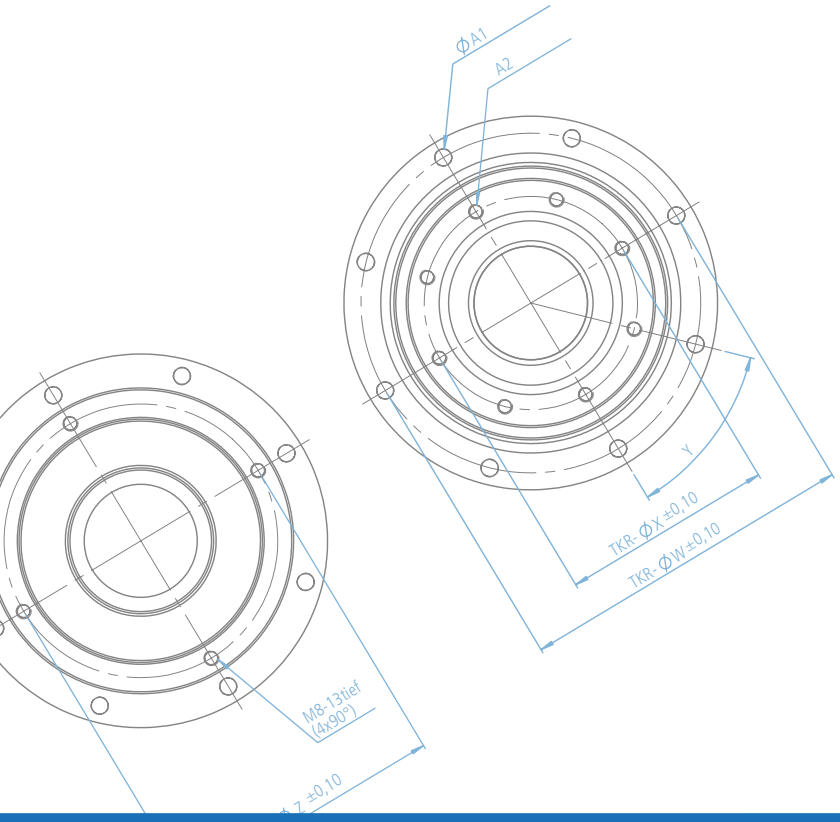
ALMA
driving elements



Vacuum Rotary Feedthroughs

The comprehensive product range with exceedingly flexible flange design, optimized bearing design, and innovative sealing technology

Vacuum Technology

ALMA vacuum rotary feedthroughs: flexible, reliable, compact and efficient

Universal mounting system for precision connections

ALMA feedthroughs are used when rotary motion has to be transmitted into pressurized or vacuum vessels, which must be sealed against gaseous media.

The flange designed by ALMA allows precise assembly in the recipients, as the rotary feedthroughs are equipped with two alternative centering devices on the vacuum side.

Tried and tested mounting threads, in two sizes on the vacuum side, offer the user a high level of flexibility when installing a wide variety of follow-on components.

Advantages of the ALMA flange design

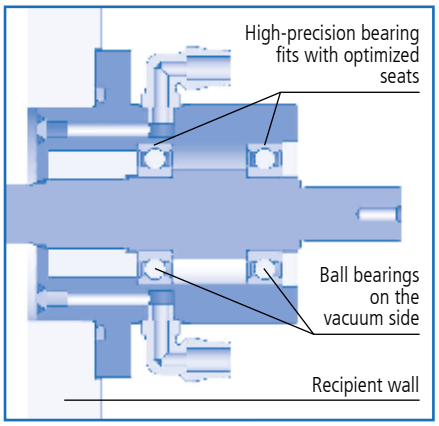
- Highly flexible mounting geometries
- High installation and positional accuracy
- Simple, exact centering (no additional parts required)

Intelligent bearing design

The sophisticated bearing design in all ALMA rotary feedthroughs offers numerous safety features and extreme precision, ensuring optimum true running properties and high load-bearing capacities.

Advantages of the ALMA bearing design

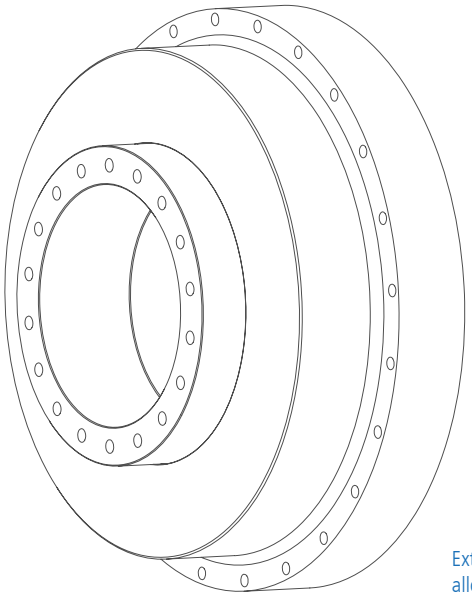
- High-precision bearing fits
- Use of precision bearings with high tilt rigidity
- Exceedingly high true-running accuracy
- Highest load-bearing capacities
- Low drag torque
- No slip-stick phenomenon
- Bearing position on the atmospheric side protects against potential contamination of the vacuum



Compact design with top load-bearing capacities

When designing rotary feedthroughs, ALMA focuses on creating the smallest possible design envelope for the maximum load-bearing capacity. Thus, we have already been able to design customer-specific rotary feedthroughs, which achieve, for example, an axial load-bearing capacity of 10,000 N and a radial load-bearing capacity of 1,000 N for a housing diameter of only 84 mm and a length of only 62 mm.

