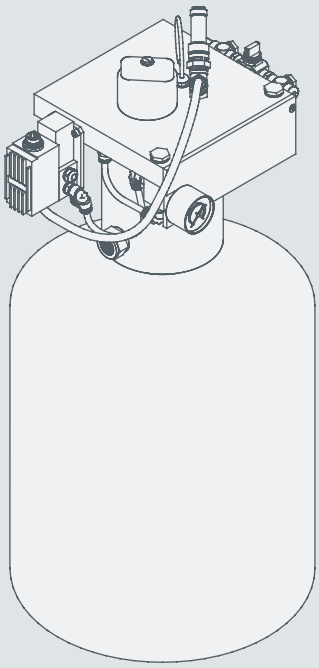


Oil distribution panel for connecting up to 3 pressure vessel units with automated filling, consisting of

- Distribution panel with 1 input
- 3 outputs for up to 3 pressure vessel units
- 1 x 2/2-way 24V solenoid valve per pressure vessel unit
- various accessories

Order no.: **INDU**TEC® **MS** ÖVP3

PRESSURE VESSEL FOR AUTOMATED FILLING SYSTEMS



The illustration shows an **INDU**TEC® **MS** 0-D20.6 AUTO SPS Pressure Vessel Unit with a capacity of 20 litres.

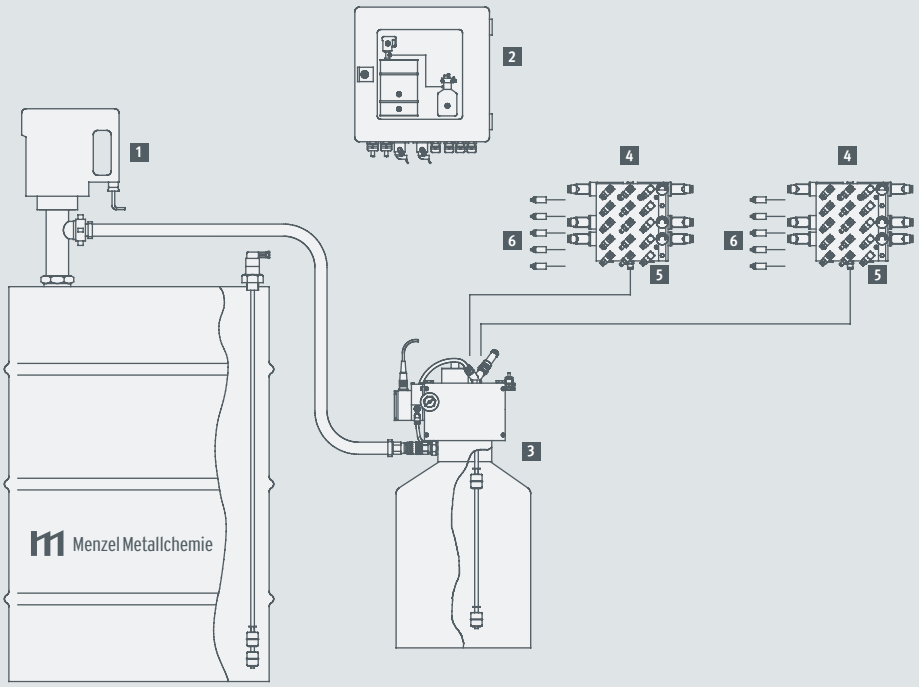
Custom-made 6 litre or 20 litre pressure vessel unit for automated filling during normal operation.

