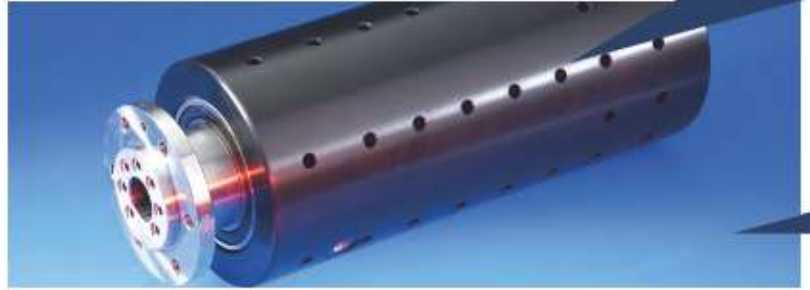


# Product Catalogue

Rotary Unions  
Slip Rings  
Precision Air Bearings  
Test Rig Technology



**GAT**®

**MOOG**



## Our Company

GAT – Gesellschaft für Antriebstechnik mbH headquartered in Geisenheim, Germany, is a leading international technology venture, engineering and producing tailored products for the most diverse industry applications in the fluid and sealing technology sectors as well as electrotechnical transmission technology for more than 30 years.

The company is the technology leader in the production of rotary unions, electrical slip rings, precision air bearings, test rig equipment as well as special equipment.

Our team of highly qualified engineers and product specialists offers competent expert advice responding to the requirements and needs of our customers, choosing from our wide range of products to find a standard or individual, custom-made solution.

We design, produce and distribute high-tech precision products used in machine and plant engineering as well as energy generation worldwide.

Our product specialists based in 18 sales offices around the world offer our customers competent technical advice, taking economic considerations into account on a professional level, thereby contributing to our customers' success.



## Our Competence

Being an innovative company meeting the challenge of the ever faster increasing requirements of modern technologies, GAT and their employees are constantly further developing their equipment and products.

Our rotary unions, slip rings and test rig technology reflect our broad technological know-how in conjunction with innovation and process optimization as well as our many years of experience in this business field.

GAT delivers complete systems from a single source and is the only manufacturer worldwide that designs, produces and distributes rotary unions, slip rings and test rig technology in-house. This guarantees optimal support for our customers, from conceptual to design phase and up until the end product.

All our customers benefit from certified quality and short delivery times. Our after sales service ensures support for our customers worldwide.

Customer satisfaction always comes first for us. We trust in long-term, reliable, confiding and fair cooperation.



## Our Quality

Repairs are as annoying as downtimes are costly. We at GAT take every effort to develop and manufacture products that yield a long service life and utmost reliability. GAT products are subject to long operating periods, extreme loads and demanding operating conditions. That is why all parts must be manufactured as accurately as possible.



During the initial product design only cutting-edge processes and high-quality materials are used. GAT products are developed with the help of powerful 3D CAD systems, and FEA serves for the simulation and optimization of critical parts. Machining to minimal tolerances and assembly take place in air-conditioned rooms and in compliance with strict cleanliness requirements.

Any tests during the manufacturing process are carried out with modern electronic testing devices. Each product is subject to a final quality check under customer-specific testing requirements, making sure that all functions work properly.

Finally, a quality management system in compliance with DIN ISO EN 9001 ensures a consistently high quality of all processes.

With our proprietary quality concept our customers can rest assured that components from GAT are the most durable and reliable parts of their equipment and offer high technology with a long service life.





## Our References

Our technically elaborated products are used wherever uncompromised reliability under the most adverse operating conditions is crucial. When it comes to ensuring system availability our products play a key role:

- In wind turbines, our hydraulic rotary unions and slip rings allow correct adjustment of blade pitch to wind direction, even under rough conditions.
- Thanks to the reliable supply of coolant to milling spindles, production runs smoothly even at high utilization rates.
- The production rates of rolling mills can be increased as the rotary union ensures a reliable supply of hydraulic fluid to the spindle - even at high speeds.
- Highway tunnels are driven through mountains in record-breaking time thanks to special rotary unions providing effective protection against abrasive rock dust.
- The continuously increasing demand for technically more complex machines in the packaging industry require a reliable, durable solution that has been realized by us with success.
- GAT slip rings allow ships to perform seismic ocean-floor scanning at unprecedented speeds.
- GAT is the product manufacturer of choice for the petroleum industry to further reduce downtimes.

Products from GAT are used in critical situations and in various production plants and machines.

## Our Industry Expertise

- Windturbines
- Automotive industry
- High-precise tooling machines
- Hot and cold rolling mills
- Tunnel-boring machines
- Construction machines
- Petroleum industry
- Semiconductor production
- Vessel winches
- Human centrifuges
- Filling machines
- Special machines
- Packaging machines
- Water turbines
- Solar cell manufacturing
- Separating centrifuges
- Theater stages
- Gear manufacturing
- Seismic Measuring systems
- Injection-molding machines
- Automotive painting lines
- Vacuum coating technology
- Robots
- Medical technology
- Crane manufacturing
- Security technology

## Rotary Unions

ROTOSTAT® E	02-05
ROTOSTAT® N	06-11
ROTODISK S	12-17
ROTODISK S-AK	18-19
ROTODISK S-HP	20-21
ROTODISK SW Cartridge	22-23
ROTODISK S Installation Set	24-25
ROTOPACK®	26-31
ROTOVAC®	32-33

## Slip Rings

ROTOFLUX® ESR	34-37
ROTOFLUX® ESW	38-39
ROTOCAP®	40-43
ROTORAY®	44-45

## Combinations

ROKOMBİ®	46-47
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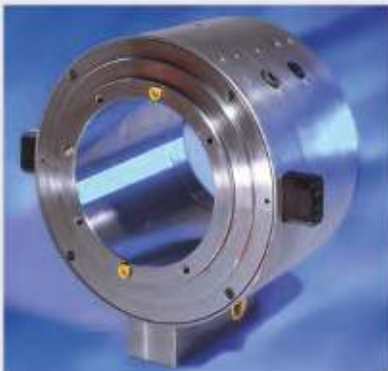
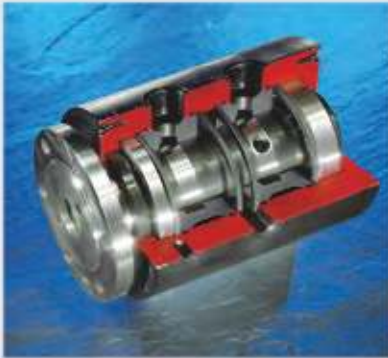
## Precision Air Bearings

ROSPRAY®	48-49
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## Various other Products

ROTOSTAT® A, ROTOCAL, ROTODOCK	50
ROTOGUIDE, GAT Test Rig Technology	51

# Rotary Unions Radial Gap Seal



## Product Features

- Hydrostatically regulated radial gap seal
- Pressures up to 600 bar
- Speeds up to 20,000 rpm
- Wear-free ceramic coating
- Extremely minimal leakage in primary sealing system
- For flow rates up to 300 l/min
- Low mechanical loss

## Design and Function

The ROTOSTAT® E series consists of wear-free hydrostatically regulated radial gap seal systems with self-centring sealing bushings. The patented sealing principle enables reliable operation under very high pressures and at high speeds. The critical load areas in the primary and secondary sealing sections are provided with resistant coatings and finished with the best possible surface quality in order to achieve the greatest possible level of reliability. The low level of leakage inherent in the system can be calculated in advance. Mechanical corrosion is prevented by the sealing bushing concept.

## Applications

ROTOSTAT® E products can be used anywhere where very high pressures of up to 600 bar and high speeds are required at the same time. Typical areas of application include the supply of oil or emulsion in chucks and collets in machine tools, rotor blade pitch control in wind turbines, hydromotor oil supply in decanter centrifuges and the ventilation of screw extruders.

## Versions

ROTOSTAT® E is available in a standard design with up to 4 channels as a complete unit. See table on the next page for detailed dimensions. Special Designs will be engineered according to customer-specific requirements with reference to channel diameters, flow rates and connections sizes. Pressures up to 600 bar, flow rates of 400 l/min per channel and shaft diameters up to 360 mm are possible. Also 2-channel designs with coaxial flange are available.

## Ordering Code ROTOSTAT® E Standard

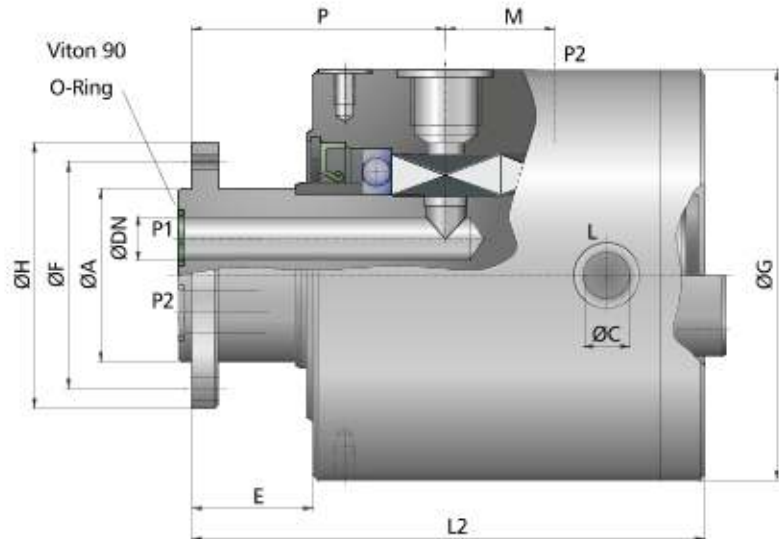
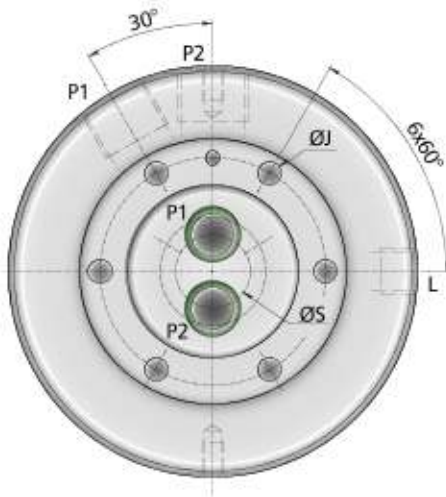
W	B	Y	F	G*
W = Shaft diameter	B = Media	Y=Channels	F=Shaft end	G=max. pressure for oil**
M15 E	X = Oil	1 = 1 Channel	0 = closed	A = 210 bar
M25 E	L = Air	2 = 2 Channels	1 = through type	B = 350 bar
M40 E	W = Water	3 = 3 Channels		
M60 E		4 = 4 Channels		
M80 E				

\* Replace W-B-Y-F-G with the required value. Order example: M25 EX2-0-210

\*\* Max. pressure for air and water on request

# ROTOSTAT® E Standard

## ROTOSTAT® E 15 - 80



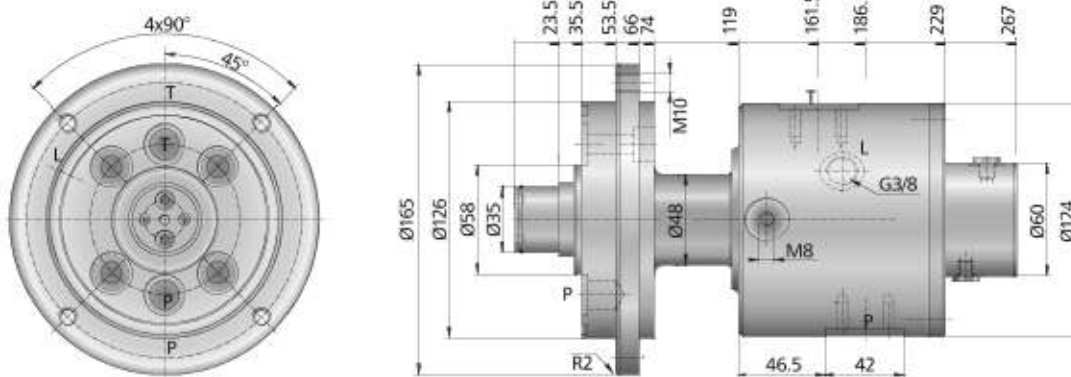
### Technical Data

ROTOSTAT® E Standard	M15 E	M25 E	M40 E	M60 E	M80 E
Shaft diameter	15	25	40	60	80
Max. pressure for oil - type A / B (bar)	210 / 350	210 / 350	210 / 350	210 / 350	210 / 350
Max. speed (rpm)	10,000	6,000	4,000	3,000	2,500
Speed upon request	15,000	10,000	8,000	6,000	5,000
Nominal width DN (mm)	4-6	6	10	16 - 18	20
Ø A j6 (mm)	18	30	45	65	80
P1 - P4 (")	G ¼	G ¼	G ¾ + G ½	G ¾	G1
Ø C (")	G ¼	G ¼	G ¾	G ¾	G ½
E (mm)	20	31	38	45,5	57
Ø F ± 0.1 (mm)	30	46	65	85	130
Ø G (mm)	82	88	124	154	178
Ø H (mm)	42	58	78	100	158
Ø J (mm)	5.5 (4x)	6.5 (6x)	6.5 (6x)	9 (6x)	14 (6x)
L 2-Channel (mm)	120	123	154	191	271
M (mm)	25	25	25	41	76
P (mm)	58.5	61.5	80.5	95.5	121
Ø S ± 0.1 (mm)	7.5	13 / 4-fold: 14.5	25	31 / 4-fold: 34	42
O-Ring (mm)	4 x 1.5 / 7 x 1.5	7 x 1.5	10 x 2	17 x 2	21 x 2

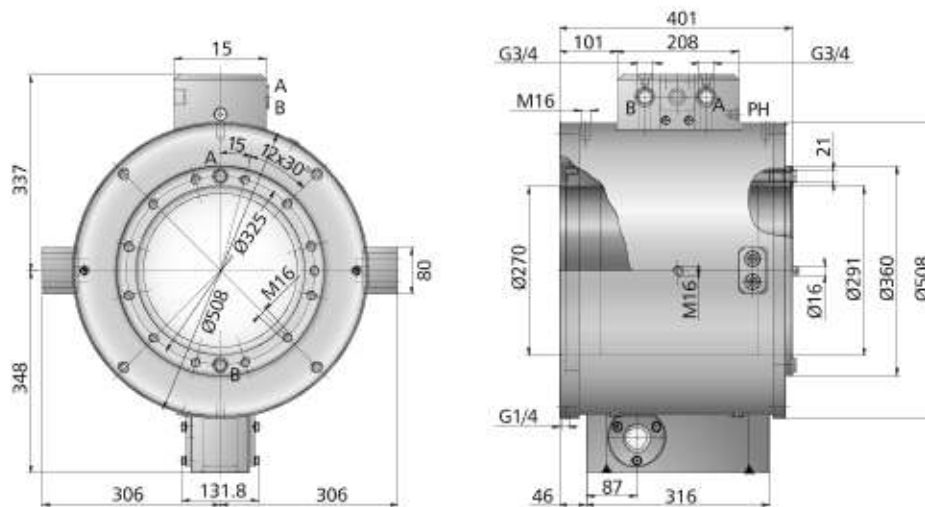
Even larger shaft diameters available on request.

# Special Designs

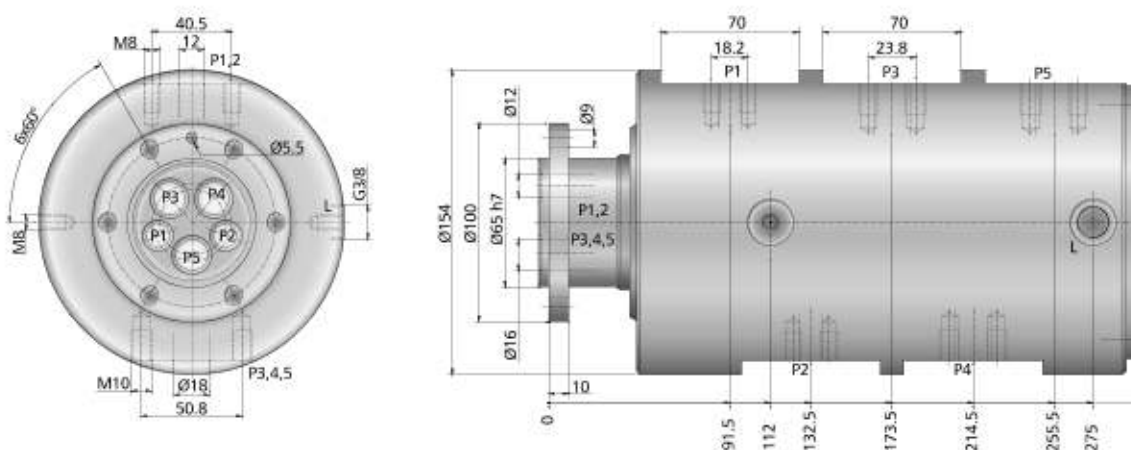
**ROTOSTAT® M40 EX2-S, Type 5736 – 3,500 rpm / Hydraulic Oil, 350 bar**



**ROTOSTAT® M360 EX2-1-S, Type 6530 – 1,120 rpm / Hydraulic Oil, 140 bar**

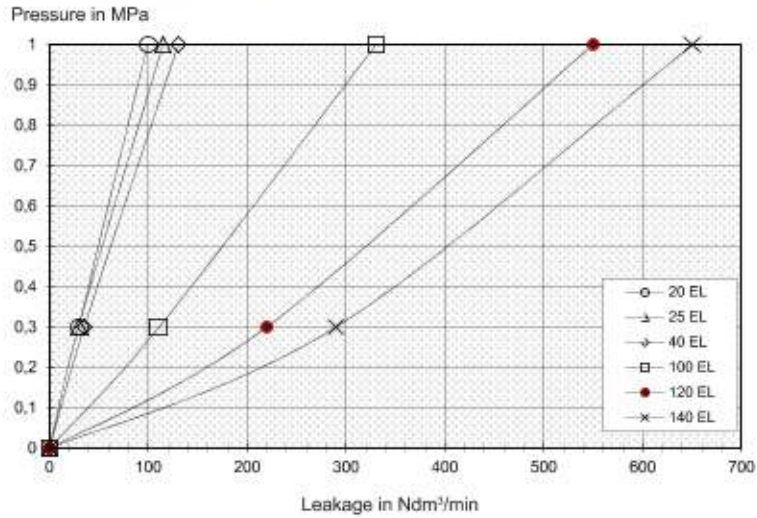


**ROTOSTAT® M60 EX5, Type 8161 – 3,000 rpm / Hydraulic Oil, 220 bar**

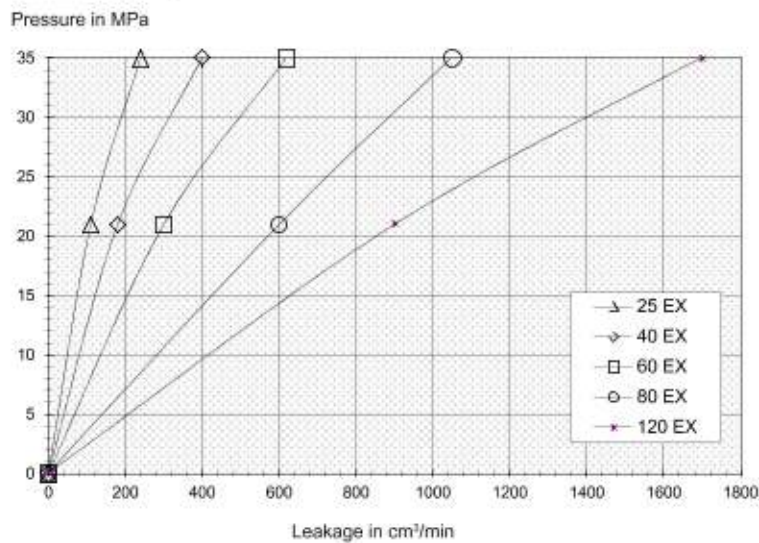




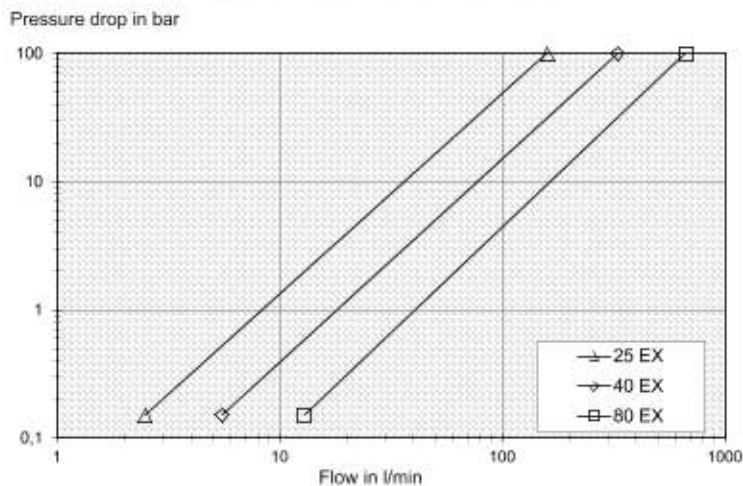
## Leakage ROTOSTAT® EL (Air) T = 20 °C



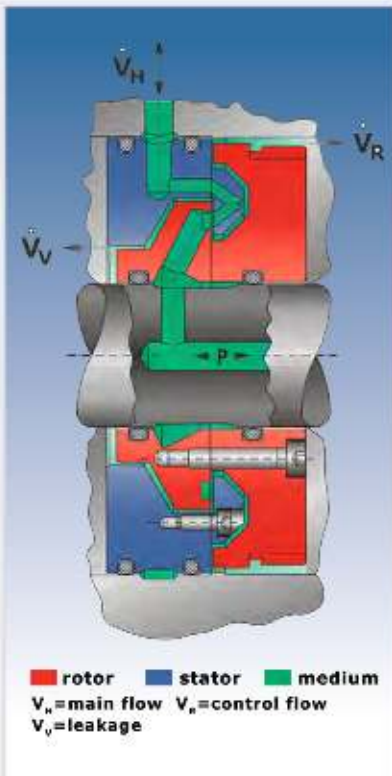
## Leakage ROTOSTAT® EX (Oil) at 46 cSt



## Pressure Drop ROTOSTAT® E Hydraulic Oil at 46 cSt



# Rotary Unions Axial Gap Seal



## Product Features

- Hydrostatically regulated gap seal
- Pressures up to 250 bar
- Speeds up to 20,000 rpm
- Flow rates up to 700 l/min
- Contact- and wear-free sealing system
- Dry-running sealing bushing
- For oil and aqueous liquids

## Design and Function

The ROTOSTAT® N series consists of contact-free hydrostatic gap seals. A patented inverse gap regulator ensures that the gap between stationary and rotating parts is maintained constantly at a few  $\mu\text{m}$  even under high pressures, so that the resultant leakage is very low. Friction losses are also kept at an extremely low level, thanks to this contact-free construction principle. Due to a construction designed to be ultra-resilient, the ROTOSTAT® N is insusceptible to temperature fluctuations, dirt and pressures surges. The cartridge construction ensures excellent dry-running characteristics and rapid reavailability in case of repairs. Oil and water-based liquids can be transferred using this element, also non-lubricating liquids in some applications.