- Control using a special 3-way proportional valve with integrated pressure sensor for controlling the device using the SPS
- Operating pressure: approx. 0.3 bar, max.: 2.3 bar; generally depends on the length of the respective hose (general reference values refer to trials with water)
- With large spacer ring incl. medium adapter for filling pipe
- Butterfly valve for pressurizing
- Safety valve
- Delivery tube for medium with filter
- Special filling level controller for automated refilling control (on/off) by the **INDU**TEC® **MS** MFE material conveyance unit
- Cover for adjustable ventilation

Order no.: **INDU**TEC® **MS** 0-D6.6 AUTO SPS AL	(6-litre capacity, anodised aluminum)
Order no.: **INDU**TEC® **MS** 0-D6.6 AUTO SPS VA	(6-litre capacity, stainless steel)
Order no.: **INDU**TEC® **MS** 0-D20.6 AUTO SPS VA	(20-litre capacity, stainless steel)

Automated filling systems

PLANNING EXAMPLES FOR AUTOMATED FILLING

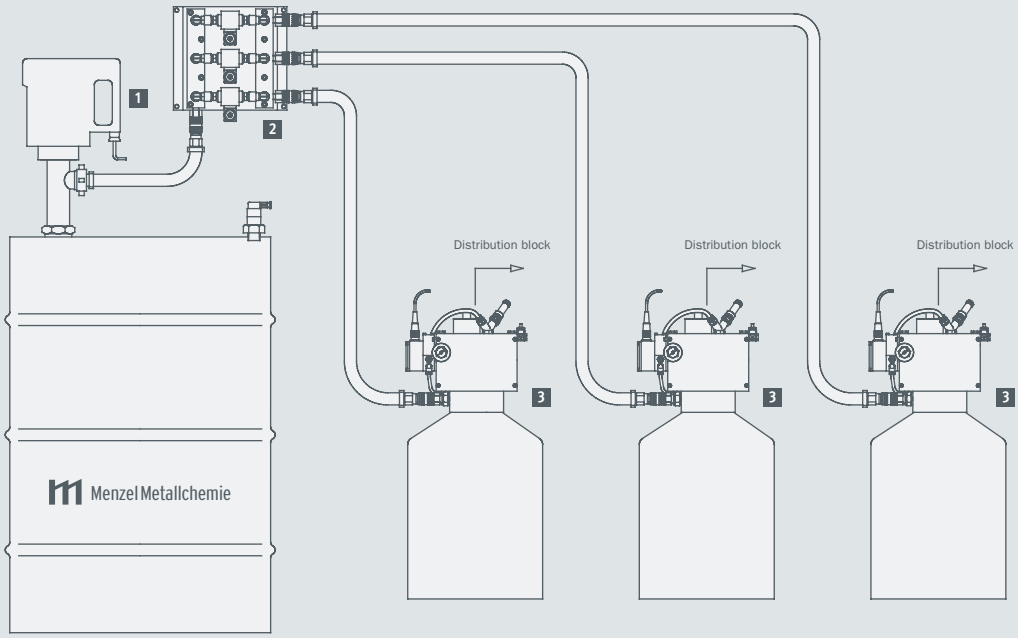


PRODUCTS USED:

1	Material conveyance unit for use with 200-litre standard barrel	Order no.: **INDU**TEC® **MS** MFE
2	Control device for material management (only needed if there is no SPS or similar)	Order no.: **INDU**TEC® **MS** UE1
3	Custom-made 20 litre pressure vessel unit made from stainless steel for automated filling during normal operation	Order no.: **INDU**TEC® **MS** 0-D20.6 AUTO SPS VA
4	Valve unit for medium, spraying air and control air	Order no.: **INDU**TEC® **MS** VT5-3 24/110/230V
5	Spraying head connection kit for valve unit assembly	Order no.: **INDU**TEC® **MS** AP4
6	Precision coaxial spraying head	Order no.: **INDU**TEC® **MS** SD4

Automated filling systems

PLANNING EXAMPLES FOR AUTOMATED FILLING USING 3 PRESSURE VESSELS



PRODUCTS USED:

1	Material conveyance unit for use with 200-litre standard barrel	Order no.: **INDU**TEC® **MS** MFE
2	Oil distribution panel for connecting up to 3 pressure vessel units	Order no.: **INDU**TEC® **MS** ÖVP3
3	Custom-made 20 litre pressure vessel unit made from stainless steel for automated filling during normal operation	Order no.: **INDU**TEC® **MS** 0-D20.6 AUTO SPS VA

Astonishing, what a millilitre can do.

The **INDU**OIL® **HL** High Performance Oils.

INDUOIL® **HL**

Minimum Quantity Cooling Lubricating Mediums

Once a pioneer, now a market leader.