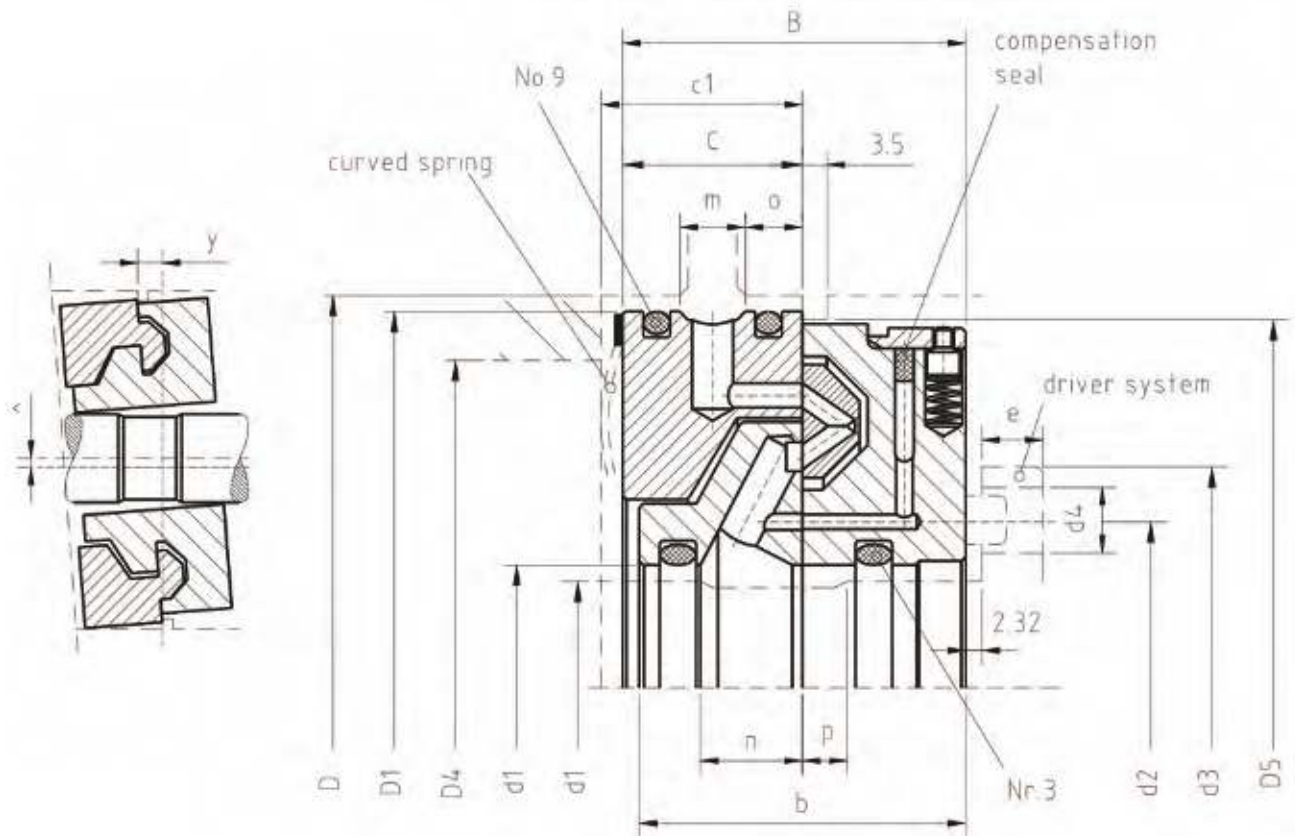
## Applications

The ROTOSTAT® N rotary unions can be used wherever there are simultaneous requirements for high pressures up to 250 bar and high speeds. Thanks to its resilience, ROTOSTAT® N is ideally suitable for rough applications such as pusher centrifuges, coilers in mills, propeller pitch control in ships and blade pitch control in water turbines.

## Versions

ROTOSTAT® N is available as a cartridge element for installation in customer constructions and as a complete rotary union with up to eight channels. The exact channel diameter and connection sizes are designed in accordance with the required flow rates.

## ROTOSTAT® N Installation Dimensions „Cartridge-Element“



Type	Ø D G6	Ø D <sub>1</sub> f6	Ø D <sub>2</sub>	Ø D <sub>3</sub> +0.1	Ø D <sub>5</sub>	Ø d f6	Ø d <sub>1</sub> G6	B	b	c	m	n	o	p	Weight	I*
30 N	92.0	91.9	88.0	90.0	90.0	30.0	30.1	42.0	40.0	22.0	8.0	12.5	7.0	5.5	1.55	0.004
80 N	150.0	149.9	146.0	148.0	147.0	80.0	80.1	47.0	48.0	23.0	9.0	12.1	7.0	7.0	3.89	0.029
140 N	220.0	219.9	217.8	218.5	218.5	140.0	140.1	58.0	59.0	29.0	11.0	11.0	9.0	13.2	8.9	0.165
200 N	310.0	309.9	299.0	300.0	305.0	200.0	200.1	72.0	73.0	34.0	10.0	7.0	12.0	18.5	18.2	0.380
Unit	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg	kg/m <sup>2</sup>

Type	Installation with Curved Spring				Seal Set		Driver System					
	x	y	Curved Spring NX Order-no.	Curved Spring NW Order-no.	c <sub>1</sub>	Ø D <sub>4</sub> max.	2 parts each no. 3+no. 9	Part.- no.	d 2	d 3	d 4	e
30 N	0.2	0.04	415.900.020	415.900.007	24.4	80.0	400.000.026	M-30	43.0	58.0	8.0	10.0
80 N	0.2	0.06	415.900.026	415.900.027	25.2	136.0	400.000.027	M-80	9.0	12.1	7.0	7.0
140 N	0.2	0.08	415.900.003	415.900.029	31.0	196.0	400.000.028	M-140	11.0	11.0	9.0	13.2
200 N	0.2	0.09	415.900.004	415.900.030	36.5	275.0	400.000.029	M-200	10.0	7.0	12.0	18.5
Unit	mm	mm			mm	mm			mm	mm	mm	mm

\* I = Moment of inertia

# Rotary Unions

## Mechanical and Hydraulic Properties „Cartridge-Element“

Model		NX				NW			
Application		for oil				for emulsions			
Type		30 NX	80 NX	140 NX	200 NX	30 NW	80 NW	140 NW	200 NW
Pressure 1) in bar	min	5	5	5	5	5	5	5	5
	nom.	160	160	160	160	125	125	125	125
	max.	200	250	250	200	150	150	150	150
Speed 2) in rpm	nom.	6,000	3,500	2,500	1,850	6,000	3,500	2,500	1,850
	max.	20,000	8,000	4,000	3,000	15,000	10,000	5,000	3,000
Temperature 3) in °C	nom.	80	80	80	80	80	80	80	80
	max.	280	280	280	280	280	280	280	280
Viscose frictional torque 4)		0.9	3.5	6.5	16.0	0.1	0.3	0.6	1.3

1) The maximum pressure can only be exceeded briefly; it is essential to contact the manufacturer if this occurs!

2) If the nominal speed is exceeded, it is essential to contact the manufacturer.

3) If the nominal temperature is exceeded, special seals are required; please contact the manufacturer!

4) The figures apply to oil with a viscosity of 20 cm<sup>2</sup>/s and water or emulsions with a viscosity of 1 cm<sup>2</sup>/s in Nm.

Flow Rate									Type	Leakage Rates								
The flow rate in the ROTOSTAT® N is dependent on the viscosity of the medium and the pressure drop.										With oils and high viscosity media, the leakage values are dependent on the pressure, viscosity and speed. With emulsions and low viscosity liquids, they depend only on the pressure and speed.								
Flow Rate in l/min										Leakage in l/min								
at pressure drop Δp in bar										Speed in rpm								
1	2	3	4	5	6	7	8	<b>NX</b>		0		1,500		3,000				
45	65	80	95	100	110	120	130	<b>30</b>	0.1	0.1	0.2	0.1	0.2	0.3	0.2	0.4	0.5	
80	110	135	155	175	190	210	220	<b>80</b>	0.2	0.4	0.6	0.4	0.8	1.2	0.6	1.1	1.7	
105	150	180	210	235	260	280	300	<b>140</b>	0.4	0.8	1.3	0.8	1.6	2.7	1.1	2.2	3.4	
230	310	400	430	500	560	600	640	<b>200</b>	0.9	1.7	2.6	1.5	2.8	4.5				
Pressure Δp in bar									50	100	150	50	100	150	50	100	150	
For emulsions (viscosities of 1-2 cm <sup>2</sup> /s) the flow rate is approx. 15 % higher than in the table above.									<b>NW</b>	For emulsions and low viscosity liquids, the leakage values are 12-15 times higher than the values in the column for speed 0.								
All figures have been determined in trials and are to be regarded as guidelines for oil with a viscosity of von 20 cm <sup>2</sup> /s. Deviations are therefore possible.																		
ROTOSTATE® for use with aggressive media can be supplied. Please contact us for further details.																		

## Installation Dimensions („Multiple“ Version)

These multiple rotary unions are composed of single standardized elements which can be used as a complete unit:

- for installation on a continuous shaft
- or as final unit with a flange-on shaft

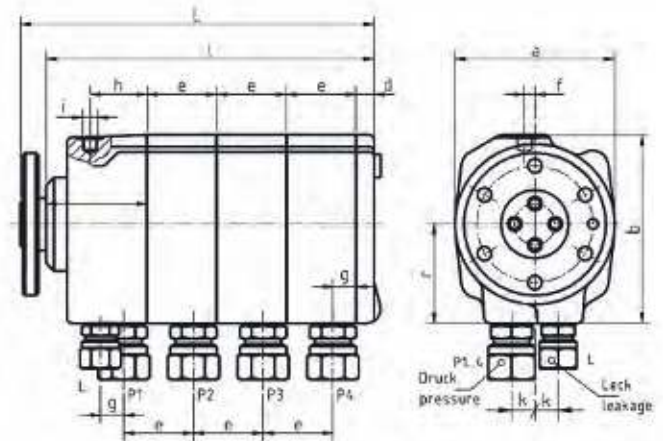
Single and multiple way rotary unions can be mounted by fitting individual elements together (the number depends on the shaft diameter!).

The oil liquid is discharged via the housing part.

Please note:

The individual versions may vary optically!

Screw fittings are not included!

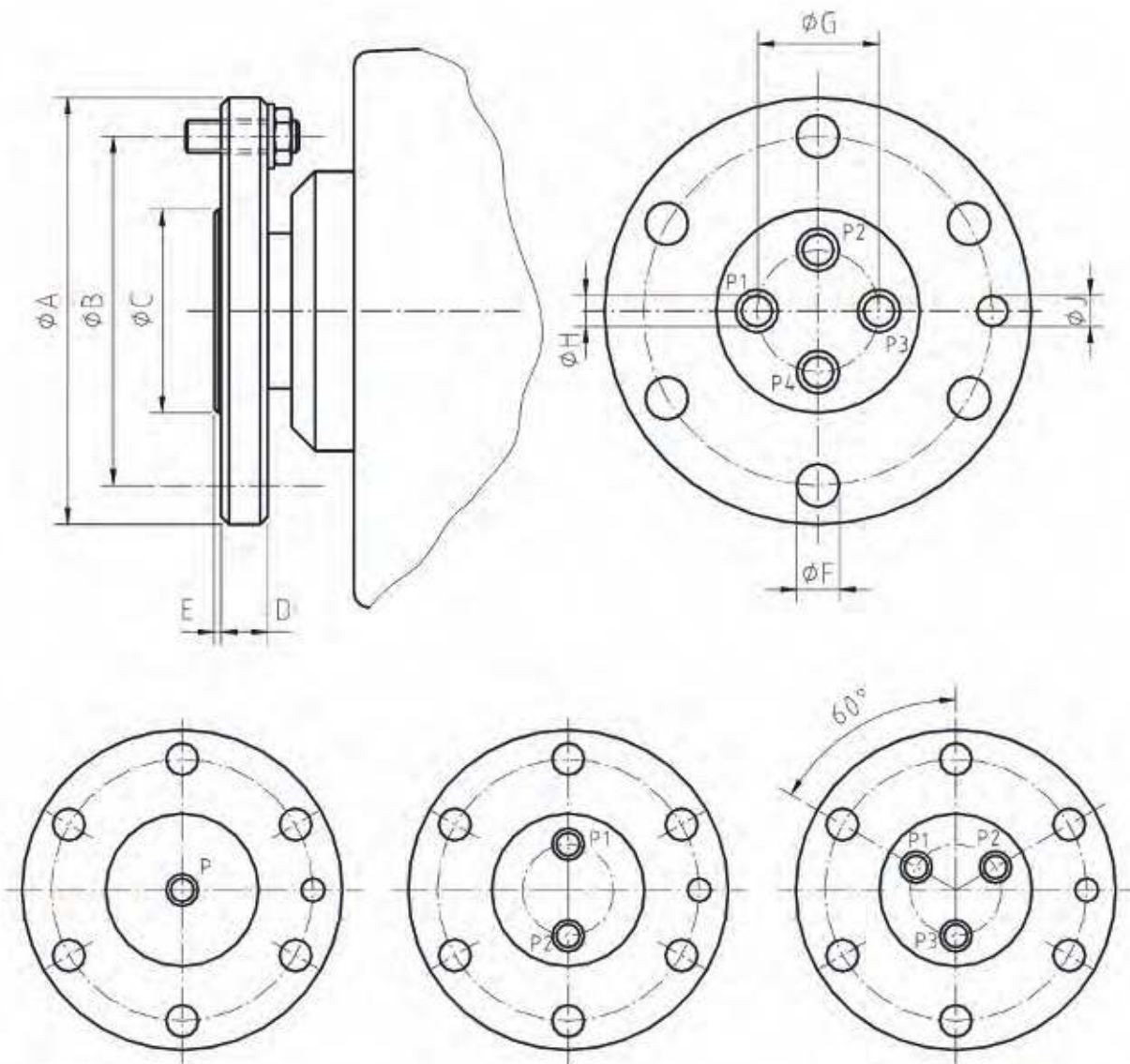


Dimensions												
Type	a	b	c	d	e	f	g	h	g	r	l	L
M30 NX 1	123.0	145.5	78.0	14.0	54.0	8.0	18.0	43.0	18.0	76.5	97.0	117.0
M30 NX 1	123.0	145.5	78.0	14.0	54.0	8.0	18.0	43.0	18.0	76.5	151.0	171.0
M30 NX 1	123.0	145.5	78.0	14.0	54.0	8.0	18.0	43.0	18.0	76.5	205.0	225.0
M80 NX 1	195.0	215.0	105.0	27.0	61.0	22.0	22.0	45.0	22.0	115.5	131.0	164.0
M80 NX 2	195.0	215.0	105.0	27.0	61.0	22.0	22.0	45.0	22.0	115.5	192.0	225.0
M80 NX 3	195.0	215.0	105.0	27.0	61.0	22.0	22.0	45.0	22.0	115.5	253.0	286.0
M80 NX 4	195.0	215.0	105.0	27.0	61.0	22.0	22.0	45.0	22.0	115.5	314.0	347.0
M140 NX 1	280.0	297.0	125.0	31.0	76.0	22.0	24.0	85.0	22/25	150.0	162.0	214.0
M140 NX 2	280.0	297.0	125.0	31.0	76.0	22.0	24.0	85.0	22/25	150.0	238.0	290.0
M140 NX 3	280.0	297.0	125.0	31.0	76.0	22.0	24.0	85.0	22/25	150.0	314.0	366.0
M140 NX 4	280.0	297.0	125.0	31.0	76.0	22.0	24.0	85.0	22/25	150.0	390.0	442.0
M200 NX 1	380.0	408.5	70.0	37.0	89.0	**	**	**	**	205.0	198.0	245.0
M200 NX 2	380.0	408.5	70.0	37.0	89.0	**	**	**	**	205.0	278.0	334.0
M200 NX 3	380.0	408.5	70.0	37.0	89.0	**	**	**	**	205.0	376.0	423.0
M200 NX 4	380.0	408.5	70.0	37.0	89.0	**	**	**	**	205.0	465.0	512.0
Unit	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm
Technical Characteristics				Pressure Connection			Leakage Connection		Thread I			
Type	Oilflow/path	Pres- sure*	Speed*	Thread	Fitting	Thread	Fitting	/ (depth)				
M30 NX 1-3	40 / 45	160	3,500	R 3/4"	GE - 20 - PSR - ed	R 1/2"	GE - 18 - PLR - ed	M 12 / 10				
M80 NX 1-4	70 / 80	200	2,800	R 1"	GE - 25 - PSR - ed	R 3/4"	GE - 22 - PLR - ed	M 12 / 18				
M140 NX 1-4	100 / 110	200	2,000	R 1 1/4"	GE - 30 - PSR - ed	R 3/4"	GE - 22 - PLR - ed	M 16 / 16				
M200 NX 1-4	200 / 230	200	1,500	R 1 1/4"	GE - 30 - PSR - ed	R 1"	GE - 28 - PLR - ed	**				
Unit	l/min, Δp = 1 bar	bar	rpm	"	"	"	"	mm				

\*Max. values \*\*Request dimension if required (SAE-flange)

# Rotary Unions

## Flange Dimensions (Proposal)



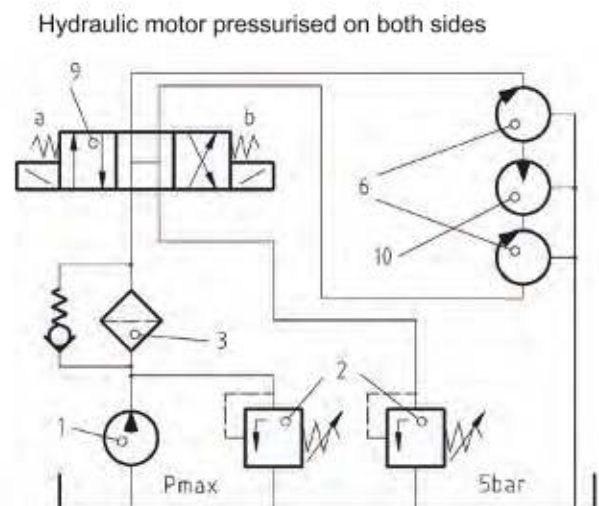
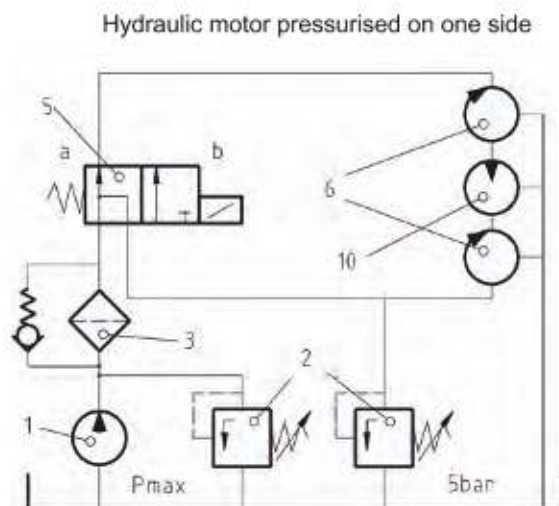
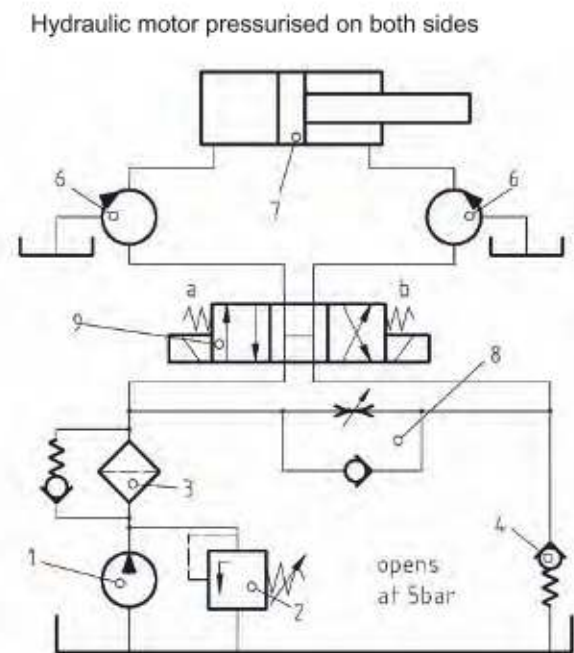
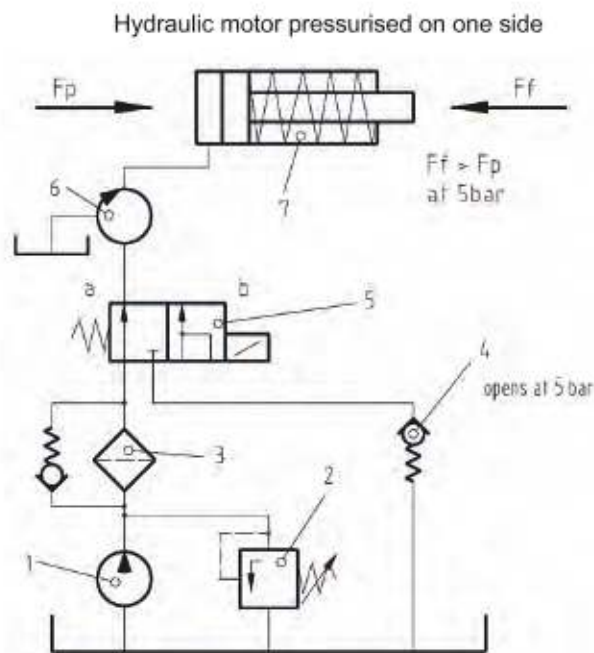
Type	$\varnothing A$	$\varnothing B$ $\pm 0.1$	$\varnothing C$ $j 6$	D	E -0.05	$\varnothing F$	$\varnothing G$	$\varnothing H$	$E_{h1}$ -0.05	$\varnothing C_{x H7}$	$\varnothing J$	Stud bold DIN 938	O-Ring
30 NX	110.0	90.0	35.0	10.0	1.8	11.0	14.0	9.5	1.8	35.0	6.0	M 10 x 25	10 x 1.5
80 NX	160.0	130.0	80.0	15.0	3.0	14.0	42.0	20.0	3.0	80.0	10.5	M 12 x 30	21 x 2.0
140 NX	220.0	190.0	140.0	18.0	3.8	16.0	70.0	22.0	3.8	140.0	12.5	M 14 x 35	23 x 2.0
200 NX	320.0	280.0	200.0	20.0	4.8	18.0	100.0	30.0	4.8	200.0	-	M 16 x 35	31 x 3.0
Unit	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm

Version M30 NX3 and NX4:  $\varnothing H=8$  mm and O-ring 8x1.5 mm; Version M30 NX3:  $\varnothing G=16$  mm

Detailed flange dimensions are according to the relevant GAT drawing.

## Hydraulic Circuit Diagrams

Under rotation the ROTOSTAT® N should always operate with a minimum pressure (5 bar lubrication pressure), in order to preserve the hydrostatic control. Special hydraulic circuits are required for this purpose.



1. Hydraulic pump
2. Pressure limiting valve
3. Oil filter with bypass
4. Pre-tensioning valve

5. 3/2-way-ventil
6. ROTOSTAT®
7. Hydraulic cylinder

8. 2-way-flow-control-valve
9. 4/3-way-ventil
10. Hydro motor

# Rotary Unions    Axial Mechanical Seal



## Product Features

- For pressures up to 140 bar at 42,000 rpm
- Hydrostatically released axial contact seals
- Ultra-hard seal rings made from silicon carbide
- No coolant leakage after media flow is stopped
- Robust precision steel housing
- Safe for dry operation

## Design and Function

The ROTODISK S series consists of single channel, axial rotary unions with hydrostatically released ceramic contact seals and an automatic alignment compensation system, which ensures that the contact seals always have full surface contact. The hydrostatic release ensures that the friction moment is low, which also means that wear is minimal even under high pressure. As a result, ROTODISK S can be operated at pressures of 140 bar and at high speeds simultaneously. The Micro-Gap System guarantees leakage-free stoppage of the emulsion flow, as well as safe dry operation. Very long service lives are achieved through the use of extremely durable contact seals made from silicon carbide. Spindle or hybrid ball bearings are built into the precision steel housing and ensure robust, smooth suspension.

## Applications

ROTODISK S is mainly used for internal coolant supply in machine tool spindles, transferring the following media: emulsion, oil, water, air or oil-air mixture. In terms of the high service life requirements of today's demanding performance data, ROTODISK S is more than capable of meeting these requirements, thanks to many years of application. Our products are constantly under further development, in order to maintain a long service life with ever-increasing operating pressures and speeds.

## Versions

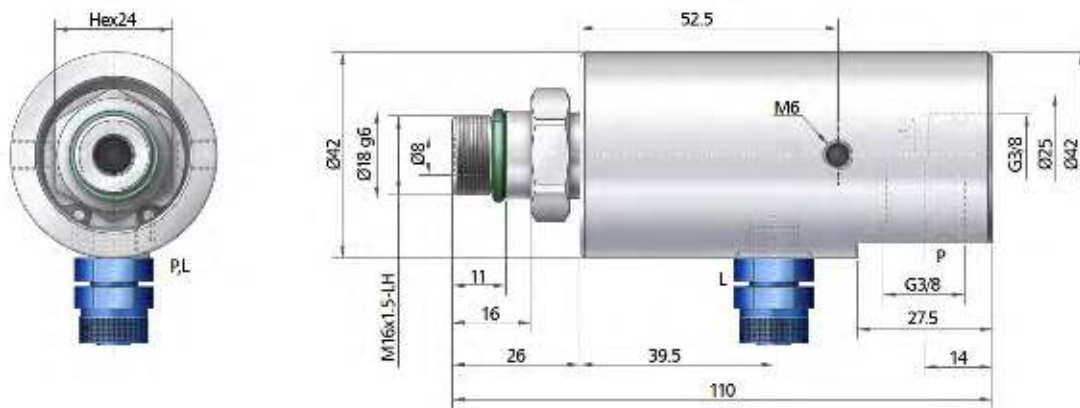
For high speeds, we recommend flexible, vibration-reducing mounting. For low to average speeds, fixed mounting is a simple, proven solution. Using contact seals made from carbon graphite, ROTODISK S can also be used for non-lubricating media. A wide variety of versions is available.

## Technical Data

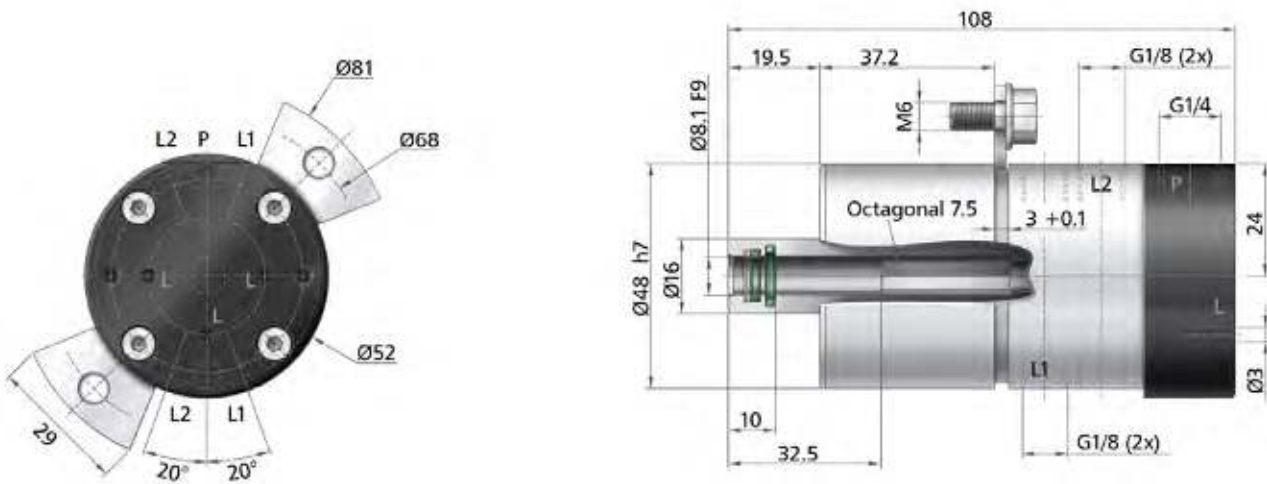
Media	Emulsion	Water	Oil	Air	Oil-air-mix
Pressure (bar)	140	140	140	10	10
Max. speed (rpm)	42,000	42,000	42,000	25,000	42,000
Flow rate (l/min)	60	60	50	3,000	1,000



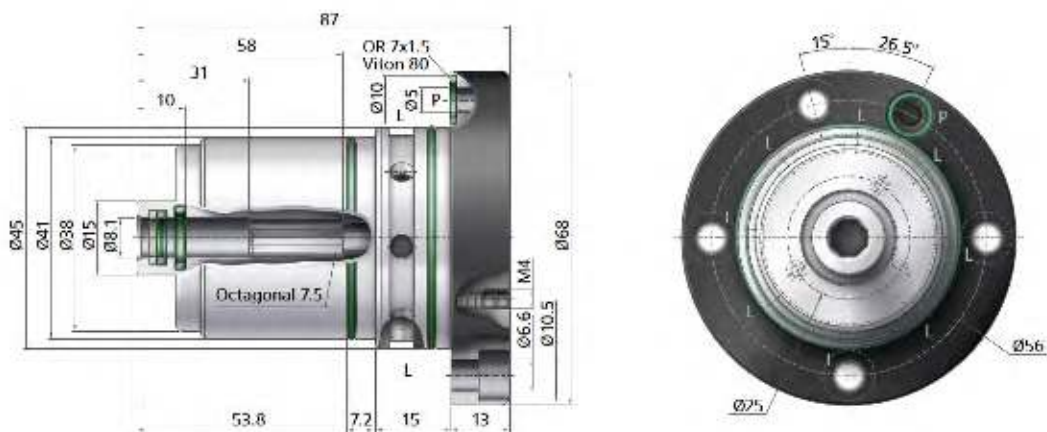
## ROTODISK S0-P, Type 11080 – 20,000 rpm / Emulsion, 80 bar / Air, 6 bar



## ROTODISK S0-HY, Type 11208 – 25,000 rpm / Coolant, 80 bar

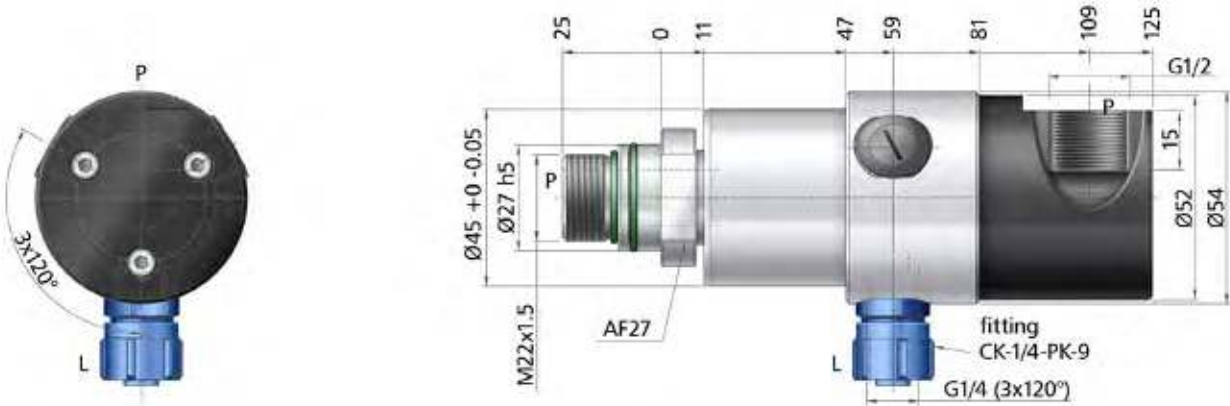


## ROTODISK S0, Type 11322 – 28,000 rpm / Coolant, 120 bar / MQL, 10 bar

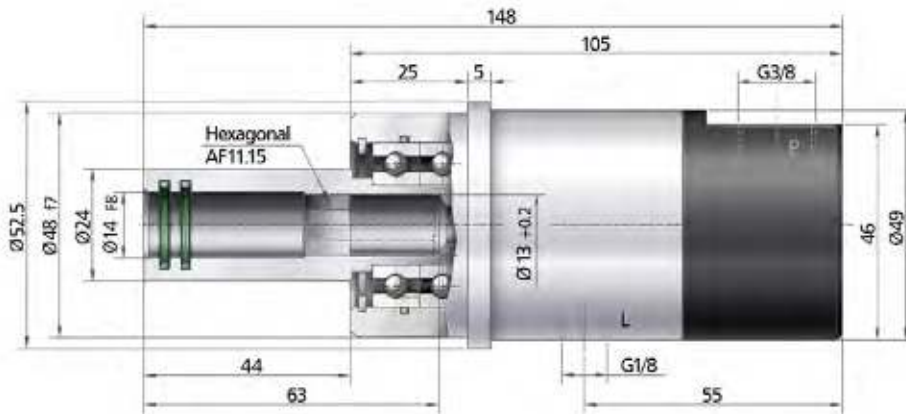


# Rotary Unions

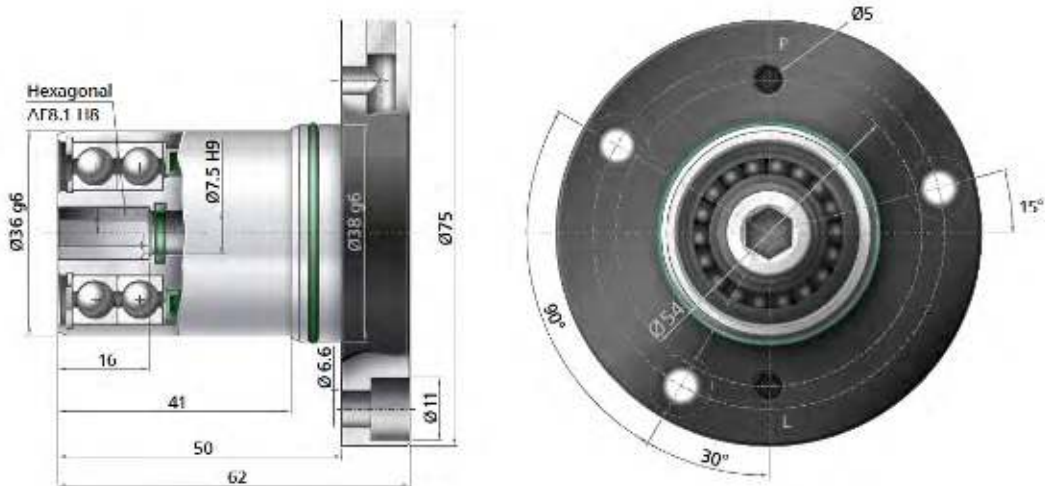
ROTODISK S1, Type 11805 – 10,000 rpm / Coolant, 30 bar / MQL, 10 bar / Air, 10bar



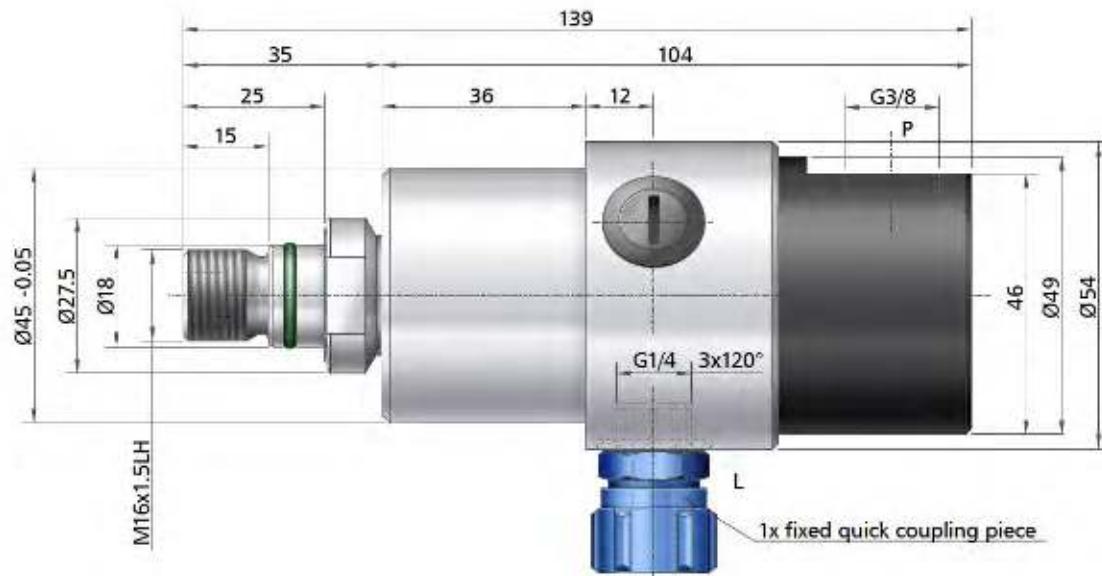
ROTODISK S1, Type 10581 – 25,000 rpm / Coolant, 80 bar / MQL, 10 bar / Oil-Air, 10 bar



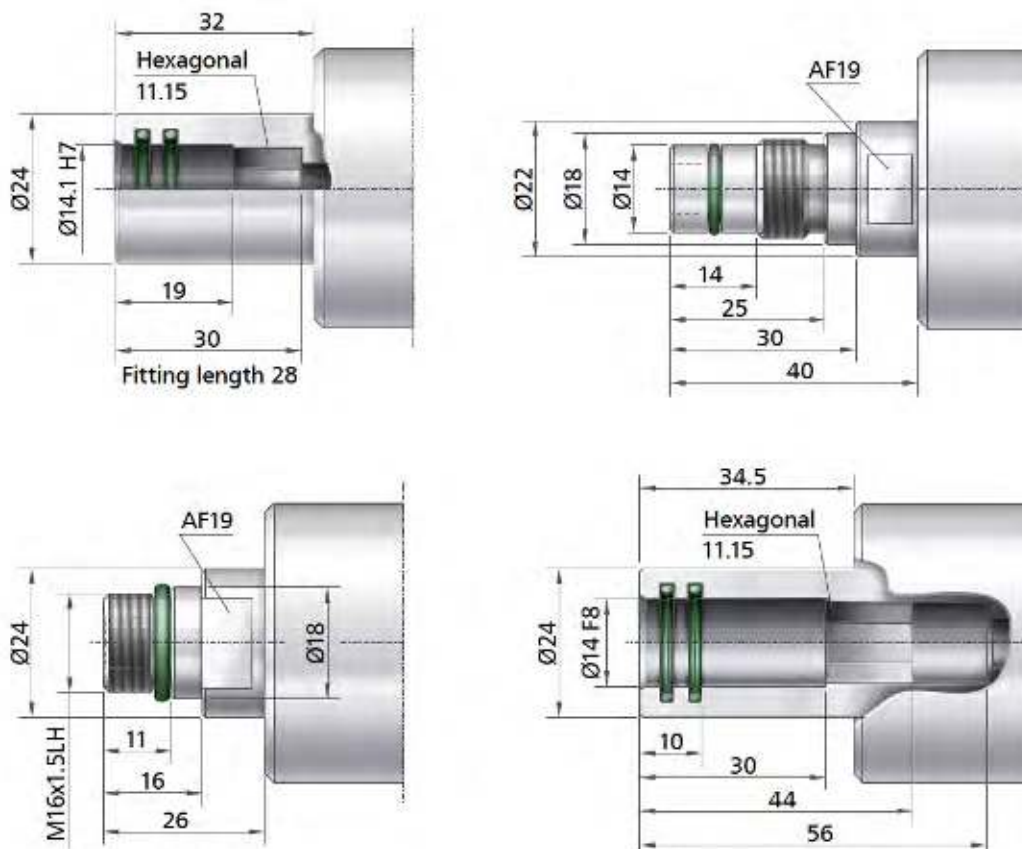
ROTODISK S1, Type 5259 – 8,000 rpm / Coolant, 80 bar / MQL, 10 bar / Air, 10 bar



## ROTODISK S1, Type 6437 – 20,000 rpm / Coolant, 70 bar

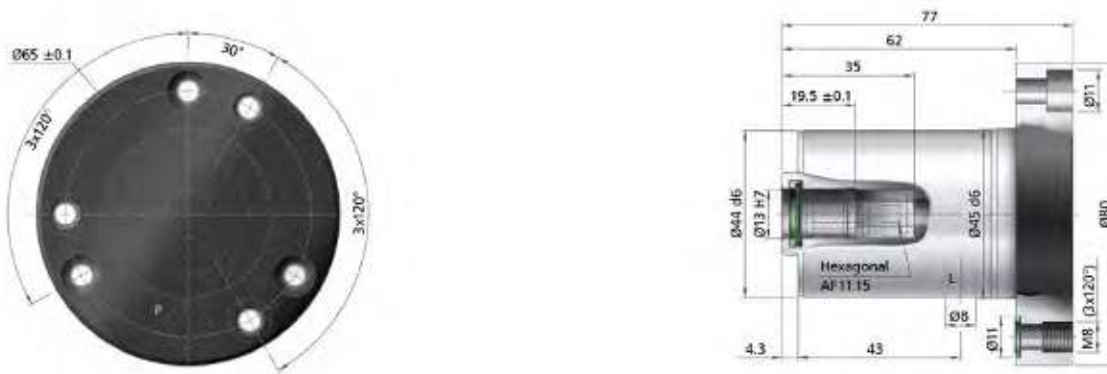


## ROTODISK S1, Type 6437 Connection Variants

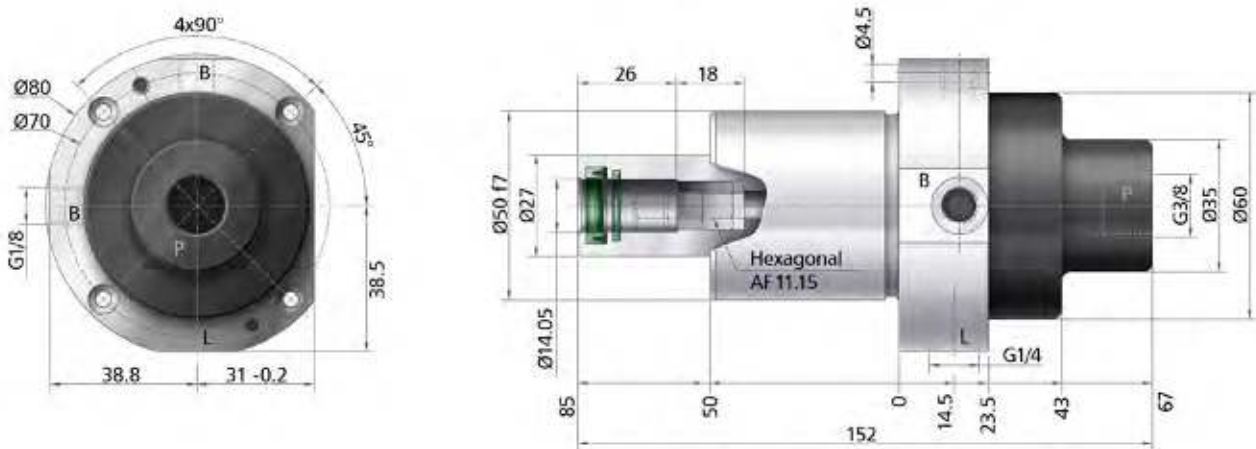


# Rotary Unions

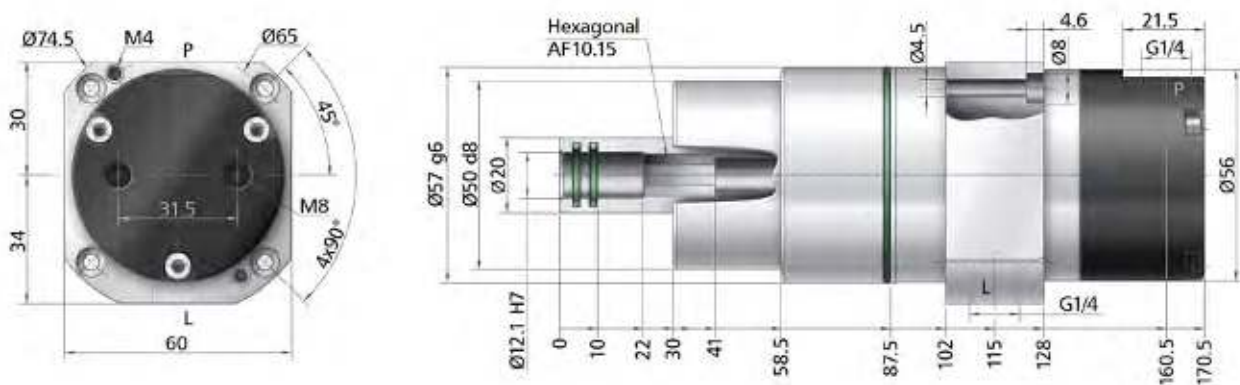
ROTODISK S2-S, Type 10573 – 10,000 rpm / Emulsion, 70 bar / Air, 10 bar