AN UNBEATABLE COMBINATION.

Because minimum quantity lubrication requires an intelligent dosage system just as much as it does pressure-absorbing high performance oils, we have been working on both areas for more than 20 years now. The result is the perfect combination: **INDU**TEC® **MS** systems and **INDU**OIL® **HL** High Performance Oils.

We have always set ourselves challenging goals:

- **minimal consumption:** how do we achieve the maximum result with the minimum of material input?
- **wide scope of application:** how can the widest range of materials be machined using minimum quantity lubrication?
- **reducing costs:** whow can costs for supply, preparation and disposal be reduced?
- **protection of the environment:** can minimum quantity lubrication using biodegradable raw materials become real?

RIGHT FROM THE START.

With **INDU**OIL® **HL** 42, we developed a product which fulfilled these requirements over 15 years ago. Today, with 13 different high performance oils, we offer mediums which can be implemented with practically any application in the metal working sector and in many other industries.

That's why our customers originate from a wide range of sectors:

- Metal working
- Machinery construction
- Foodstuffs industry
- Wood processing
- Plastic production
- Assembly
- Tooling
- Glass processing
- Tobacco industry
- Medicine technology
- Tyre manufacturing

Do you have any questions?

We look forward to inform you about our high performance oils and other sprayable mediums. Call us on

+49 (0) 7331 98 78-0

We will be glad to help.

High Performance Oils for almost any Application and Material in the Metal and Plastics Industry

Materials Application	general steels	Case hardening steels	Spring steels and hardened and tempered C steels	Q & T steels	Structural steels, balls, rolls, pins and panels	V2A+V4A stainless steel and steel such as X4 CrNi X 10 CrAl7	Aluminum alloys	Copper alloys	Plexiglas
Bending annealed pipes	22/42/80/95	–	–	–	–	22/40/42/95	22/42	22	–
Drilling	6/95	6/95	–	6/95	–	4/6	2/6/95	6/80	2/3
Turning[1]	6/40/95	6/40/95	–	6/40/95	–	4/6	2/6/40/95	2/6	
Sawing	4/40/42/80/95	40/42/80/95	40/42/80/95	40/42/80/95	–	40/42/80/95	2/40/42/80/95	80	2/3
Printing/flanging	4[3]/6/20[4]/40/55	–	–	–	–	6/40/42/55	2/4/6/40/95	2/6	–
Fine blanking	42/95	–	–	–	–	42/95	–	–	–
Flow forming	40/95	–	–	–	–	95	40/95		–
Milling[2]	6/80/95	6/80/95	–	6/80	–	6/80/95	2/6/20[4]/95	2/6	2/3
Threading (all kinds)	40/42/95	40/42/95	–	40/42/95	–	40/42/95	2/20[4]/6/95	2/6	–
Engraving	22/40	22/40	–	40	–	40/42/95	2/6	2/6	–
Channelling	80	–	–	6/80	–	–	–	–	–
Embossing / joining	22	–	–	–	–	–	2/40		–
Profiling	80	–	–	–	–	2/6	2/6	2/6	–
Reaming	40/80	40/80	–	40/80	–	–	–	–	–
Planing/ precision milling	6/40/95	6/40/95	–	6/40/95	–	6/80	2/6	2/6/80	–
Stamping	20[4]/42/95	–	40/42/95	–	42/95	42/95	2/20[4]/6/40	2/6	–
Deep drilling (internal cooling)	6	6	–	6		–	6	6	–
Deep drawing	40/55	–	–	–		–	22/40	–	–
Shaping	40/95	–	95	–	42/95	42/95	2/22/40/42	2/6/40	–

1 Depends on the infeed (chip removal)
2 Depends on the material to be machined, the corresponding tool and the infeed, amongst other things (chip removal) such as, for example, feed per rotation and speed
3 Can only be implemented following successful suitable on-site trials
4 During light-duty machining and application of a small amount of medium (ensure compliance with safety provisions)