ROTODISK S2-S, Type 8758 – 30,000 rpm / Coolant, 70 bar / MQL, 10 bar

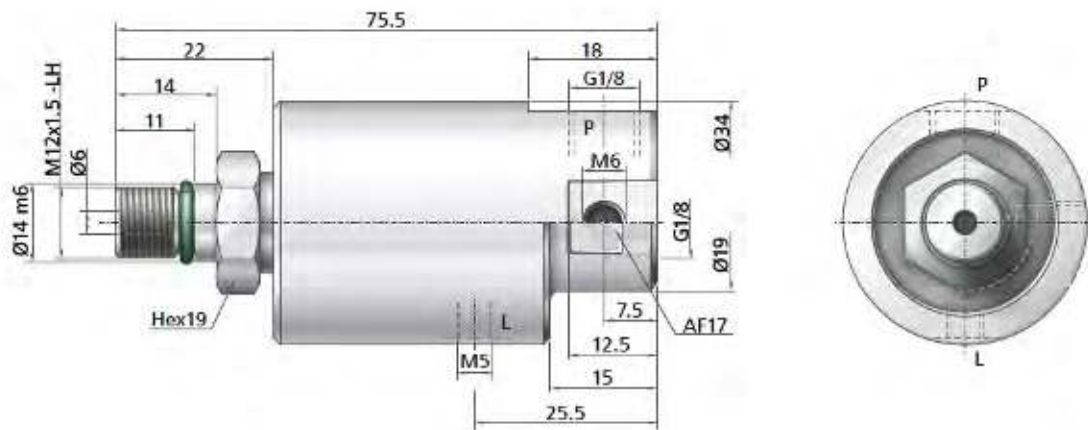


ROTODISK S2-S, Type 8500 – 24,000 rpm / Coolant, 70 bar

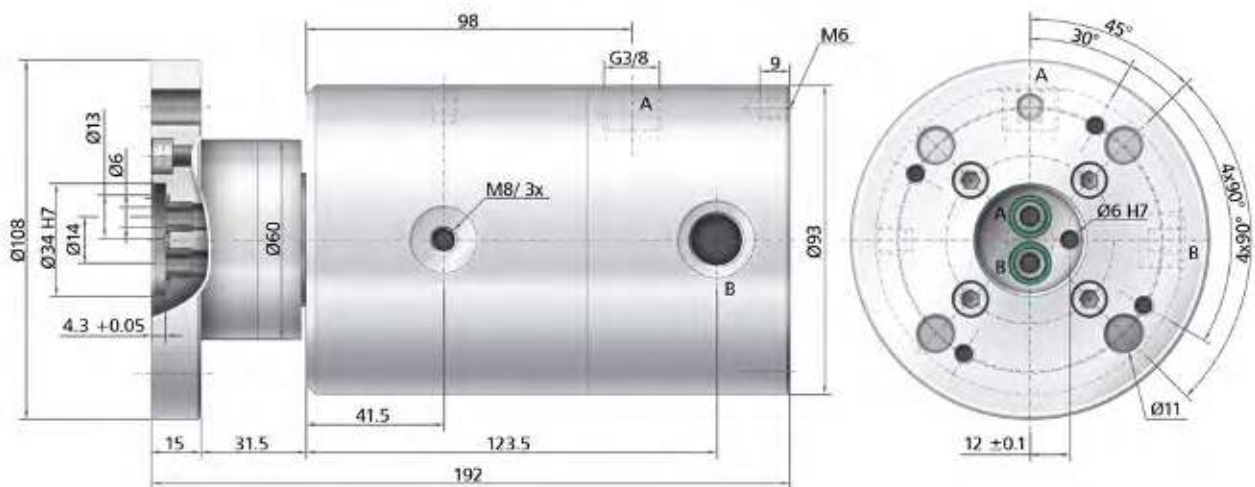


## ROTODISK S00, Type 7970

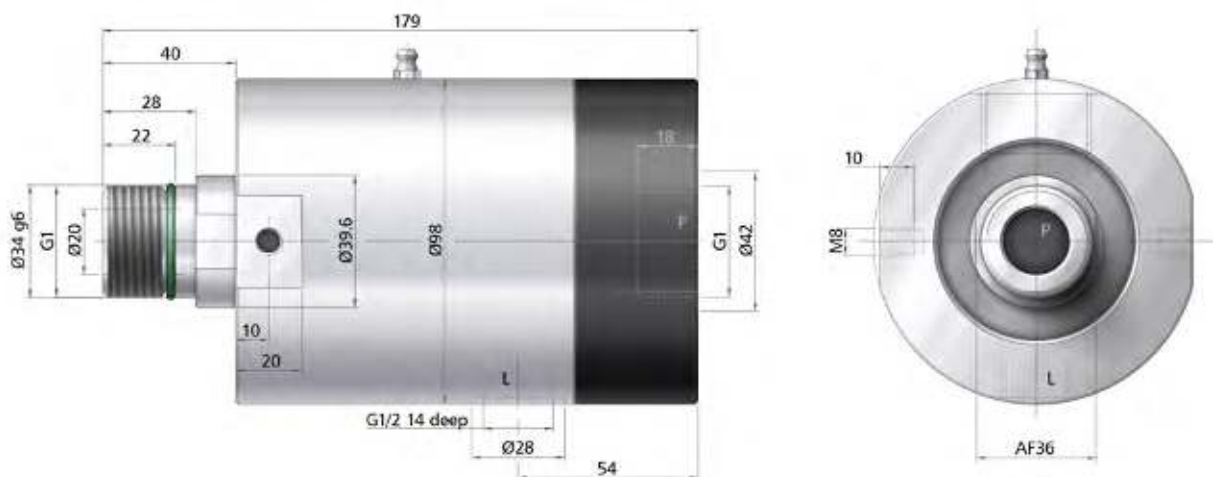
– 15,000 rpm / Grease, 80 bar / Coolant, 70 bar / Air, 10 bar / Vacuum, 980 mbar



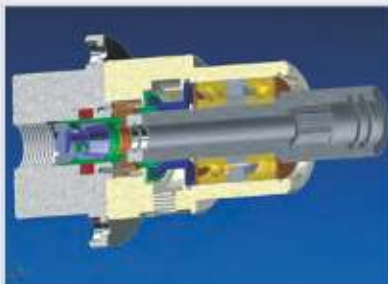
## ROTODISK D10, Type 8053 – 800 rpm / Grease, 250 bar



## ROTODISK S10, Type 11442 – 200 rpm / Water, 200 bar



# Rotary Unions Axial Mechanical Seal



## Product Features

- Switchable between emulsion, air or oil-air mixture
- Speed of 42,000 rpm with an air pressure of 20 bar possible
- Mechanical mounted silicon carbide face seals
- Precision spindle or hybrid ball bearings
- Extremely robust triple bearing system
- Safe leakage drain through dual chamber system
- Dry running safe

## Design and Function

We have developed a rotating union, based on our successful ROTODISK technology, which can optimally meet the various requirements imposed by the supply of the three mediums, emulsion, oil-air mixture, and dry air. When supplying emulsion, ceramic face seals are in use, which guarantee quasi leakage-free supply. When transporting the oil-air mixture, a whirl-free supply channel provides for the demixing-free transport of the sensitive mixture. An integrated pneumatic mechanism guarantees wear-free operation when working with dry air. Switching between the various media is achieved by an integrated valve control system. The applied rotation rates in practical operation reach up to 42,000 rpm.

## Applications

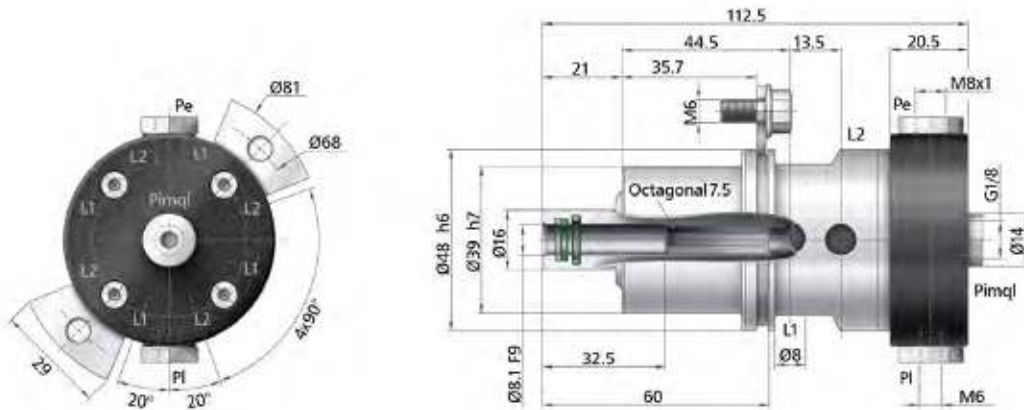
In the case of modern tooling machines, in addition to the conventional cooling methods with emulsion, alternative coolants are being used more and more. The more cost effective and ecological oil-air mixture, used for dry machining, is one of the alternative coolants, as is dry air for cooling the tool during micro machining. The combination of these three types of operation in one rotary union insures a maximum of flexibility for our customers when choosing the required coolant.

## Technical Data

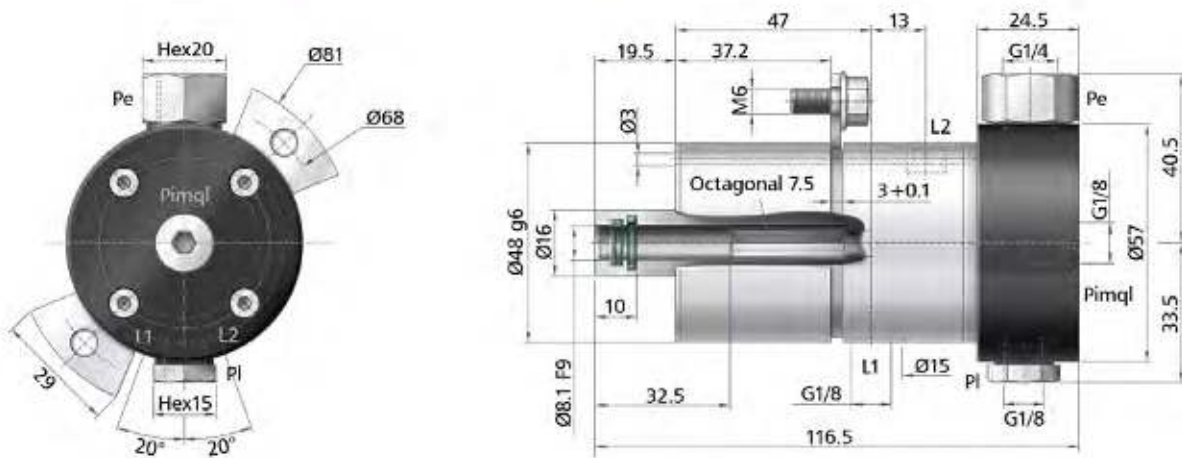
Type	S0-AK-10582	S1-AK-9395	S2-AK-10023
Operating speed max. (rpm)	42,000	35,000	30,000
Emulsion pressure max. (bar)	80	80	70
Air pressure max. (bar)	20	20	10
Flow rate max. (l/min)	40	50	50
Nominal diameter (mm)	4.5	6.5	6.5

# ROTODISK S-AK

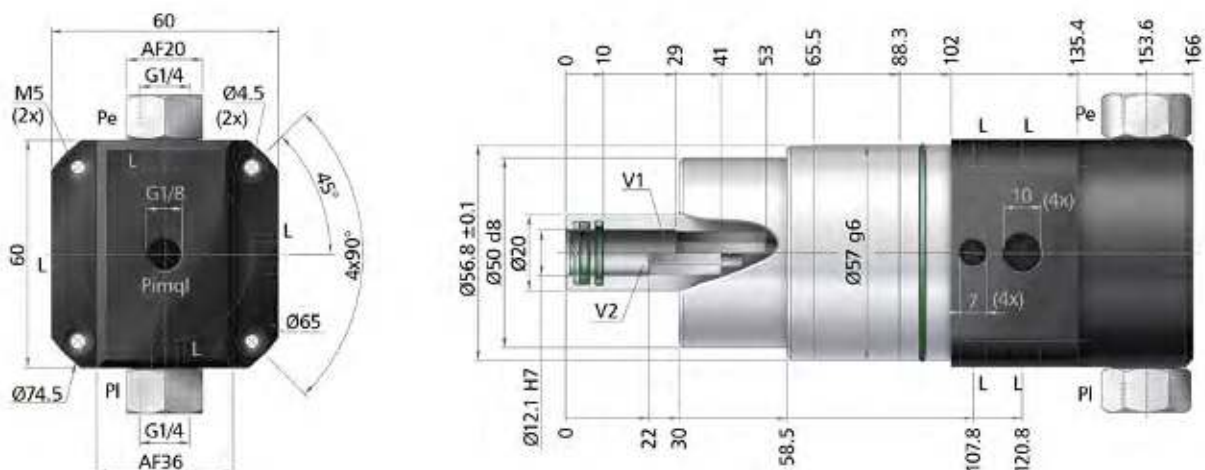
**ROTODISK S0-AK, Type 10582 – 42,000 rpm / Coolant, 80 bar / Air, 20 bar**



**ROTODISK S0-AK, Type 13088 – 42,000 rpm / Coolant, 80 bar / Air, 20 bar**



**ROTODISK S2-AK, Type 10023 – 30,000 rpm / Coolant, 70 bar / Air or MQL, 10 bar**



# Rotary Unions Axial Mechanical Seal



## Product Features

- For high pressures up to 200 bar
- Clamped silicon carbide face seals
- With precision spindle or hybrid ball bearings
- Very robust triple bearing system
- Safe leakage drain with dual chamber system
- For media: emulsion, oil, oil-air mixture
- Dry running safe

## Design and Function

The construction of these products is specially designed for the high axial forces that occur at these pressure levels. The bearings with increased load capacity guarantee equally high product lives, even at rotation rates of up to 30,000 rpm, as with our proven ROTODISK models for the normal pressure of 70 bar. Both face seals are made of wear-free silicon carbide. Our newly developed positive-locking mounting technology allows a stress-free fixing of the sealing discs. By using this technology a safe mounting is achieved that is resistant to deep hole drilling oil and that prevents a breakage of the ceramic disks.

## Applications

The requirements in the tooling machine industry for internal coolant supply lead to coolant pressures of up to 200 bar, due to the continuously increasing chips volume and the increasingly larger drilling depths. We have developed a new line of ROTODISK rotary unions especially for these applications, which stand out due to their robust bearing system and the optimized face sealing system. The problem of detaching face seals, which occurs frequently in the case of deep hole drilling, is completely resolved due to a new sealing disc mounting technology.

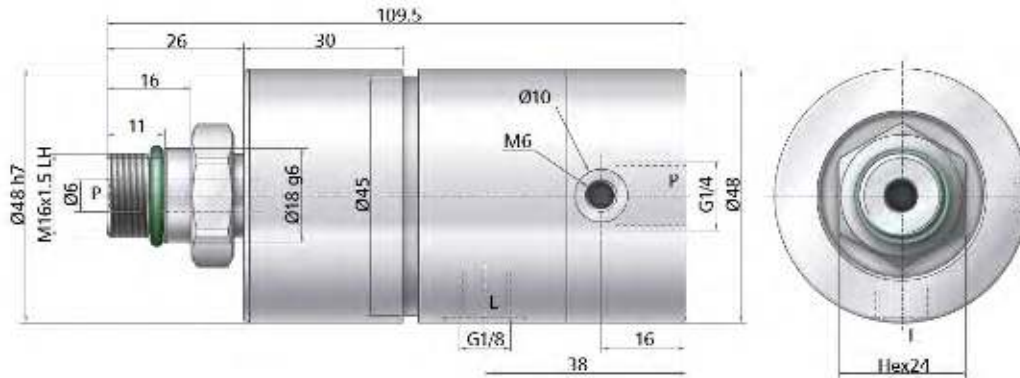
## Technical Data

Type	S00-HP 11042	S0-HP 11050	S0-HP 9494	S2-HP 9425
Operating speed max. (rpm)	20,000	30,000	15,000	30,000
Emulsion pressure max. (bar)	200	120	120	150
Flow rate max. (l/min)	45	70	70	70
Nominal diameter (mm)	6	8	8	8

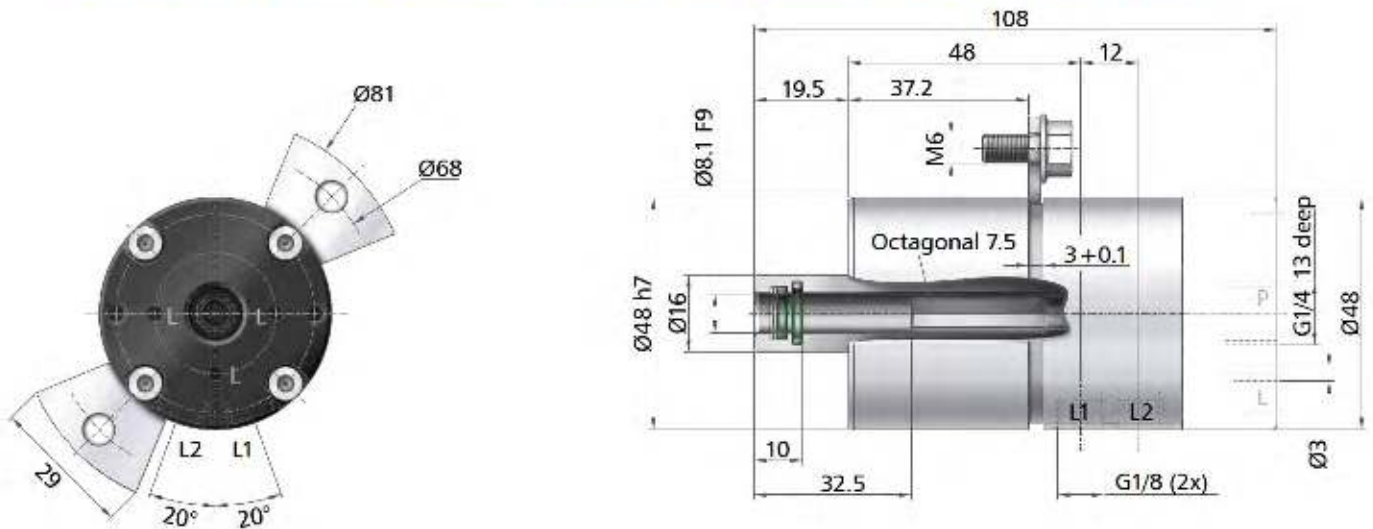


# ROTODISK S-HP

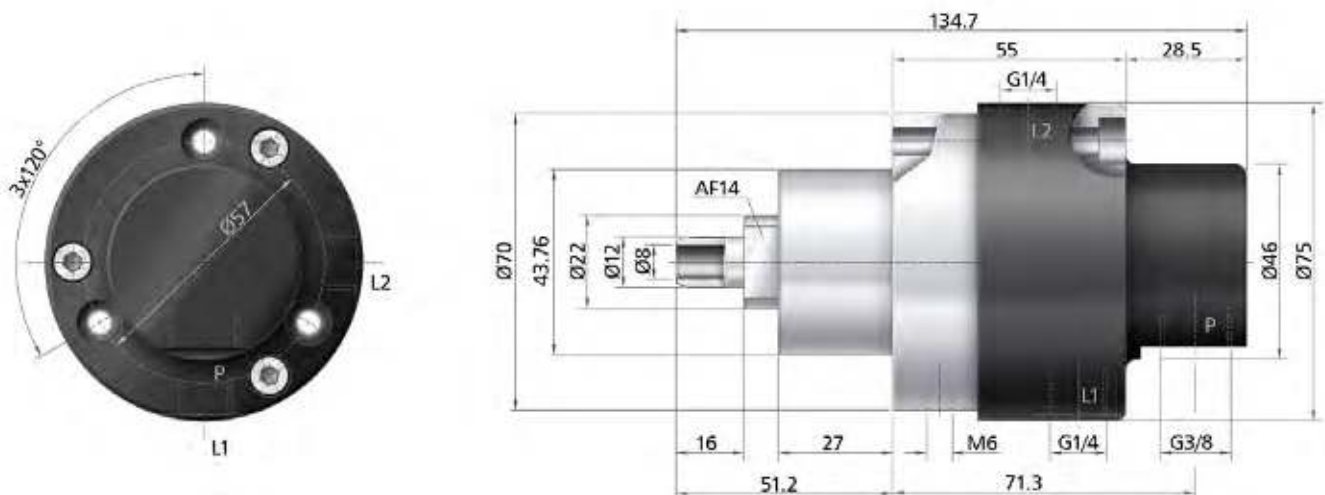
**ROTODISK S00-HP, Type 11042 – 20,000 rpm / Coolant or Oil, 200 bar**



**ROTODISK S0-HP, Type 16597 – 36,000 rpm / Coolant, 140 bar / MQL, 10 bar**



**ROTODISK S0-HP, Type 9494 – 20,000 rpm / Coolant, 120 bar / Air or MQL, 10 bar**



# Rotary Unions Axial Mechanical Seal (Cartridge)

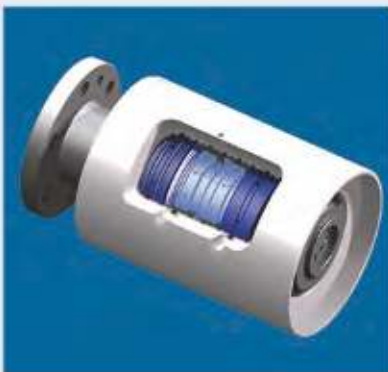


## Product Features

- Radial media supply
- For pressures of 70 bar at 10,000 rpm
- Extremely compact cartridge design
- Hydrostatically compensated
- New material combination
- Very long service life
- Low friction moment
- Multi-channel, stackable

## Design and Function

The ROTODISK SW series consists of radial, single channel rotary unions made with an extremely compact design that enables simple installation in even the smallest of spaces. The hydrostatically released seal elements, made from resistant low-friction materials, guarantee above-average service life. This newly developed seal system is practically free from leakage and achieves an extremely long operating life even at pressures of 70 bar and speeds of up to 10,000 rpm simultaneously. All functional areas are super-finished, in order to guarantee precise installation. ROTODISK SW is suitable for supplying emulsion, cutting oil, oil-air mixes and also abrasive media.



## Applications

Previously, traditional elastomer seals were used for internal coolant supply for ancillary cutter heads and powered tools. This meant that possible operating pressure was limited to 40 bar at standard speeds of up to 6,000 rpm and service life was very short. Our new ROTODISK SW was specially developed for applications in which media must be introduced radially into the shaft, with only very limited installation space available for this.

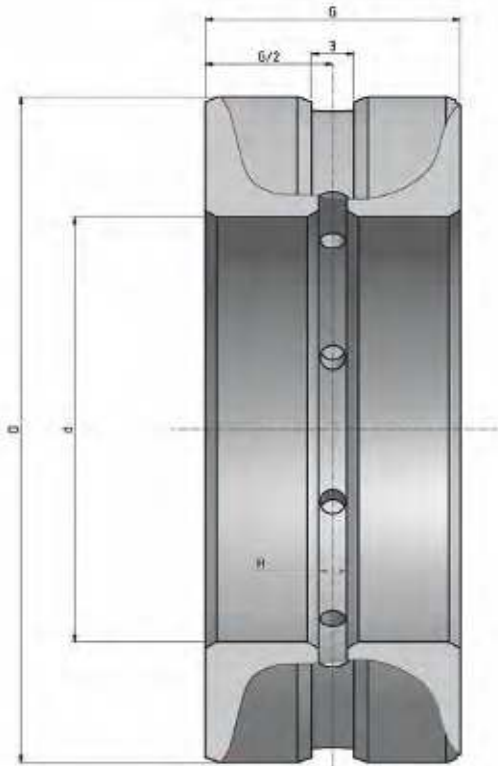
## Versions

ROTODISK SW is available in various shaft diameters between 15 and 150 mm with flow rates of between 12 and 40 l/min. Thanks to its narrow width, the single channel elements can also be stacked for multi-channel applications. Complete single or multi-channel rotary unions are also offered in various sizes for axial extension. The ROTODISK SW can also be combined with other GAT media rotary unions, thus different media can be transferred simultaneously.

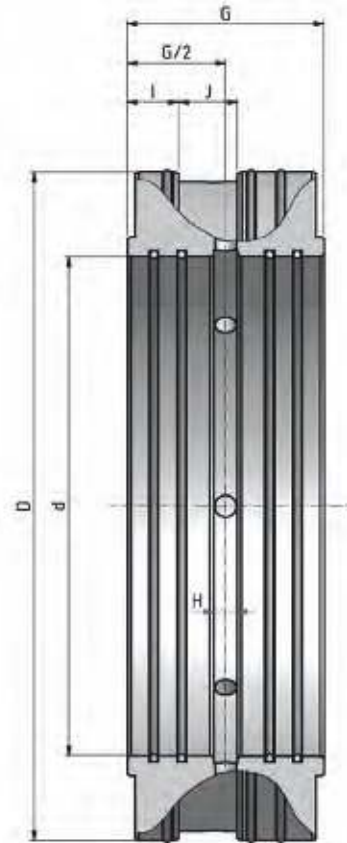


# ROTODISK SW Cartridge

ROTODISK SW 15-50



ROTODISK SW 65-150



## Technical Data

Dimensions	SW 15	SW 17	SW 20	SW 25/42	SW 25/47	SW 30/47	SW 30/55	SW 35
Nominal width (mm)	5	5	5	5	5	5	5	5
Internal diameter $\varnothing d$ (mm)	15	17	20	25	25	30	30	35
External diameter $\varnothing D$ (mm)	32	35	37	42	47	47	55	62
$G \pm 0.05$ (mm)	18	18	18	18	18	18	18	18
H (mm)	2	2	2	2	2	2	2	2

Dimensions	SW 40/62	SW 40/68	SW 50	SW 65	SW 80	SW 100	SW 125	SW 150
Nominal width (mm)	5	5	8	8	14	14	14	14
Internal diameter $\varnothing d$ (mm)	40	40	50	65	80	100	125	150
External diameter $\varnothing D$ (mm)	62	68	80	105	125	145	170	195
$G \pm 0.05$ (mm)	18	18	24	32	50	50	50	50
H (mm)	2	2	3	5	6	6	6	6
I (mm)				8.5	13	13	13	13
J (mm)				10	15	15	15	15

# Rotary Unions Axial Mechanical Seal (Cartridge)



## Product Features

- Compact installation set
- For speeds up to 100,000 rpm
- For pressures up to 140 bar
- Hydrostatically released axial contact seals
- Low-wear silicon carbide seal rings
- Wide variety of design versions available
- Safe for dry operation

## Design and Function

ROTODISK S installation sets consist of single channel, axial rotary unions with hydrostatically released ceramic contact seals and an automatic alignment compensation system, which ensures that the contact seals always have full surface contact. The hydrostatic release ensures that the friction moment is low, which also means that wear is minimal even under simultaneous high pressure and high speeds. The Micro-Gap System guarantees leakage-free stoppage of the emulsion flow, as well as safe dry operation. Very long service lives are achieved through the use of extremely durable contact seals made from silicon carbide.

## Applications

ROTODISK S installation sets are mainly used for internal coolant supply in machine tool spindles, transferring the following media: emulsion, oil, water, air or oil-air mixture. In terms of the high service life requirements of today's demanding performance data, ROTODISK S is more than capable of meeting these requirements, thanks to many years of application in machine tool construction.

## Versions

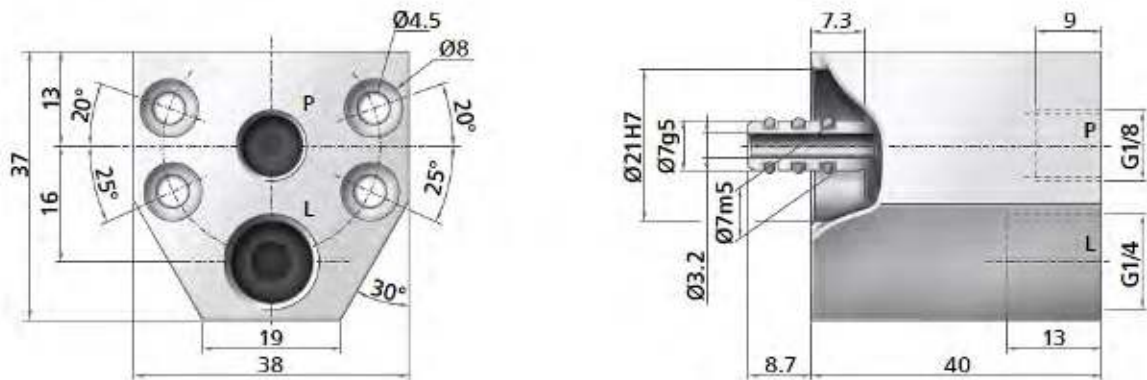
The rotary union rotor element can be installed in the end of the spindle axle using a winding or interference fit. The stationary element can be supplied with housing and leakage removal or simply as a sealed piston. Various sizes for different flow rates are listed in the table below. A wide variety of existing versions are available.

## Technical Data

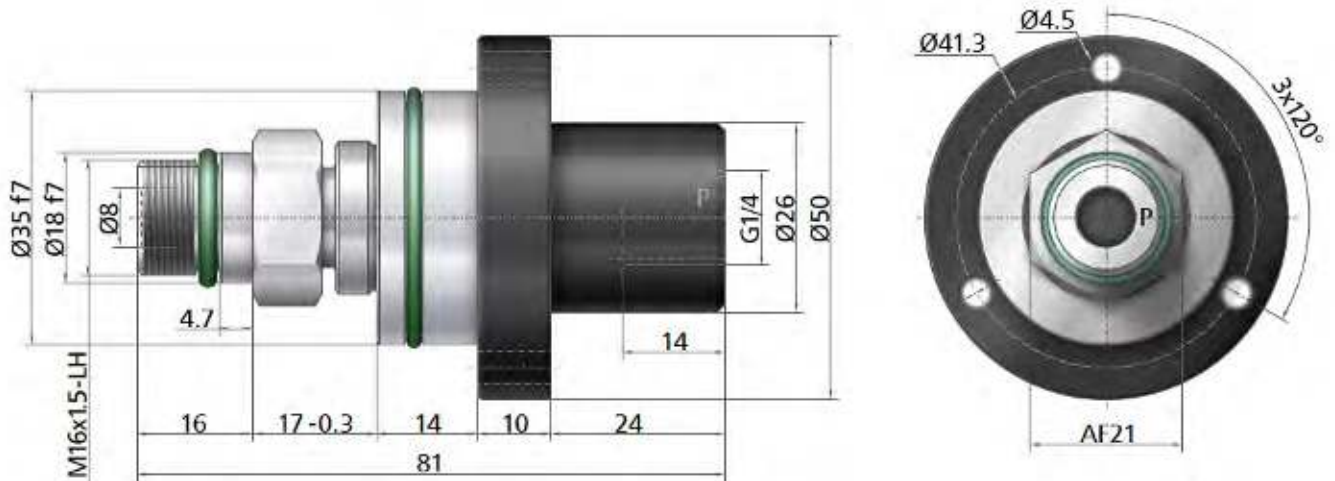
Type	S00	S0	S1	S2
Max. pressure (bar)	140	140	140	140
Max. speed (rpm)	100,000	70,000	50,000	35,000
Flow rate per channel (l/min)	15	25	35	50
Nominal diameter (mm)	3.5	6	8	10

# ROTODISK S Installation Set

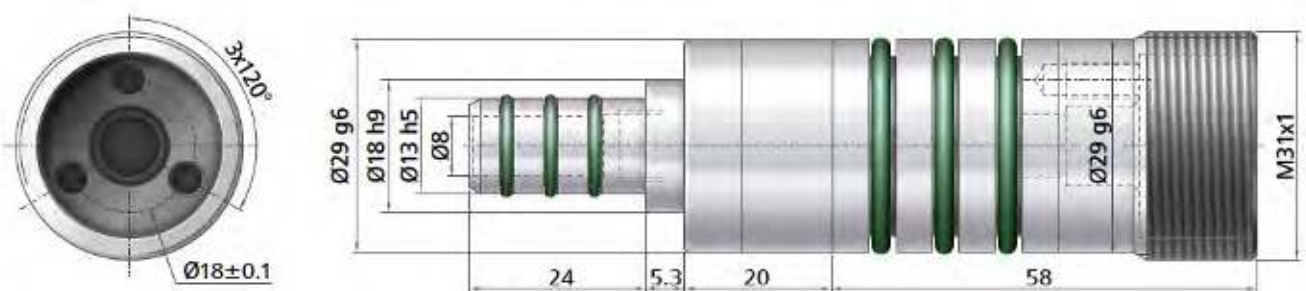
ROTODISK S00, Type 10198 – 75,000 rpm / Coolant, 80 bar / MQL, 10 bar



ROTODISK S0, Type 7997 – 20,000 rpm / Coolant, 180 bar



ROTODISK S1, Type 10770 – 12,000 rpm / Coolant, 70 bar / Air, 6 bar



# Rotary Unions Contact Seal



## Product Features

- Leakage-free sealing system
- Pressures up to 450 bar
- Multi-channel designs with up to 20 channels
- Low-friction special coatings
- Wide selection of sealing materials
- Solutions available for every medium
- Customer-specific designs

## Design and Function

ROTOPACK® is a series of leakage-free rotary unions with elastic contact seals. The optimum application-specific product can be selected from a wide range of seals specially developed by us from the most varied of materials. Special coatings are used on the shaft to minimise any friction moment and reduce wear.

## Applications

ROTOPACK® is used if a variety of media need to be supplied. Areas of application include tunnelling machines, rotary table systems and robots. Thanks to our special construction principle, we can offer a customer-specific ROTOPACK® for every possible application, which is reliable and economic to use even with the highest requirements in terms of pressure, speed, torque and seal diameter.

## Versions

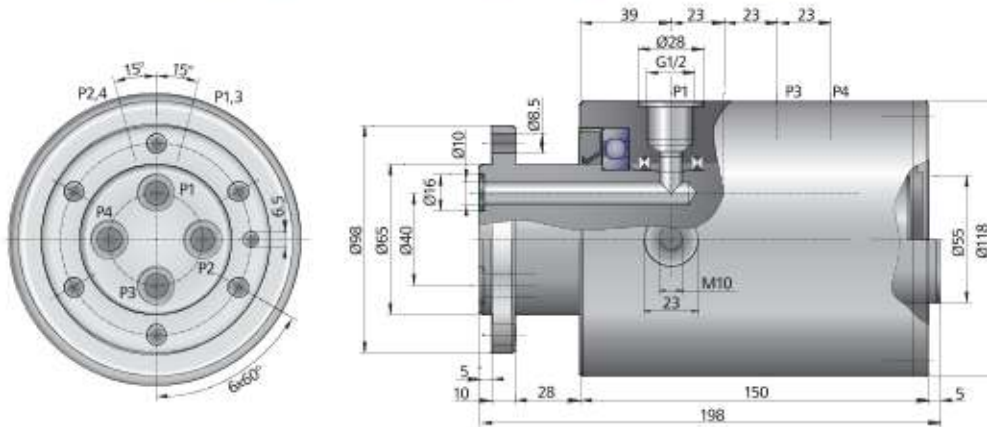
A wide range of ROTOPACK® types is available:

- Single or multi-channel, up to 20 channels
- As axial or radial mounted version
- For all liquid or gas media
- Tailor-made solution in accordance with customer requirements

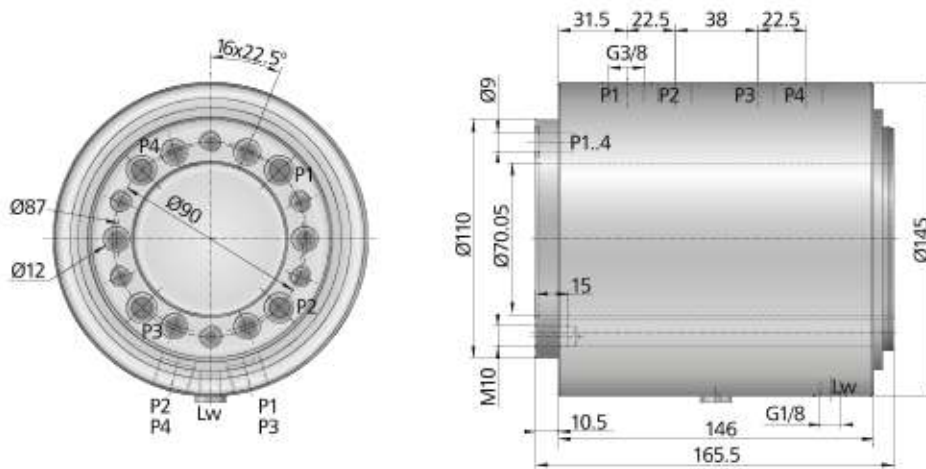
## Technical Data

Media	Oil, water, gases, water-based liquids
Pressure range (bar)	0 - 450
Speed (rpm)	Up to 1,000, depending on pressure and shaft diameter
Connection sizes (")	¼ - 3
Shaft diameter (mm)	Up to 1,000

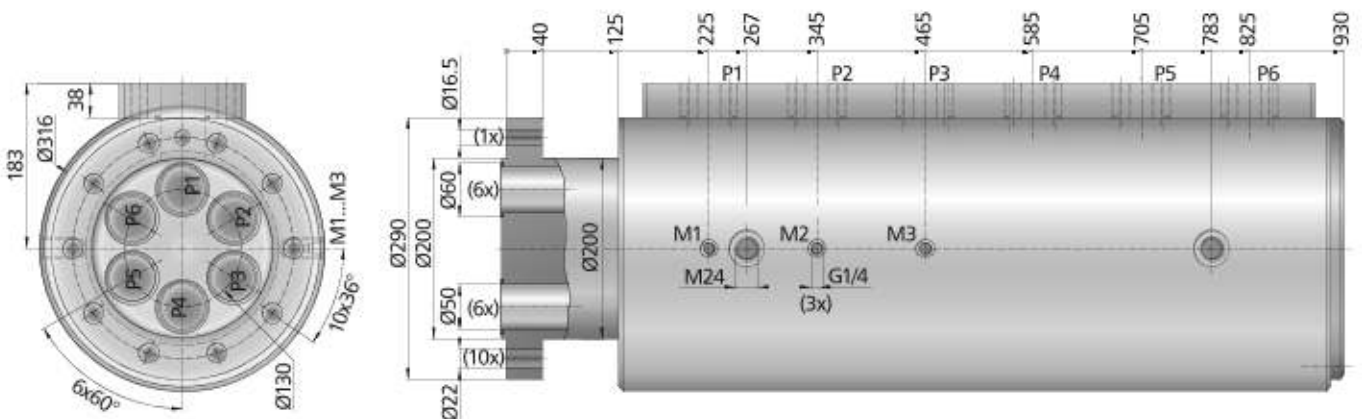
## ROTOPACK® MCR 6-10, Type 5585 – 10 rpm / Hydraulic Oil, 210 bar



## ROTOPACK® M120 S4, Type 4424 – 60 rpm / Gas, 20 bar / Water, 6 bar

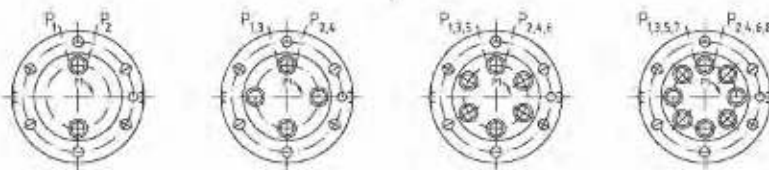
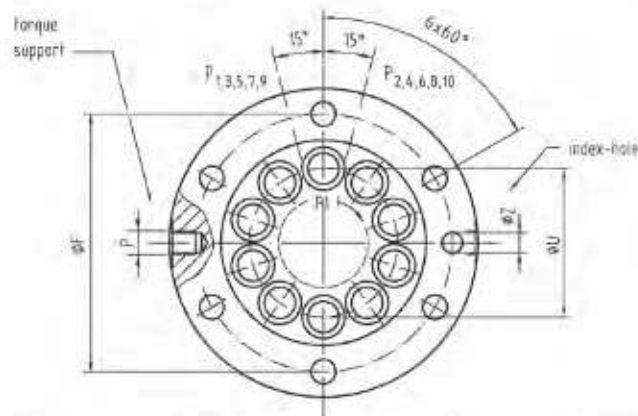
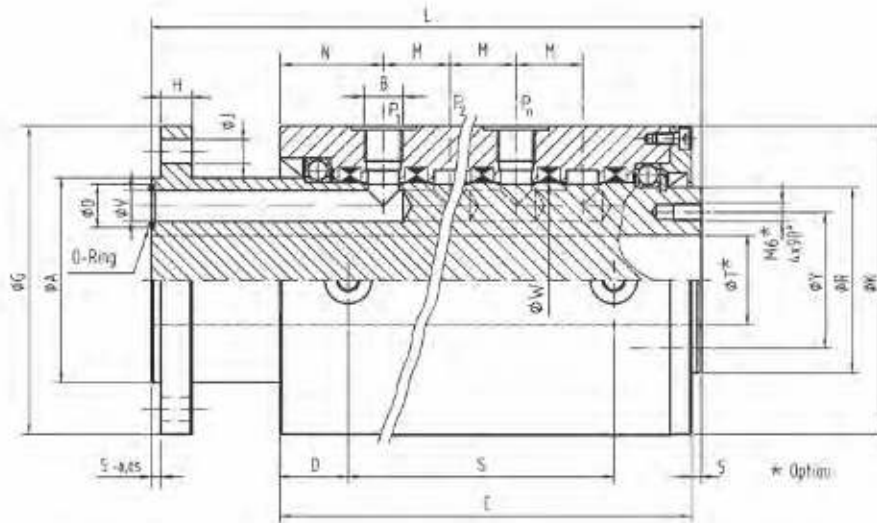


## ROTOPACK® M200 X6, Type 11131 – 4 rpm / Hydraulic Oil, 350 bar



# Rotary Unions

## ROTOPACK® MCR for Size 06 to 25



### Ordering Code

MCR V - W - X - Y - Z

Number of channels	Size	Material	Operating pressure	Central bore
2 = 2 Channels	04 = 1/8"	S = Steel	210 ≤ 21 MPa*	0 = without
4 = 4 Channels	06 = 1/4"	K = Nickel-plated-steel	350 ≤ 35 MPa*	1 = with
6 = 6 Channels	10 = 1/2"	I = Stainless steel	10 ≤ 1 MPa**	
8 = 8 Channels	16 = 3/4"			
	20 = 1"			
	25 = 1 1/4"			

Replace V - Z with the required value. Order example: MCR 4-16-S-210-0.  
 \* For oil \*\* Special seal for air, other media on request.



## ROTOPACK® MCR for Size 06 - 25

Order-No.: Ø V mm	Ø A <sub>eff</sub> mm	Ø B inch	C mm	D mm	Ø F mm	Ø G mm	H mm	Ø J mm	Ø K mm	L mm
MCR 2 - 06	45	¼	98	15	62	78	8	6.5	88	141
MCR 4 - 06	45	¼	136	15	62	78	8	6.5	88	179
MCR 6 - 06	45	¼	174	15	62	78	8	6.5	88	217
MCR 8 - 06	60	¼	228	30	80	98	10	6.5	98	273
MCR 10 - 06	60	¼	268	30	80	98	10	6.5	98	313
MCR 2 - 10	65	½	104	39	82	98	10	8.5	118	152
MCR 4 - 10	65	½	150	39	82	98	10	8.5	118	198
MCR 6 - 10	65	½	196	39	82	98	10	8.5	118	244
MCR 8 - 10	75	½	244	15	95	115	12	8.5	128	299
MCR 10 - 10	85	½	293	15	105	125	12	8.5	138	348
MCR 2 - 16	75	¾	133	20	100	125	14	12.5	128	197
MCR 4 - 16	75	¾	201	20	100	125	14	12.5	128	265
MCR 6 - 16	75	¾	269	20	100	125	14	12.5	128	333
MCR 8 - 16	95	¾	350	20	122	148	16	12.5	158	421
MCR 10 - 16	105	¾	415	35	132	158	16	12.5	158	486
MCR 2 - 20	85	1	144	20	111	138	16	12.5	150	215
MCR 4 - 20	85	1	220	20	111	138	16	12.5	150	291
MCR 6 - 20	95	1	308	20	121	148	16	12.5	168	379
MCR 8 - 20	115	1	389	20	141	168	16	12.5	188	460
MCR 10 - 20	135	1	465	20	161	188	16	12.5	198	536
MCR 2 - 25	105	1¼	173	20	138	168	20	17	188	258
MCR 4 - 25	105	1¼	265	20	138	168	20	17	188	350
MCR 6 - 25	115	1¼	363	20	150	178	20	17	198	448
MCR 8 - 25	135	1¼	458	20	170	198	20	17	212	533
MCR 10 - 25										

Dimensions on request

Order-No.: Ø V mm	M mm	N mm	Ø O mm	Ø P mm	R <sub>r</sub> mm	S mm	Ø T mm	Ø U mm	Ø W mm	Y mm	Ø Z mm	O-Ring mm
MCR 2 - 06	19	36	11	M 8	35	-	12	26	40	24	4.5	7 x 2
MCR 4 - 06	19	36	11	M 8	35	-	12	26	40	24	4.5	7 x 2
MCR 6 - 06	19	36	11	M 8	35	-	12	26	40	24	4.5	7 x 2
MCR 8 - 06	20	39	11	M 8	50	160	26	42	55	40	4.5	7 x 2
MCR 10 - 06	20	39	11	M 8	50	200	26	42	55	40	4.5	7 x 2
MCR 2 - 10	23	39	16	M 10	55	-	20	40	60	40	6.5	12 x 2
MCR 4 - 10	23	39	16	M 10	55	-	20	40	60	40	6.5	12 x 2
MCR 6 - 10	23	39	16	M 10	55	-	20	40	60	40	6.5	12 x 2
MCR 8 - 10	23	37	16	M 10	65	195	32	53	70	50	6.5	12 x 2
MCR 10 - 10	23	38	16	M 10	75	241	40	63	80	60	6.5	12 x 2
MCR 2 - 16	34	45	22	M 12	65	-	22	48	70	50	10.5	18 x 2
MCR 4 - 16	34	45	22	M 12	65	-	22	48	70	50	10.5	18 x 2
MCR 6 - 16	34	45	22	M 12	65	213	22	48	70	50	10.5	18 x 2
MCR 8 - 16	34	53	22	M 12	85	270	40	66	90	70	10.5	18 x 2
MCR 10 - 16	34	53	22	M 12	95	340	50	76	100	70	10.5	18 x 2
MCR 2 - 20	38	48	28	M 12	75	-	20	52	80	60	10.5	23 x 2.5
MCR 4 - 20	38	48	28	M 12	75	-	20	52	80	60	10.5	23 x 2.5
MCR 6 - 20	38	55	28	M 12	85	225	28	60	90	70	10.5	23 x 2.5
MCR 8 - 20	38	57	28	M 12	105	321	45	80	110	90	10.5	23 x 2.5
MCR 10 - 20	38	59	28	M 12	110	400	65	92	125	95	10.5	23 x 2.5
MCR 2 - 25	46	60	33	M 16	95	-	28	66	100	80	8.5	28 x 2.5
MCR 4 - 25	46	60	33	M 16	95	-	28	66	100	80	8.5	28 x 2.5
MCR 6 - 25	46	62	33	M 16	105	295	35	76	110	90	8.5	28 x 2.5
MCR 8 - 25	46	64	33	M 16	110	400	50	92	125	95	10.5	28 x 2.5
MCR 10 - 25												