INDUOIL® **HL** High Performance Oils Overview

Designation	Product Description	Material	Environment
INDUOIL® **HL 1**	Totally residue-free, self-ventilating, cutting, stamping and shaping fluid based on aliphatic hydrocarbons.	Non-ferrous metals (AL, CU) electric contact materials	AS 13 02 05 WGK 1
INDUOIL® **HL 2**	A low-viscosity, totally residue-free, self venting special lubricant based on aliphatic hydrocarbons.	Non-ferrous metals (AL, CU) electric contact materials	AS 13 02 06 WGK 1
INDUOIL® **HL 3**	Low-residue hydrocarbon mix formulated with synthetic lubricating enhancers.	Non-ferrous metals (Al), non-alloy and alloy steels (ST, V2A), Plexiglas, Makrolon, plastic, wooden materials, electric contact materials, heavy metals	AS 13 02 06 WGK 1
INDUOIL® **HL 4**	Low-residue stamping, cutting and shaping coolant with excellent lubricating properties.	Non-ferrous metals (Al), heavy metals, non-alloy/alloy steels (ST, V2A), electric contact materials	AS 13 02 06 WGK 1
INDUOIL® **HL 6**	Low-viscosity, almost residue-free self venting speciallubricant based on aliphatic hydrocarbons.	Non-ferrous metals (AL, CU) electric contact materials	AS 13 02 06 WGK1
INDUOIL® **HL 20**	High performance oil based on special fatty alcohols with outstanding adhesive and lubricating properties, suited to a wide range of applications.	Non-ferrous metals (Al, Cu), heavy metals, alloy steels (ST)	AS 13 02 07 Not water polluting
INDUOIL® **HL 22**	Special cutting and shaping oil based on pharmaceutical white oils with good adhesive and pressure absorbing characteristics.	Non-alloy, alloy and high-alloy steels, Non-ferrous metals (Al, Cu, Ti), alloys (MS), cast iron/grey iron	AS 13 02 05 WGK 1
INDUOIL® **HL 40**	Mid-viscosity, vegetable-based cutting and deep drawing oil.	Non-ferrous metals (Al, Cu), non-ferrous metals, alloy steels (up to STK60), electric contact materials	AS 13 02 07 WGK 1
INDUOIL® **HL 42**	High performance cutting, stamping and shaping oil based on food safe vegetable oils, with a highly effective combination of additives and outstanding wetting and lubricating properties.	Non-alloy and high-alloy steels (see HL 95), non-ferrous metals (Al), heavy metals	AS 13 02 07 WGK1
INDUOIL® **HL 45**	Special cutting oil, highly activated with active EP agents to enhance lubrication.	Non-ferrous metals (Al), heavy metals, non-alloy/alloy steels	AS 13 02 07 WGK2
INDUOIL® **HL 55**	Fine stamping, deep drawing and shaping medium based on food safe vegetable oils, with a highly effective combination of additives.	Non-ferrous metals (Al), non-alloy, alloy and high alloy steels (ST)	AS 13 02 07 WGK2
INDUOIL® **HL 80**	Totally universal high-viscosity stamping, cutting and shaping oil with maximum possible adhesion and good pressure absorbing characteristics, based on pharmaceutical white oils. Delivers the best results, even when used with materials with a high carbon content.	Non-ferrous metals (Al), non-alloy, alloy and high alloy steels, heavy metals	AS 13 02 05 WGK 1
INDUOIL® **HL 95**	High-viscosity universal stamping, cutting and shaping oil with above average adhesion.	Non-alloy and high-alloy steels (RST 37-3, ZSTE 52, C60, CK60, 42CrMo4 and X10 and CrNiMoTi), non-ferrous metals (Al)	AS 13 02 07 WGK1

The details provided here are based on our current level of knowledge but are not guarantees of product characteristics and form no basis for contractual legal relationships.

Application	Viscosity	Flash Point	Degreasing
During very light-duty non-machining operations such as stamping, shaping and bending and for chip-cutting machining operations such as turning, milling, drilling, etc. and for high-speed machining (HSC). Also used as a lubricant (e.g. when pressing in rubber eyes, metal bushes) and as a cleaner.	1,0mm²/s at 40°C	› 65°C	Evaporates to leave no residue.
Non-diluted by spraying, rolling, daubing, shaping or in the drop procedure. Not suitable for cyclic or mechanical lubrication!	1,4mm²/s at 40°C	› 56°C	Evaporates to leave no residue.
Turning, milling, copy-milling, thread cutting, sawing and drilling, but also high-speed cutting (HSC), stamping and shaping thinwalled electric contact materials. When machining Plexiglas, no stress cracks or adhesion arises, cutting edges remain clear.	1,5mm²/s at 40°C	› 56°C	Evaporates leaving virtually no residue when used as intended.
During light-duty non-machining (i.e. shaping) operations, such as stamping, bending, shaping, drawing, deep drawing, but also during chip-cutting machining such as milling, turning, drilling, sawing and tapping, and during internal cooling for MQL.	2,5mm²/s at 40°C	105°C	Evaporates leaving virtually no residue when used as intended.
During light- or medium-duty non-mechanical shaping such as stamping, shaping and bending, but also during chip-cutting machining such as turning, milling, drilling, etc. as well as for high-speed-cutting (HSC).	1,4mm²/s at 40°C	› 56°C	Evaporates leaving virtually no residue when used as intended.
During light-duty non-mechanical (i.e. shaping) operations, such as stamping, shaping and bending and for chip-cutting machining such as turning, milling, drilling, etc. and for highspeed cutting (HSC).	20mm²/s at 40°C	› 140°C	**INDU**OIL® **HL** 20 to 95: Minimum residue when used as intended. For further machining (painting, powder coating etc.), grease can be removed by means of spray, ultrasonic or immersion cleaning using efficient neutral or alkaline cleaners as well as most organic solvents.
Chip-cutting machining with defined cutting edge with all metals, thread shapes and rollers as well as internal cooling.	22mm²/s at 40°C	200°C	
During light-duty non-mechanical (i.e. shaping) operations, such as stamping, bending, shaping, drawing, roll forming, but also during chip-cutting machining such as milling, turning, drilling, sawing and tapping.	35mm²/s at 40°C	› 200°C	
During non-machining (i.e. shaping) operations such as stamping, bending, shaping, drawing, roll forming, but also during chipcuttingmachining such as milling, turning, drilling, sawing and tapping.	39mm²/s at 40°C	› 200°C	
Particularly suited to internal cooling and machining under high pressure because of slight foaming.	44mm²/s at 40°C		
Fine stamping, stamping, deep drawing and shaping.	50mm²/s at 40°C	› 200°C	
During non-machining (i.e. shaping) operations such as stamping, bending, shaping, drawing, roll forming, but also during chip-cutting machining such as milling, turning, drilling, sawing and tapping.	81mm²/s at 40°C	› 200°C	
During non-machining (i.e. shaping) operations such as stamping, bending, shaping, drawing, roll forming, but also during chip-cutting machining such as milling, turning, drilling, sawing and tapping, also best suited to flow forming.	100mm²/s at 40°C	› 200°C	

Depending on the usage profile, if in any doubt, practical tests will be required on site.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For all, who want even more.

The MENZEL Services.

Enhancing the Perfect.

EXPERIENCE IS WHAT MAKES THE DIFFERENCE

With a MENZEL **INDU**TEC® **MS** system, you are making a choice for state-of-the-art process-safe minimum quantity cooling and lubricating technology. You will benefit in economic terms and in terms of the environment as a result, even with the most challenging of manufacturing jobs.

In this respect, the most important factor for optimum productivity is, and always will be, experience. It is therefore worth consulting an experienced MENZEL applications engineer concerning the interplay between the medium and the system, especially if the processes involved are challenging. They will be by your side right from the start in the planning of your production system.

GUARANTEE HIGH PERFORMANCE

An **INDU**TEC® **MS** system requires no maintenance. Although your system had an optimal set-up from the start, even the best spraying technology can suffer under constant loads in the uncompromising everyday life of industry. Not to mention the possibility of incorrect operational routines which can creep in over time.