Dimensions on request

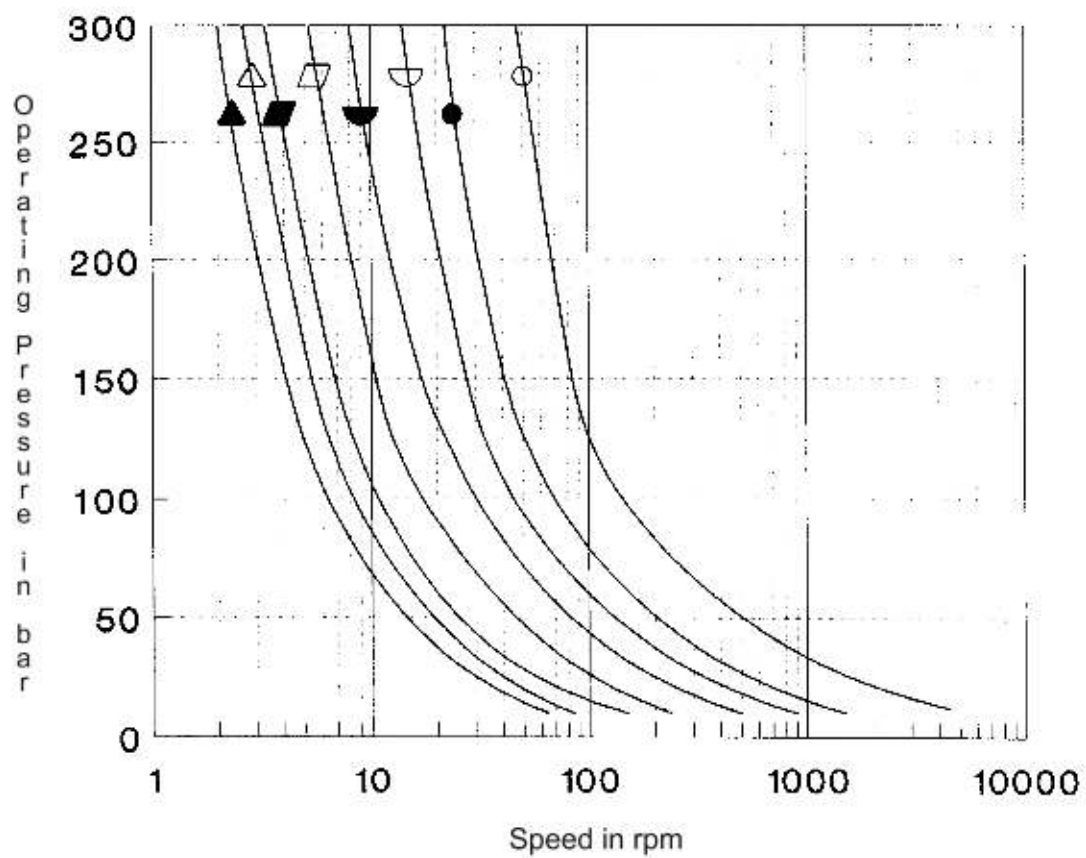
Ø W provides the measurement for reading the pv value!

# Rotary Unions

## ROTOPACK® MCR (for oil)

### pv-Diagram

Permissible operating parameters depending on operating pressure, speed and seal diameter

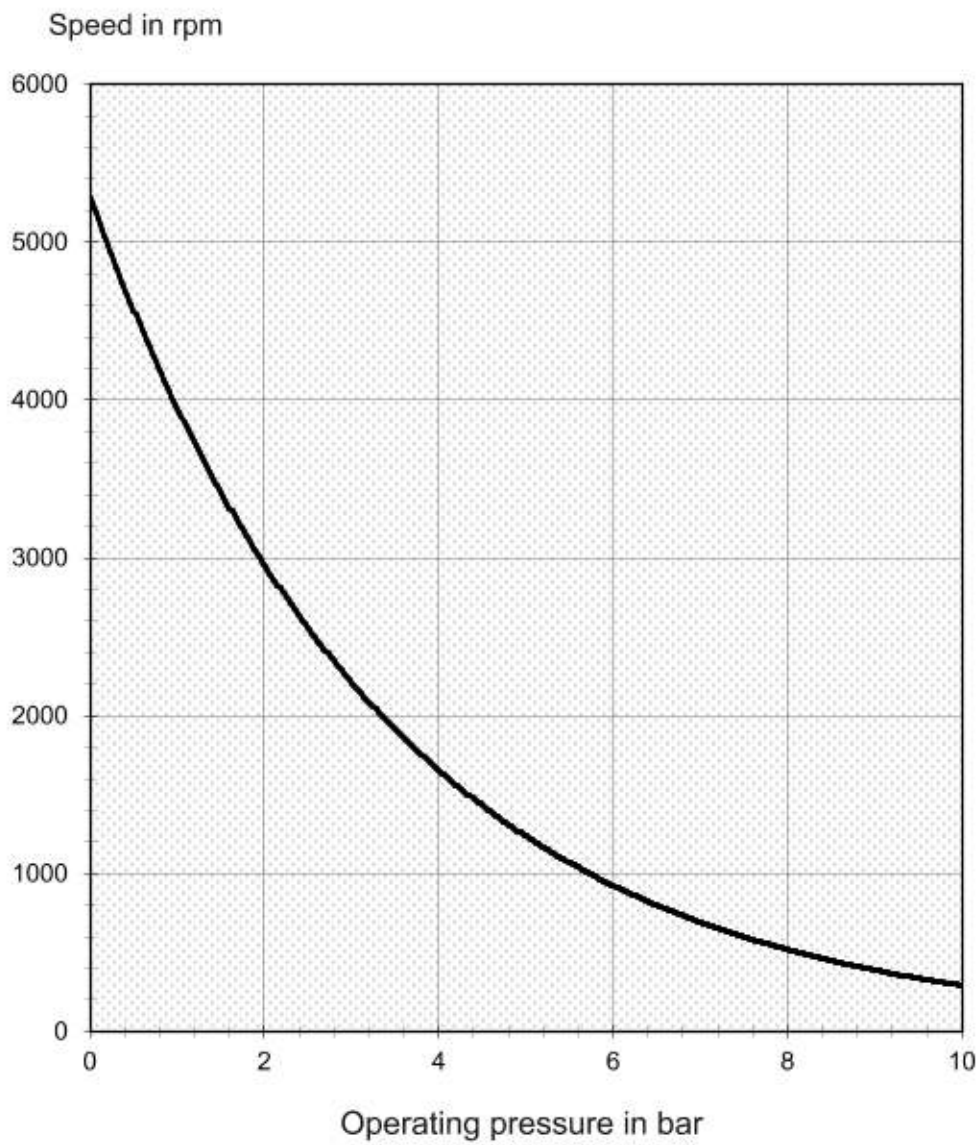


Seal diameter in mm for pv			
○	5	●	10
◐	20	◑	40
▭	60	▮	110
△	130	▲	180

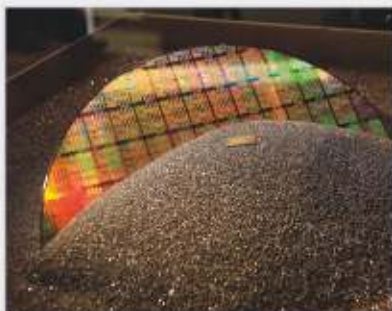
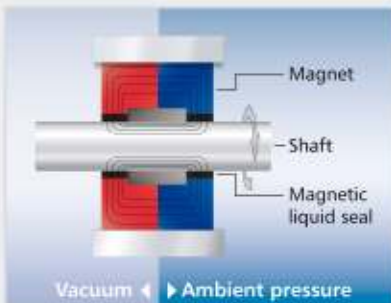
This information can be seen as an indication only and is very dependent on the operating conditions.

## ROTOPACK® MCVR (for air)

### pv-Diagram



# Rotary Unions Ferro-Fluid Seal



## Product Features

- Vacuum rotary unions for highest cleanliness
- For ultra-high vacuum up to  $10^{-8}$  mbar
- With inert magnetic fluid seal
- Very low friction torque
- Reliable, low maintenance
- Solid and hollow shaft designs available

## Design and Function

With the ROTOVAC<sup>®</sup> rotary union, the gap between the shaft and the fixed seal element is filled with a magnetic fluid. Permanent magnets produce a strong circular magnetic field, which fixes the ferrofluid in its position and makes it pressure-loadable. Only viscous friction is created in the sealing gap, so a rotary motion with very little friction torque and minimum slip-stick effect can be transmitted into the vacuum. This means that less drive power is needed and that higher surface speeds of up to 15 m/s can be achieved. The abrasion that is normally created using elastomer seals disappears completely, so these unions can be used for processes, which require very high cleanliness levels. Our magnetic fluid is of an extremely high quality so that a regular refilling of the rotary union is not required any longer. Our magnetic liquid seal is long lasting and requires no maintenance.

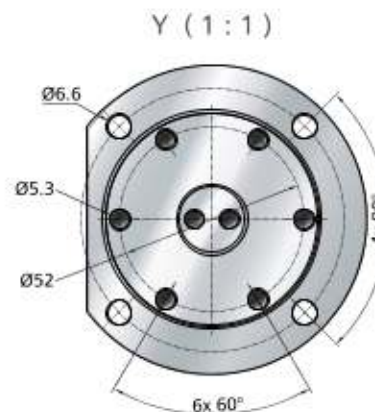
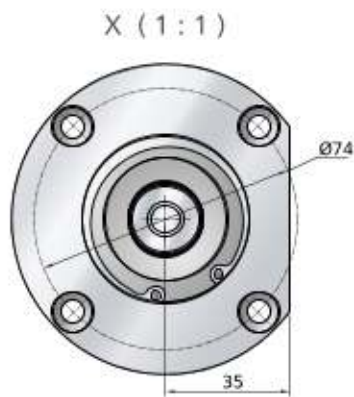
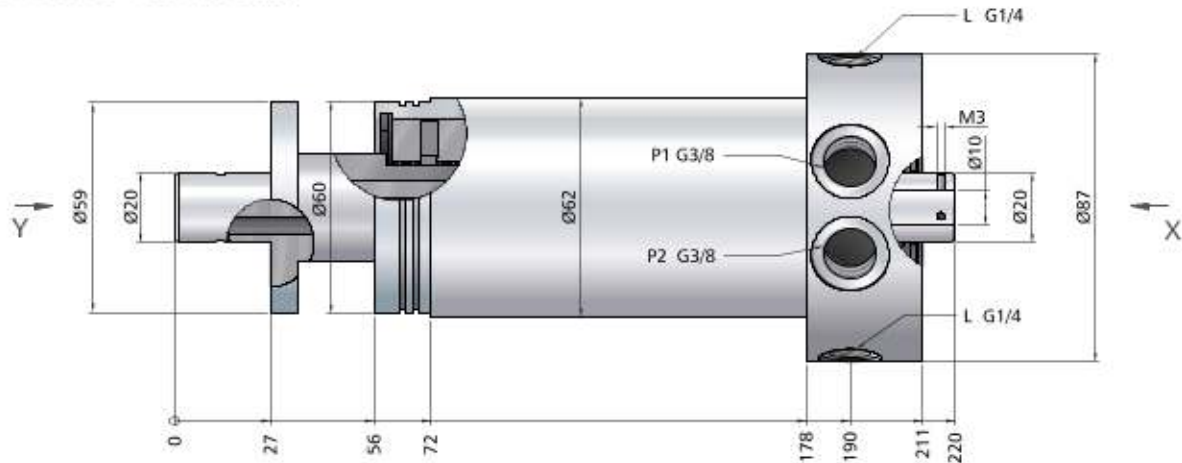
## Applications

ROTOVAC<sup>®</sup> vacuum rotary unions are used for transmitting a rotary motion into a vacuum. The use of a completely inert magnetic liquid makes them suitable for use in processes that require very high vacuum quality. Our ferrofluid is extremely clean so can be used in ultra-high vacuum up to  $10^{-8}$  mbar. ROTOVAC<sup>®</sup> vacuum rotary unions can be used in semiconductor or light bulb production, in coating plants, packing machines, lifting and transport equipment and test rigs.

## Versions

ROTOVAC<sup>®</sup> rotary unions and combinations are designed customer specific. They are available in solid and hollow-shaft designs, with customer-specific or standard connections, and in combinations with several channels for vacuum or different media, and combinations with electric slip rings.

## ROTOVAC® M24 W2MF



### Technical Data

Media	Vacuum (combination with other media and slip rings possible on request)
Vacuum level	bis $10^{-9}$ mbar
Leakage rate	$<1 \times 10^{-9}$ mbar x l/s
Maximum Speed	Up to 15 m/s on seal diameter
Housing material	Stainless steel
Shaft material	Stainless steel
Shaft geometry	Solid shaft, hollow shaft, several channels, customer-specific
Connection geometry	KF, ISO-K, CF, key connection, customer-specific
Connection thread	ISO-metric, Whitworth, UNC, UNF, BSPT, customer-specific

# Slip Rings Contacting Transmission Technology



## Product Features

- Very safe and reliable transmission of signal, data streams, and high currents
- Communication via field bus systems and Ethernet
- Compact design with robust aluminum or steel housing
- Sealed ball bearings
- Extremely low electrical noise
- Highest contact quality
- Very low contact resistance
- Maintenance-free, long service life
- High operational reliability even when subjected to vibrations and extreme temperatures
- Compatible with GAT media rotary unions

## Design and Function

Slip rings of the ESR series use gold spring wire and gold-plated rings as contact pairs to achieve excellent values of power, signal and data transmission as well as a long product life. Their design is very compact. The gold/gold technology and the perfect surfaces required ensure ultimate contact quality and extremely low transition resistance while providing excellent corrosion resistance. The part of the slip ring transferring electric current is protected by a robust aluminium or steel housing and sealed ball bearings. Thanks to this design, protection up to class IP65 can be achieved. The slip rings of the ESR series can hence be used under the most adverse conditions and ensure a reliable function even in extreme environments.

## Applications

The range of application includes the transmission of digital signals for Interbus, Profibus or CAN bus systems as well as the transmission of the most delicate analogue measuring signals and even very high power currents. Typical areas of application of our slip rings are rotary tables, wind turbines, packaging machines, tooling machines, rotary cranes, theater stages, agitators, medical devices, etc.

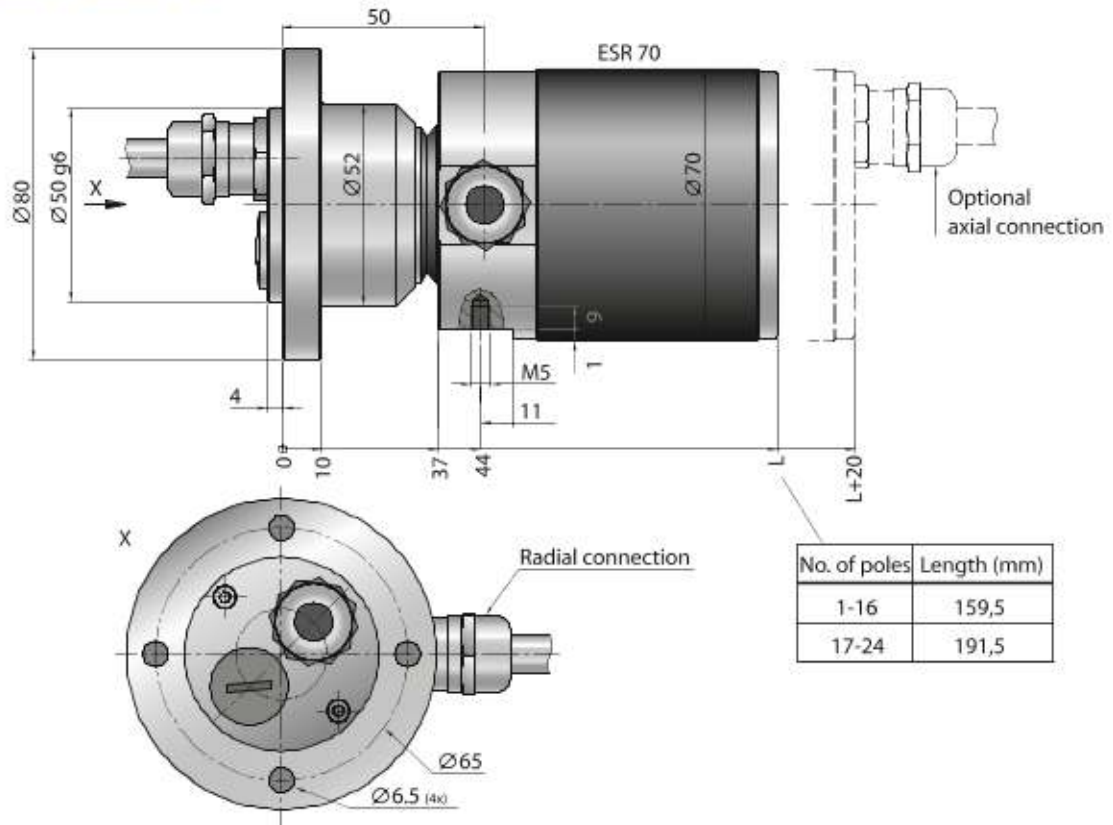
## Versions

The standard range of this ESR series with the housing diameters 70, 110 and 160 is shown in the following pages. Also larger housing diameters are available on request.

Thanks to its modular design, this slip ring can be quickly adjusted to new applications. It can be adjusted to individual and specific customer requests and for a wide range of applications by varying the number of poles, the number of poles per ring, and the mechanical and electric connections.

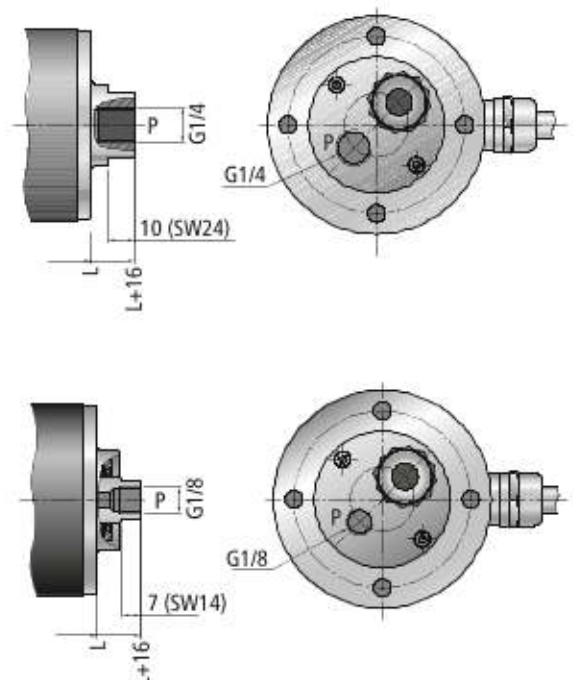
The high packaging density of the axially arranged contact rings allows the stacking of up to 300 poles. Most slip rings are supplied as sealed variants with aluminium housing and in compliance with protection class IP 64. The rotor can be connected directly to the shaft or by a flange or plug-in shaft connection. Slip ring bodies and brush block components are also available as open installation versions for the direct integration into on-site structures provided by the customer.