Get your **INDU**TEC® **MS** system checked and optimised on a regular basis. For the purposes of this, MENZEL has put together comprehensive service packages which guarantee the optimum performance of the system:

- Inspecting your system
- Carrying out fine technical adjustments to your system
- Training your employees

Service Packages

Keep your **INDU**TEC® **MS** MQL system right up to date::

- Inspection of the functions of the device and the spraying head
- Inspection of the pressure vessel for dirt and subsequent cleaning
- Inspection of the hoses to the spraying head and cleaning of the medium hose (Replacement of up to 2m hose length per spraying head)
- Inspection of the medium settings and optimisation of the settings
- On-site instructions concerning the function and the settings

We will gladly prepare you an individual offer for this service package and others. We will be glad to help if you have any further questions. Call us on

+49 (0) 7331 98 78-0

We look forward to your call.

One of many Challenges.

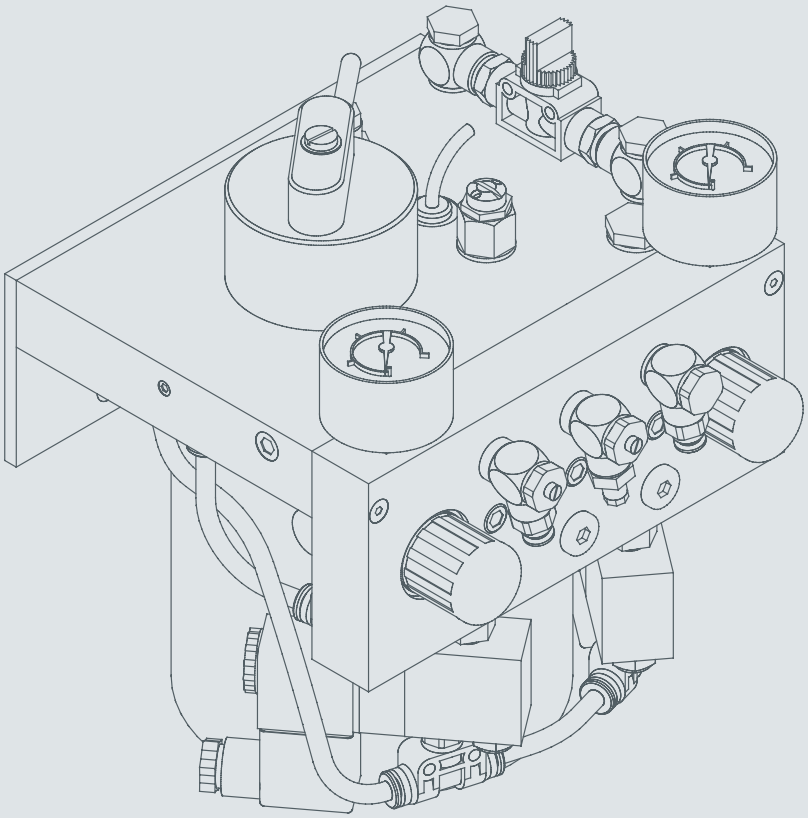
New Materials Little Space Long Distances Usage of Special Mediums Unreachable Chipping Points Spraying around the Corner Short-time Moistening without Residue mobile Systems Food Industry Purposes Controlling Flow Rates Uninteruptible Processing 24/7

WE KNOW ABOUT NEW FRONTIERS

In technology like the minimum quantity cooling and lubrication many cases lead to new frontiers. The demands regarding materials, production facilities and processes are mostly that specific, that only practical tests on site lead to an ideal solution.

Often new solutions are required for a variety of circumstances. The application engineers at MENZEL are specialists to find or even develop such solutions.

You can find an example right here: for a saw carrying along the pressure vessel on a mobile slide, a special compact systems was developed. Only one of many challenges, we look forward to face every day.



The answer to space problems: The extra small and compact version of a 1-Litre **INDU**TEC® **MS** Standard System built to customer's requirements

Date: May 2011. Subject to errors and technical changes in the interest of improving the system and its individual parts in conformity with its intended purpose. All drawings in this catalogue are drafts which may differ from the original parts.

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