## ROTOFLUX® ESR 70



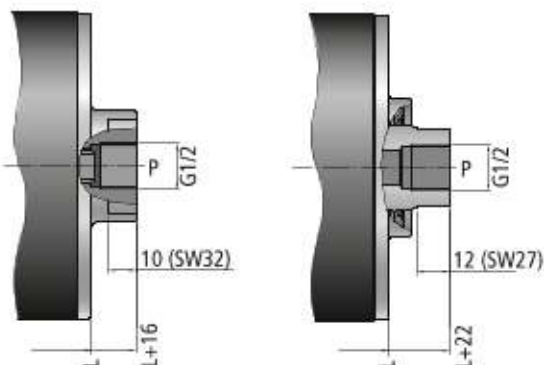
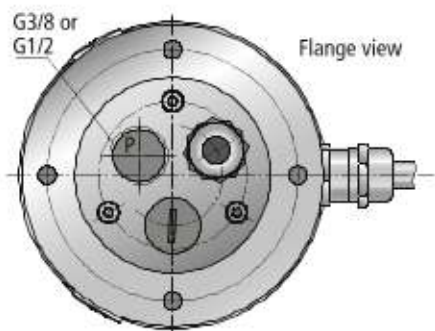
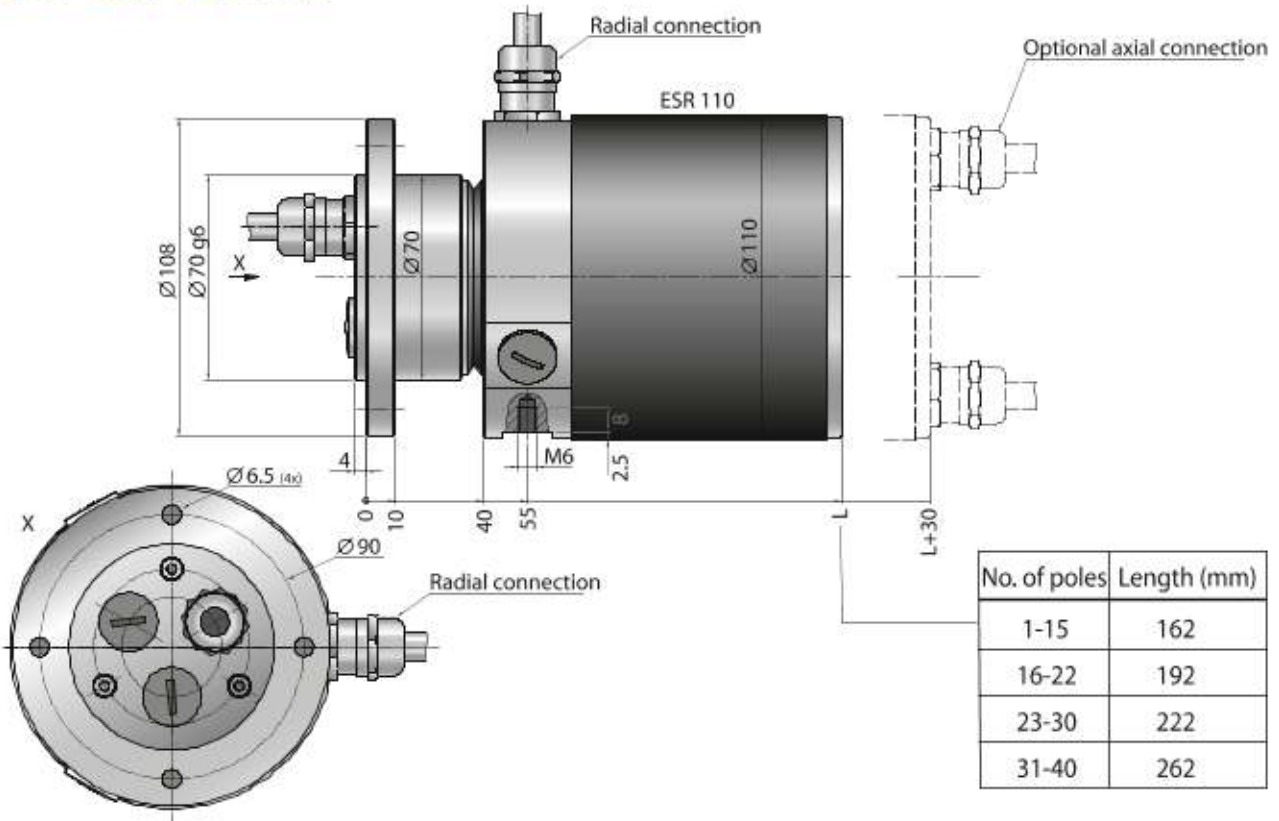
## Technical Data

Type	ESR 70
Housing outer diameter Ø (mm)	70
Max. no. of poles	24
Max. rated current (A)	20
Max. peak current (A)	2 x I <sub>N</sub> for 1s
Max. operating voltage (V)	250
Insulation resistance @ 500VDC (MΩ)	1,000
Max. speed (rpm)	500
Air supply (") optional	G 1/8 / G 1/4
Max. air pressure (bar)	10
Installation position	vertical / horizontal
Torque (Nm)	< 6
Operating temperature (°C)	-20 to +80
Protection class	IP 64 (IP 65)
Typical lifespan (per million rotations)	100
Maintenance interval (per million rotations)	20



# Slip Rings

## ROTOFLUX® ESR 110

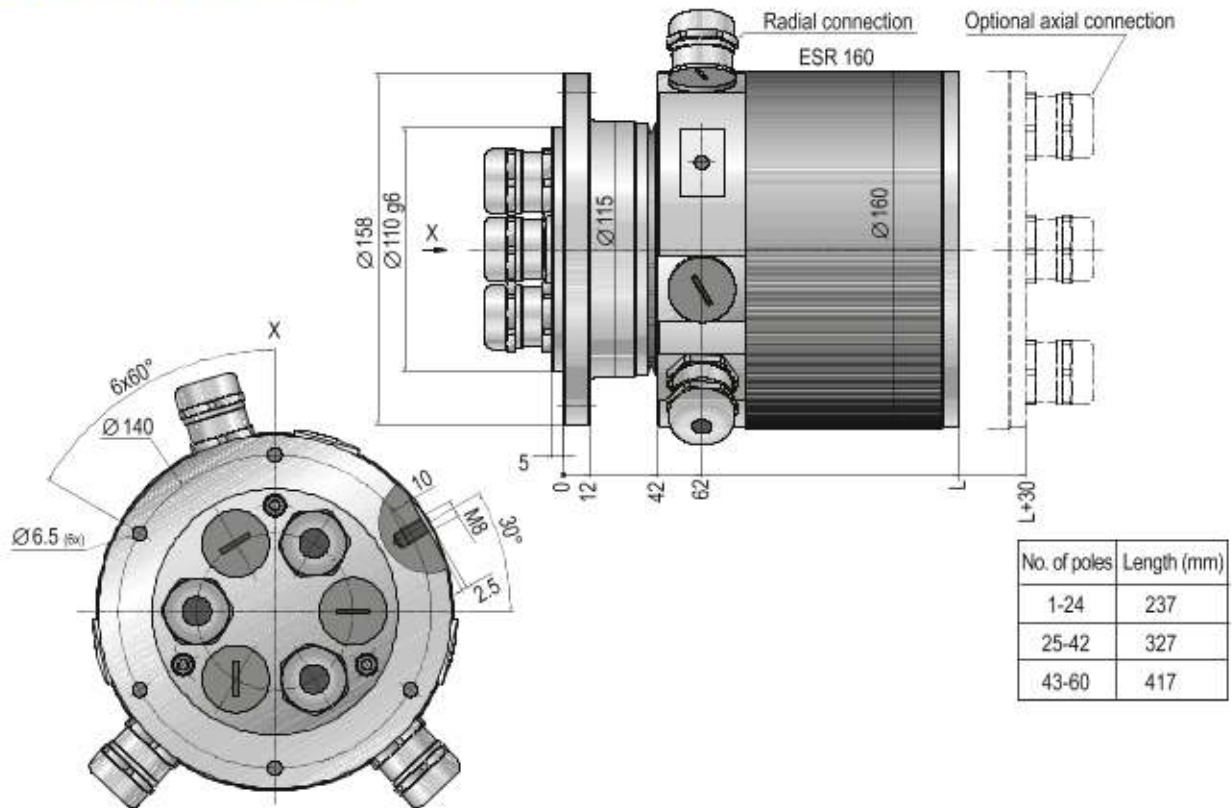


## Technical Data

Type	ESR 110
Housing outer diameter $\varnothing$ (mm)	110
Max. no. of poles	40
Max. rated current (A)	40
Max. peak current (A)	$2 \times I_n$ for 1s
Max. operating voltage (V)	750
Insulation resistance @ 500VDC (M $\Omega$ )	1,000
Max. speed (rpm)	150
Air supply (") optional	G 1/2
Max. air pressure (bar)	10
Installation position	vertical / horizontal
Torque (Nm)	< 6
Operating temperature (°C)	-20 to +80
Protection class	IP 64 (IP 65)
Typical lifespan (per million rotations)	100
Maintenance interval (per million rotations)	20

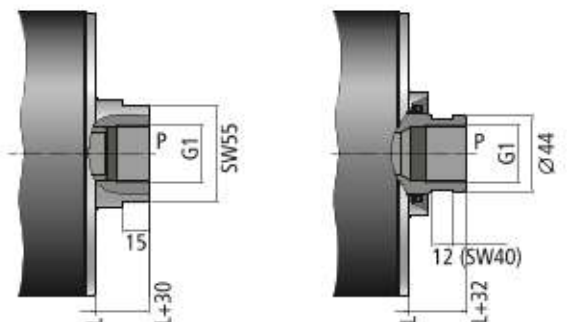
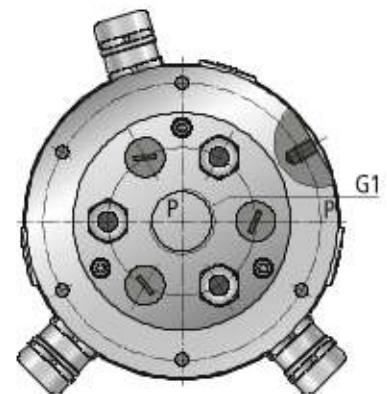


## ROTOFLUX® ESR 160



### Technical Data

Type	ESR 160
Housing outer diameter Ø (mm)	160
Max. no. of poles	60
Max. rated current (A)	50
Max. peak current (A)	2 x I <sub>N</sub> for 1s
Max. operating voltage (V)	750
Insulation resistance @ 500VDC (MΩ)	1,000
Max. speed (rpm)	100
Air supply (")	G 1
Max. air pressure (bar)	10
Installation position	vertical / horizontal
Torque (Nm)	< 6
Operating temperature(°C)	-20 to +80
Protection class	IP 64 (IP 65)
Typical lifespan (per million rotations)	100
Maintenance interval (per million rotations)	20



# Slip Rings Contacting Transmission Technology



## Product Features

- Free internal diameter (25 ... 500 mm)
- Transmission of signal currents or digital data
- Transmission of power currents
- Gold/gold contacts for ultimate contact quality
- Extremely low electric signal noise
- Robust design for adverse operating conditions
- Constant contact quality throughout entire product life
- Maintenance-free operation
- Combination with GAT media rotary unions possible

## Design and Function

Thanks to their free inner diameter, the slip rings of the ROTOFLUX® ESW series can be used for a variety of applications. The contact pairs consist of gold spring wire and gold-plated rings to provide excellent power, signal and data transmission while achieving a long product life. Their design is very compact. The gold/gold technology and the perfect surfaces ensure ultimate contact quality and low transition resistances while providing excellent corrosion resistance. The interior of the slip ring is protected by a robust aluminium or steel housing and sealed ball bearings. Thanks to this design, compliance with protection class IP 64 (up to IP 65 upon request) is achieved. Our slip rings of the ESW series are designed to be used under the most adverse conditions and at extreme temperatures.

Special variants with larger dimensions, for explosive environments or for high speeds are also available.

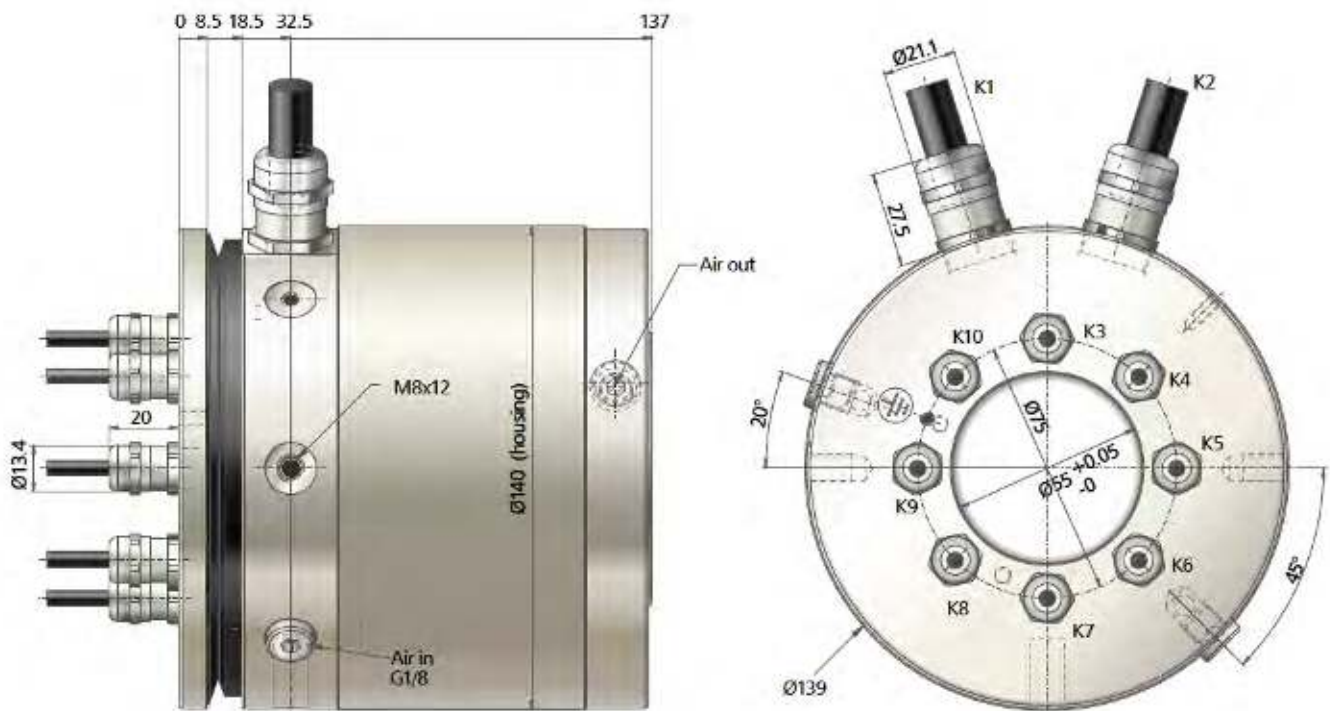
## Applications

ROTOFLUX® ESW offers a wide range of application and includes the transmission of digital signals for Interbus, Profibus or CAN bus systems as well the transmission of the most delicate analogue measuring signals and even very high power currents.

## Versions

The table on the next page shows the standard range of the ESW series. The modular system makes the selection of a configuration for new applications quick and easy. It can be adjusted to individual and specific customer requests and for a wide range of applications by varying the number of poles, the number of poles per ring, and the mechanical and electric connections. Axially arranged and densely packaged slip rings allow the stacking of up to 300 poles. Most slip rings are supplied as sealed variants with aluminium or steel housing and in compliance with protection class IP 64. The rotor can be connected directly to the shaft or by a flange or plug-in shaft connection. Slip ring bodies and brush block components are also available as open installation versions for the direct integration into on-site structures provided by the customer.

## ROTOFLUX® ESW 140



### Technical Data

Type	ESW 110	ESW 140	ESW 200	ESW 250	ESW 300	ESW 350	ESW 400	ESW 525
Free inner diameter max. Ø (mm)	35	55	100	110	160	210	275	395
Housing outer diameter Ø (mm) other diameters possible	110	140	200	250	300	350	400	525
Number of poles max.	80	80	100	100	150	150	150	50
Rated current max. (A)	60	60	60	100	198	240	240	60
Max. speed (rpm)	250	250	100	100	50	50	50	30
Installation position	vertical / horizontal							
Protection class	up to IP 65							

# Slip Rings Non-contacting Transmission Technology



## Product Features

- Non-contacting, capacitive data transmission
- Data transmission rates up from 50 Mbit/s to 1.25 Gbit/s
- Combined with contacting gold/gold technology
- Bit error rate  $< 10^{-12}$
- High resistance against EMI and ESD
- Compatible with all standard binary signal formats
- Maintenance-free slip ring
- Suitable for combination with GAT media rotary unions
- Free inner bore possible
- Diameters up to 500 mm available

## Design and Function

The capacitive slip ring combination ROTOCAP® supports uni- and bidirectional high-speed binary data transmission between rotating and stationary parts. The data transmission is based on a non-contacting capacitive transfer technology. The product line allows high-speed data transmission at bit error rates better than  $10^{-12}$ .

In addition, ROTOCAP® slip ring combinations are highly resistant against external interference. The modular design of these capacitive slip rings allow a simultaneous and bidirectional use of multiple channels. All standard DC-free protocols such as Video or Fibre Channel can be transmitted.

The slip ring combination ROTOCAP® also supports the safety transmission of power and sensors by the integrated contacting gold/gold technology.



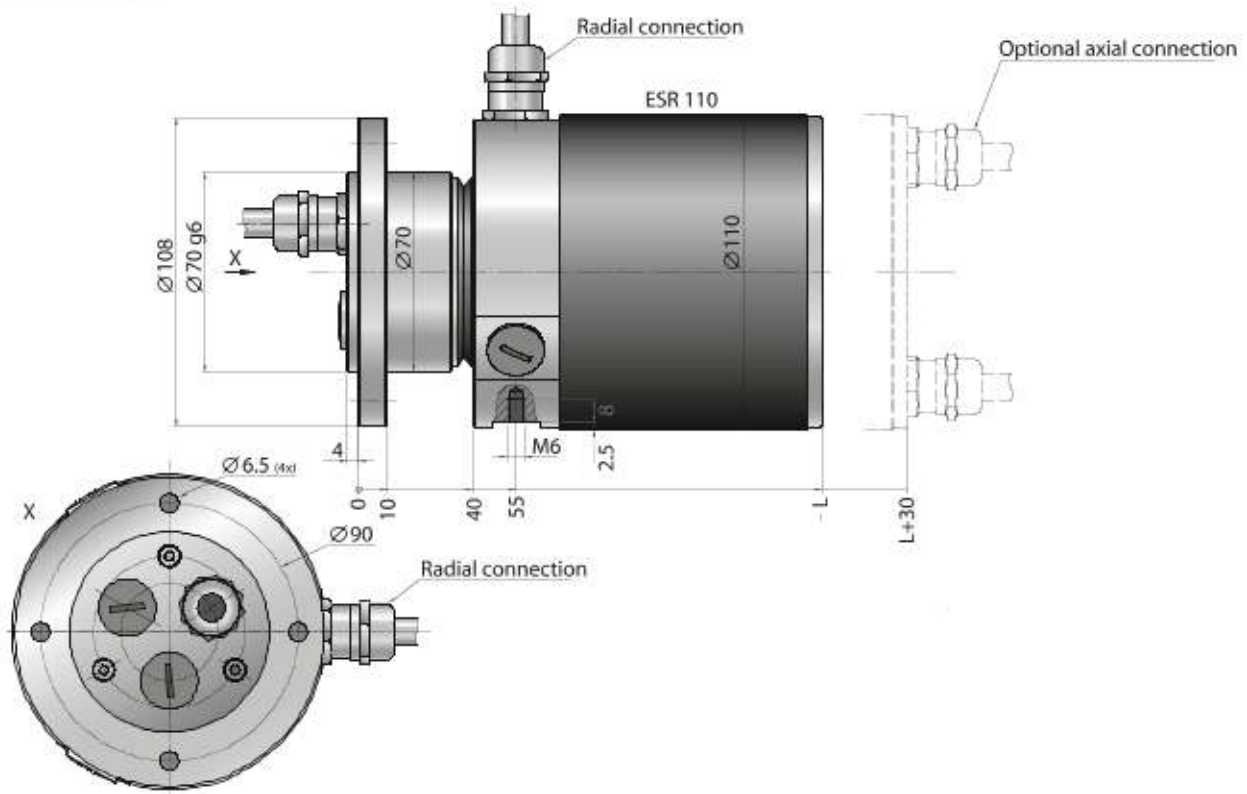
## Applications

The continuously increasing demand for high-speed transmission rates in many applications require high-performance slip ring systems able to handle Gigabit data rates. Being highly resistant against electromagnetic interference, our capacitive slip ring combination ROTOCAP® ensures a reliable high-speed data transmission even in environments with strong electric and magnetic interference.

The capacitive slip ring systems are used in medical systems, automation industry, radar and surveillance systems as well as offshore and marine applications.



## ROTOCAP®



### Technical Data

ROTOCAP®	110, 160 ...
Housing outer diameter Ø (mm)	110, 160 ...
Number of paths	1...4
Transmission standard and supported protocols	Fiber Channel, Video-Signals, ECL, TTL, LVDS, etc.
Bit error rate max.	$< 10^{-12}$
Latency	Application specific
Supply voltage (VDC)	5
Operating temperature range (°C)	-40 to +80
Typical lifespan (per million rotations)	100
Maintenance interval (per million rotations)	maintenance-free
Air connection (") (optional)	G 3/8 or G 1/2
Air pressure max. (bar)	10

# Slip Rings Non-contacting Transmission Technology



## Product Features

- Non-contacting, capacitive data transmission
- 100 Mbit/s Fast Ethernet and Profinet transmission possible
- Combined with contacting gold/gold technology
- Bit error rate <math>< 10^{-12}</math>
- High resistance against EMI and ESD
- Maintenance-free slip ring
- Compatible with GAT media rotary unions
- Free inner diameter possible
- Larger diameters up to 500 mm available

## Design and Function

The capacitive slip ring combination ROTOCAP® Ethernet supports bidirectional high-speed data transmission between fixed and rotating parts. The special design of the ROTOCAP® Ethernet has been adapted to the requirements of all standard Fast Ethernet 100BASE-TX based transmission protocols (Profinet, Powerlink, Sercos III, etc.). Due to the internal clock recovery and signal amplification a very low noise signal as well as a very high data security up to 1,000 revolutions is ensured.

The data transmission is based on capacitive non-contacting transmission technology. The product line allows high-speed data transmission at bit-error rates better than  $10^{-12}$ . Thanks to the modular design of this capacitive slip ring system, multiple channels can be used simultaneously and bidirectionally.

The slip ring combination ROTOCAP® Ethernet supports also the transmission of power and sensors by the integrated contacting gold/gold technology.



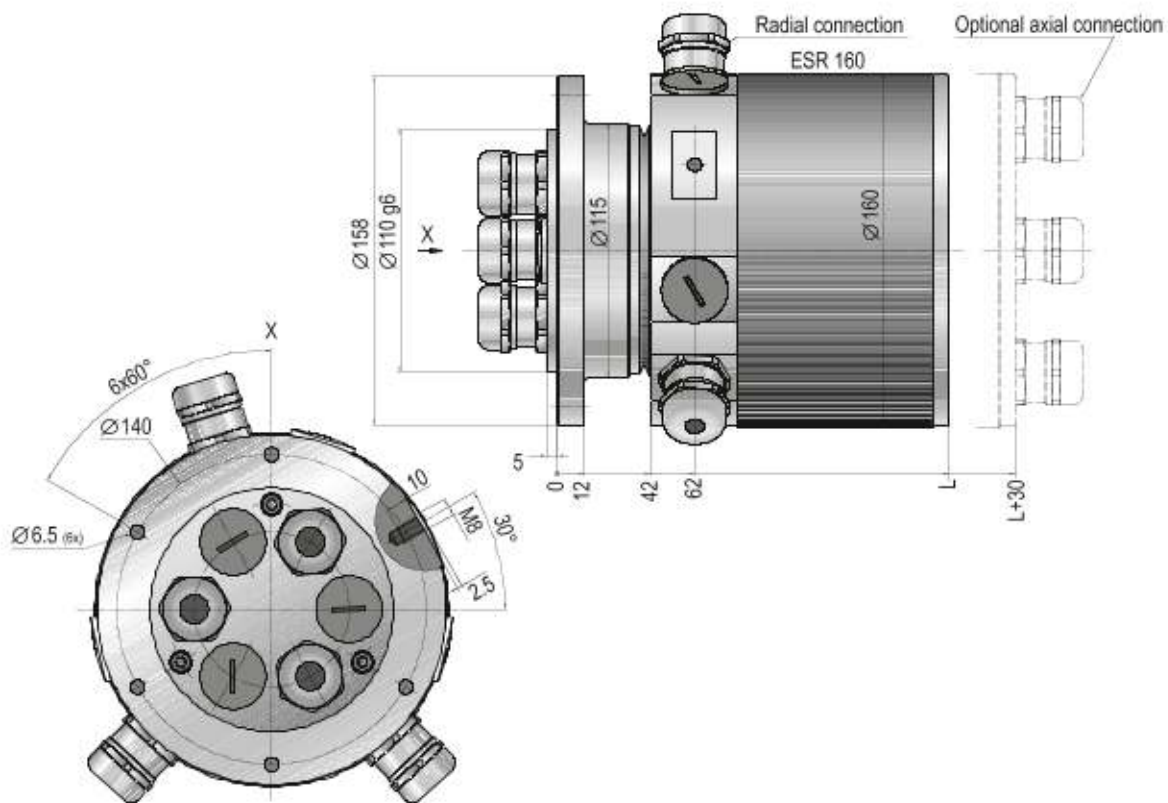
## Applications

The continuously increasing transmission rates in many application areas require high-capacity transmission systems able to handle highest data rates. Being highly resistant against electromagnetic interference, our capacitive slip ring combination ROTOCAP® Ethernet ensures a reliable high-speed data transmission even in environments with strong electric and magnetic interference.

The capacitive slip ring systems ROTOCAP® Ethernet are used in packaging industry, wind turbines, automotive industry, medical equipment, etc...



## ROTOCAP® Ethernet



## Technical Data

ROTOCAP® Ethernet	160...
Housing outer diameter $\varnothing$ (mm)	160
Number of Ethernet paths	1...4
Transmission standard and supported protocols	100BASE-TX (Fast Ethernet, Profinet, POWERLINK, Sercos III, etc.)
Bit error rate max.	$< 10^{-12}$
Latency ( $\mu$ s)	$< 2$
Supply voltage (VDC)	5
Operating temperature range ( $^{\circ}$ C)	-40 to +80
Typical lifespan (mil. rotations)	100
Maintenance intervals (mil. rotations)	Maintenance-free
Air connection ("") (optional)	G $\frac{3}{8}$ or G $\frac{1}{2}$
Pressure max. (bar)	10

# Slip Rings    Optical Transmission Technology

## Product Features

- Very low insertion loss
- Extremely robust design
- Optical performance insensitive to temperature changes
- Single Mode or Multi Mode version available
- Data transmission rates up to 30 Gbit/s
- Immune against EMI and ESD
- Easily upgradeable to multichannel system

## Design and Function

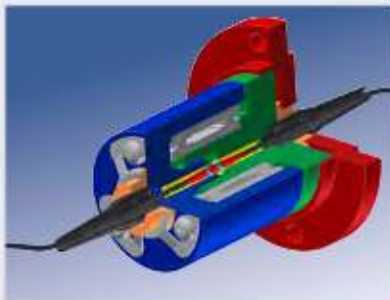
Our Fiber Optical Rotary Union (FORU) ROTORAY® supports contactless high speed bi-directional data transmission through a single fiber between a stationary and a rotating part. It is available for single- and multimode glass fibers. The core technology of this device is a wave length optimized micro lens collimator and high precision bearing system. Our new developed ultra precise alignment process and innovative technology of positioning the optical components results in outstanding optical efficiency. The robust stainless steel design insures nearly unchanged insertion loss even under severe temperature or vibration conditions. The compact stainless steel housing is dust and water tight and made for harsh environment applications. The whole unit is maintenance-free. This FORU is a passive device that will work with any data transmission protocol and can be used for highest data rates up to 30 Gbit/s. The fiber connectors are usually FC/PC or FC/APC, but others are available as well.

## Applications

The ever increasing data transmission rates require high performance communication devices, which can support multi gigabit data rates. Because of its immunity against electromagnetic interference our Fiber Optical Rotary Union can enable high speed data transmission even in areas with high electric and magnetic fields or explosion hazardous environments. A typical operating area of our ROTORAY® is the offshore, marine or energy sector. For example these FORUs are integrated in Remote Operated Vehicles (ROV), which are used for exploration, technical maintenance works, inspections and more. The reels of seismic vessels are fitted as well with these Fiber Optical Rotary Unions for safe transmission of huge data volumes. Other application fields where a reliable high speed data transmission over long distance is required are medical systems, wind turbines, security systems and others.

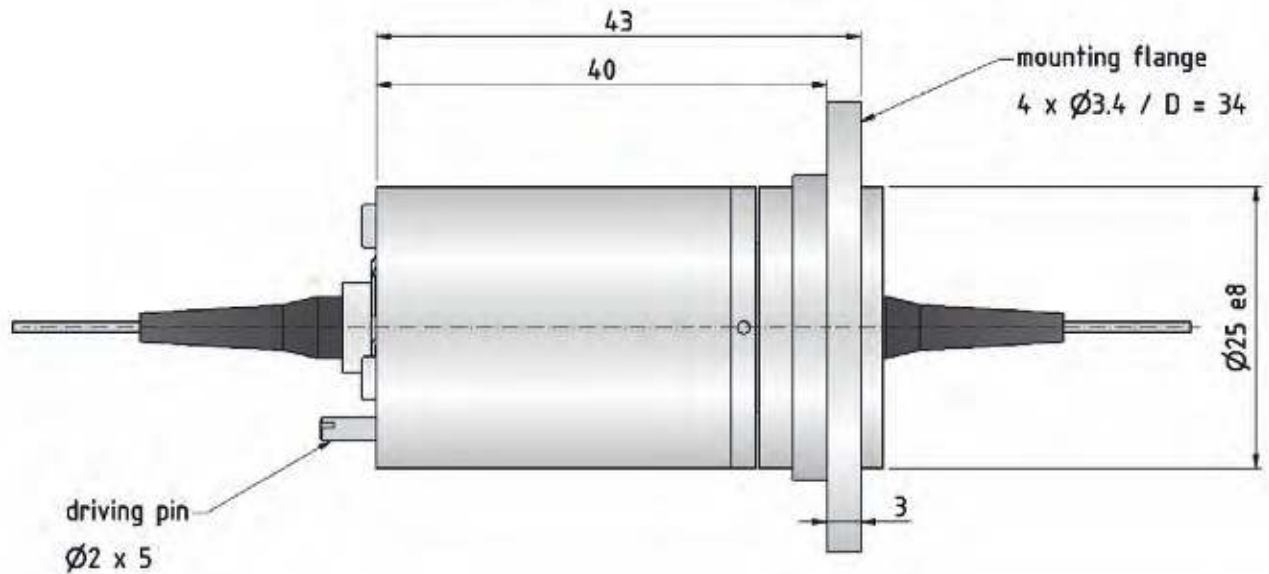
## Versions

If additional channels are required, we can combine this single channel FORU with a multiplexer, which allows transmitting up to 16 independent optical signals over 1 fiber. They are available for 2, 4, 8 or 16 channels and allow a very simple upgrade to more optical channels. All FORUs can be combined with our electrical slip rings as well as our rotary unions.





## ROTORAY® SM1/MM1



### Technical Data

Type	ROTORAY® SM1	ROTORAY® MM1
Fibre types ( $\mu\text{m}$ )	Single Mode 9/125	Multi Mode 62,5/125 Multi Mode 50/125
Wavelength range (nm)	1,310 - 1,650	850 - 1,580
Insertion loss (dB)	< 2.0	< 1.5
Dynamic insertion loss variation (dB)	< 0.5	< 0.5
Back reflexion (dB)	FC/PC - 35 FC/APC - 40	FC/PC - 15 PC/APC - 20
Connector types	FC/PC oder FC/APC	FC/PC oder ST/PC
Operating temperature ( $^{\circ}\text{C}$ )	- 40 to + 80	
Rotations speed (rpm)	2,000	
Protection class	IP 65	
Housing outer diameter $\varnothing$ (mm)	25	
Housing material	Stainless steel	

## Combinations without Limits



### Product Features

- All combinations of various types of GAT rotary unions and slip rings are possible
- Complete system from one single source
- Easy replacement of individual components with our quick-change system
- Simultaneous transmission of electrical currents and signals and media such as air, water, oil, coolant, grease, vacuum, etc.
- For all media with different pressures and flow rates
- Reliable communication via field bus systems and Ethernet
- Low-maintenance sealing systems
- Maintenance-free slip rings
- Very simple to adapt to plant or machine

### Design and Function

With our ROTOKOMBI® system all combinations of slip ring systems and media rotary unions are available. Therefore it is possible to transmit several media with different pressures and electrical currents and signals simultaneously between stationary and rotating machinery parts. The ROTOKOMBI® technology guarantees that for every medium the optimally adapted sealing system is applied. Proven systems and tested components are used, which are assembled specifically for every application according to customer requirements.

This system allows the combination of the features of the slip ring variants ROTOFLEX®, ROTORAY® and ROTOCAP® with any imaginable features of GAT media rotary unions, creating complete rotary transmission systems from one single source.

### Applications

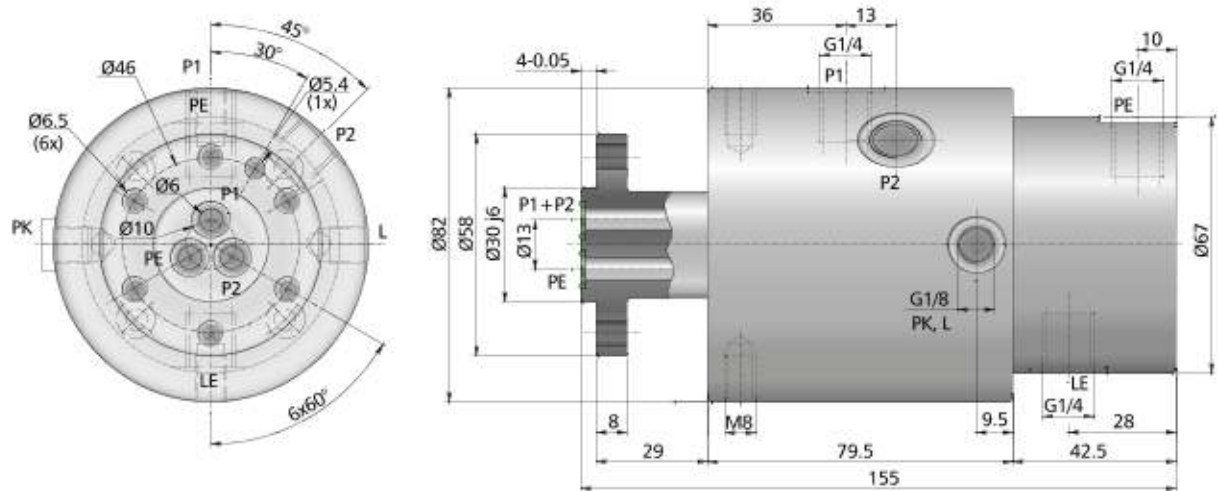
Our ROTOKOMBI® system can be used anywhere where various media or electrical currents must be transferred through an integrated system. There are many applications where our ROTOKOMBI® is used, e.g. in tunnel-boring machines, in centrifuges, rotary table systems, packaging machines, wind turbines, tooling machines, robots, etc..

### Versions

ROTKOMBI® rotary transmission systems are always tailored to the requirements of the customer or application. There is practically no limit to the number of electric poles, the media or the size. The modular design allows the easy replacement/extension or upgrades of individual components of the entire rotary transmission system. Any service work on the sealing systems of the rotary unions can be performed by the customer or operator.

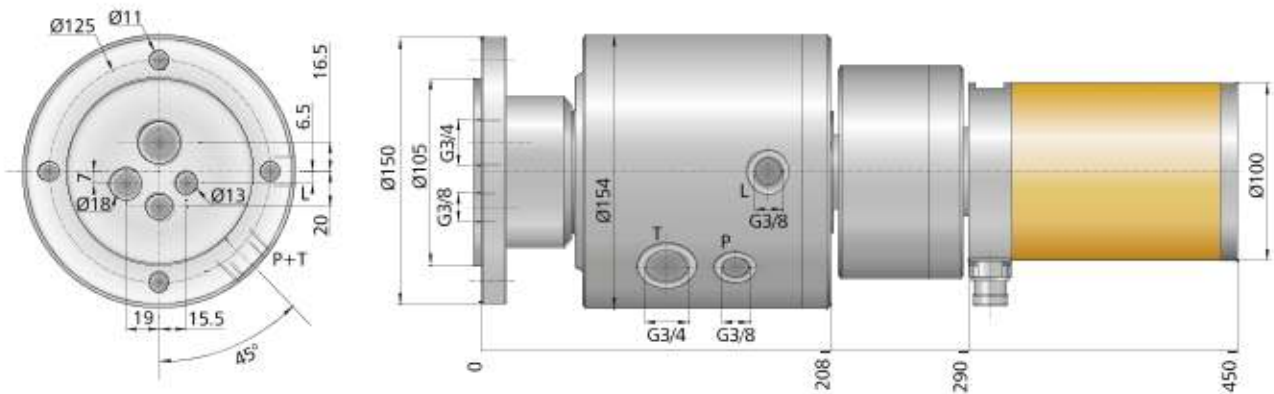
## ROTOKOMBI® M25 EX2 + S0, Type 11379

– 15,000 rpm / Hydraulic Oil, 210 bar / Coolant, 70 bar



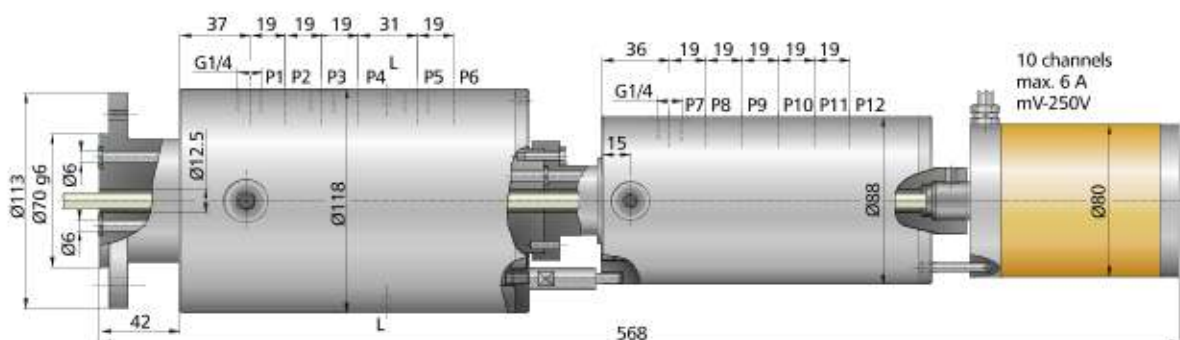
## ROTOKOMBI® M60 EX2 + ESR 100-20, Type 10828

– 19 rpm / Hydraulic Oil, 210 bar



## ROTOKOMBI® M60-6 + MCR 6-06 + ESR 80-10, Type 10976

– 8 rpm / Hydraulic Oil, 140 bar / Water, 6 bar / Air, 12 bar



# Air Bearing Rotary Atomizer



## Product Features

- Air bearing rotary atomiser
- Atomising power max. 1,200 ml H<sub>2</sub>O/min bei 70,000 rpm
- High load capacity for robot applications
- Special bearing material guarantees robustness
- Aerodynamically-enhanced high-performance turbine
- Low air consumption
- Integrated optical encoder
- Development of customer-specific air bearings

## Design and Function

The construction of our rotary atomiser is based on an aerostatic air bearing system that consists of radial and axial bearings fitted with micro jets. The radial bearing has a high load capacity of up to 96 N at the front end of the shaft, specially designed for use with robots (up to 3G). The bearing surfaces are made from special materials with very good failsafe running capability to be able to cope with shaft touch down. A pneumatic radial turbine drives the atomisers. The turbine blade geometry has been perfectly adapted to air inflow and exhaust speeds. The turbine air inlet has been designed to ensure minimum pressure drop, from the connection right up to the blade. This means that the turbine blades are exposed to higher pressure, and this leads to considerably improved performance. A high-contrast axial encoder ring has been incorporated for speed sensing with an operating wavelengths of 880 nm or 650 nm.

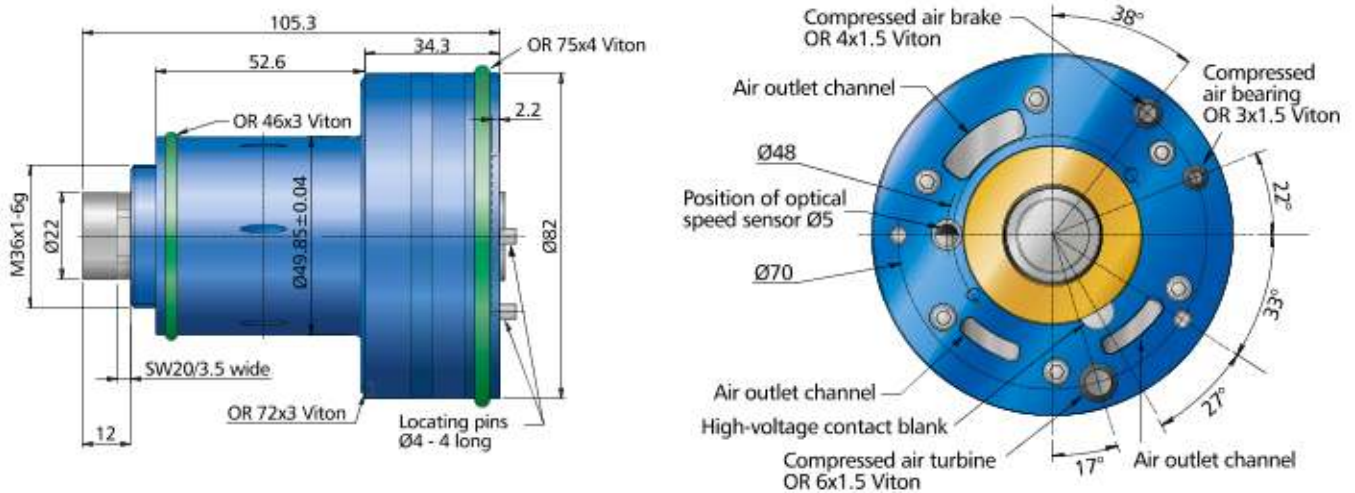
## Applications

The ROTOSPRAY® Z70, Z70 HP und Z70 HP2 rotary atomisers have been designed for paint atomization in automated paint streets. The load capacity of the air bearing has been improved continuously to be able to absorb the high acceleration speeds that occur during robotic painting. The turbine power is twice that of conventional products, allowing large quantities of lacquer to be atomised, even at high speeds.

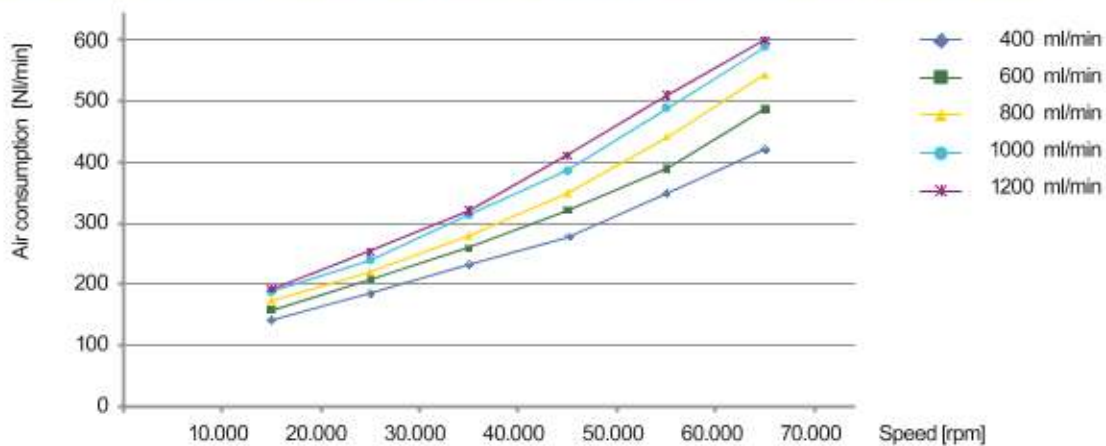
## Versions

The interface of the ROTOSPRAY® rotary atomiser can be customized. Customer specific air bearing designs can be developed as well for other precision or high-speed applications in semi-conductor production, metrology and positioning system technology.

## ROTOPRAY® Z70



### Turbine Air Consumption with a Load of 400-1,200 ml/min H<sub>2</sub>O, D55 Bell



### Technical Data

ROTOPRAY®	Z70-10000B	Z70HP-10269B
Max. speed (rpm)	70,000	70,000
Max. flow rate (ml/min)	600 *	1,200 *
Radial load capacity (N)	82	96
Axial load capacity (N)	158	174
Bearing air pressure (bar)	6	
Bearing air consumption max. (Nl/min)	85	85
Turbine air pressure approx. (bar)	5.5	5.2
Turbine air consumption approx (Nl/min)	470	620
Bell diameter (mm)	55 - 70	

\* At 70,000 rpm, 55 mm bell, medium: Water



## ROTOSTAT® A - Axial Gap Seal

- Hydrostatically regulated axial gap seal
- Transmission of oil, emulsion and other non-greasy liquids, as well as air and gas
- Extremely light and compact design
- Constantly small gap and low leakage
- Cartridge element or complete rotary union with up to eight channels available
- Main field of application is the installation in machine tool spindles for the radial supply of hydraulic oil for rotating hydraulic systems, as well as the supply of coolant or pressurized air.



## ROTOCAL - Sliding Shoe Sealing System

- Radial rotary unions for shaft diameters from 200 mm to 3,000 mm
- Pressure up to 100 bar at a simultaneous rotation speed up to 20 m/s
- Low friction losses
- Very low leakage losses
- For all flow rates
- Suitable for all media
- Typical applications are special machine manufacturing, mining machinery, drive coupling, or propeller pitch control.
- Advantage of the sectoral spraying e.g. in mining machinery: dust is kept down to avoid explosions.



## ROODOCK - Docking System

- For the transmission of a medium at a standstill
- Available for every medium, all pressures and diameters and all flow rates
- Leakage-free
- Very low friction losses
- No friction torque
- Wear-free
- Very economic
- Suitable for hydraulic clamping purposes, by which the tool is changed at standstill but by which otherwise there is a quick relative rotation between the machinery parts.

# Various other products

## ROTOGUIDE - Linear Air Bearing

The design of the Rotoguide high-precision positioning device is based on an air bearing with micro-jet technology. The jet shape ensures maximum load capacity and tolerance against contamination.

Shafts and bearing parts are machined to ultra-high precision for a positioning accuracy within  $\mu\text{m}$  range. A contactless vacuum rotary union with a very low leakage rate can be integrated for vacuum applications. Thanks to the contactless design, linear air bearings are free from wear and resilient to high loads. Linear air bearings can be used for the positioning of components in many applications.

- High-precision linear air bearing with micro-jet technology
- Ultimate linear and rotary accuracy
- Optimized for ultra-high vacuum applications
- Wear-free air bearings with superior load capacity
- Graphite bearing shells for excellent dry-running properties
- Extremely low air consumption
- Due to their high precision these linear air bearings are particularly suitable for vacuum applications and other processes requiring ultimate cleanliness and accuracy.



## Test Rig Technology

We design and manufacture test rigs suitable for running full-load tests of drive elements subject to torsional forces.

The torsion test rig with energy recirculation and mechanical torsional load generation, generally called Four Square Test Rig, using a hydrostatic torsion motor has proved to be extraordinarily efficient in many areas of the relevant performance.

The product features of the GAT test rigs are:

- Low energy consumption
- Low cost of investment
- Low operating and maintenance costs
- Optimal speed and torque controlling
- Pulsating, alternating and dynamic torque induction
- Suitable for integration into existing test rigs
- Fast start-up





## Our Product Portfolio

- Rotary Unions
- Electrical Slip Rings
- Precision Air Bearings
- Test Rig Technology
- Special Equipment



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