Another example of a rotary feedthrough designed by us with an excellent performance/size ratio is a feedthrough with an axial load-bearing capacity of 120,000 N and a maximum permissible static tilting moment of 40,000 N – for a length of only 245 mm and a housing diameter of only 600 mm.



Extremely compact rotary feedthrough, allowing very high load-bearing capacities of 10,000 N (axial) and 1,000 N (radial) respectively for its very compact design envelope of only 84 x 62 mm.

ALMA sealing technology ensures the highest level of purity in the vacuum

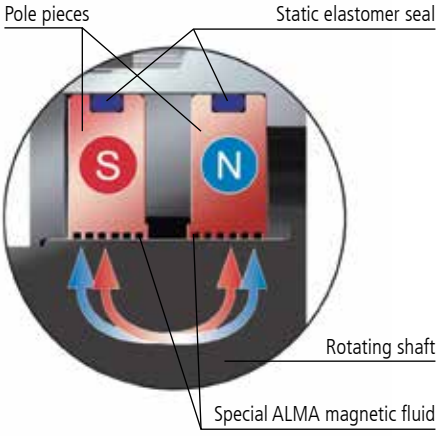
The reliable sealing concept: magnetic fluid seals

The design focus of the ALMA rotary feedthroughs is on tightness and a high level of operational reliability. Our wear-free sealing concept based on magnetic fluid prevents mechanical abrasion, guaranteeing not only a long service life but also a high level of purity in the vacuum application. This benefits the customer, as maintenance downtime is no longer necessary, ensuring maximum system availability.

Magnetic fluid seals utilize the reaction of magnetic fluids to an applied magnetic field. In principle, the seal consists of two pole pieces, a magnet, the magnetic fluid, a rotating shaft and a housing. The magnetic fluid is held in place annularly by the magnetic field at the sealing position between the pole pieces and the rotating shaft. The magnetic fluid thus creates a "liquid sealing lip" and seals hermetically.

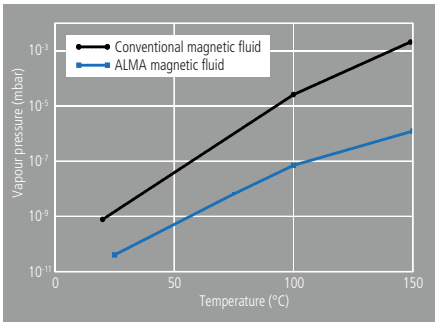
In standard products, the static seal between the housing and the pole pieces is produced by an elastomer O-ring.

The magnetic fluid sealing technology for a high level of vacuum reliability



High-quality special magnetic fluid for maintenance-free applications

ALMA uses a special magnetic fluid that offers significant technical advantages compared to conventional fluids. Due to its significantly lower outgassing, this fluid excels above all in applications involving thermal loading.



The table shows the change in vapor pressure with increasing temperature (the lower the vapor pressure, the lower the outgassing of the fluid). Depending on the application parameters, the vacuum quality thus improves significantly when the ALMA fluid is used.

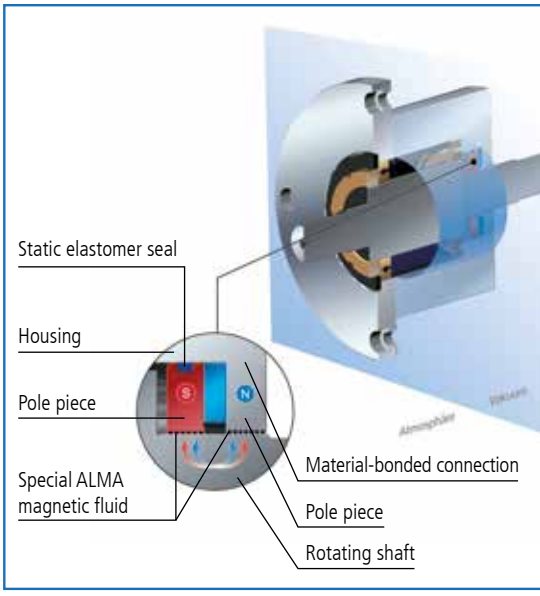
The magnetic fluid in our rotary feedthroughs is hydrocarbon-based and contains an oil that exhibits the lowest vapor pressure of all currently known hydrocarbon oils. The vapor pressure at room temperature is 4 x 10^{-11} mbar and increases to only 7 x 10^{-8} mbar at 100 °C. At present this fluid is used exclusively by ALMA.

Besides the quality criteria, the pollution control of the vacuum, the ALMA fluid also offers economic advantages: The maintenance costs are lower, as the typical shorter maintenance cycles due to the outgassing of conventional fluids are no longer necessary.

The material-bonded connection for UHV applications

If it is necessary to work in an ultra-high vacuum, leakage rates become a problem (e.g. when wafer-coating). ALMA rotary feedthroughs for use in ultra-high vacuums are designed so that a static sealing point is not required, as material bonding is used rather than an elastomer O-ring.

The innovative design concept of material-bonded connections



The pole piece is materially bonded with the housing. Unlike the use of O-rings, this design principle ensures that no permeability to the vacuum occurs. Additional advantage: The pole piece can be cooled directly. This facilitates the bake-out process.

Advantages of ALMA sealing technologies

- Material-bonded joining technology for UHV rotary feedthroughs
- Special ALMA magnetic fluid for greater vacuum integrity and efficiency
- No particle formation
- 100 % maintenance-free

Rotary feedthroughs with ALMA flange and long solid shaft

For high rotational speeds
High level of positional accuracy

These rotary feedthroughs are equipped with the ALMA flange and provide the user with a large degree of freedom during installation.

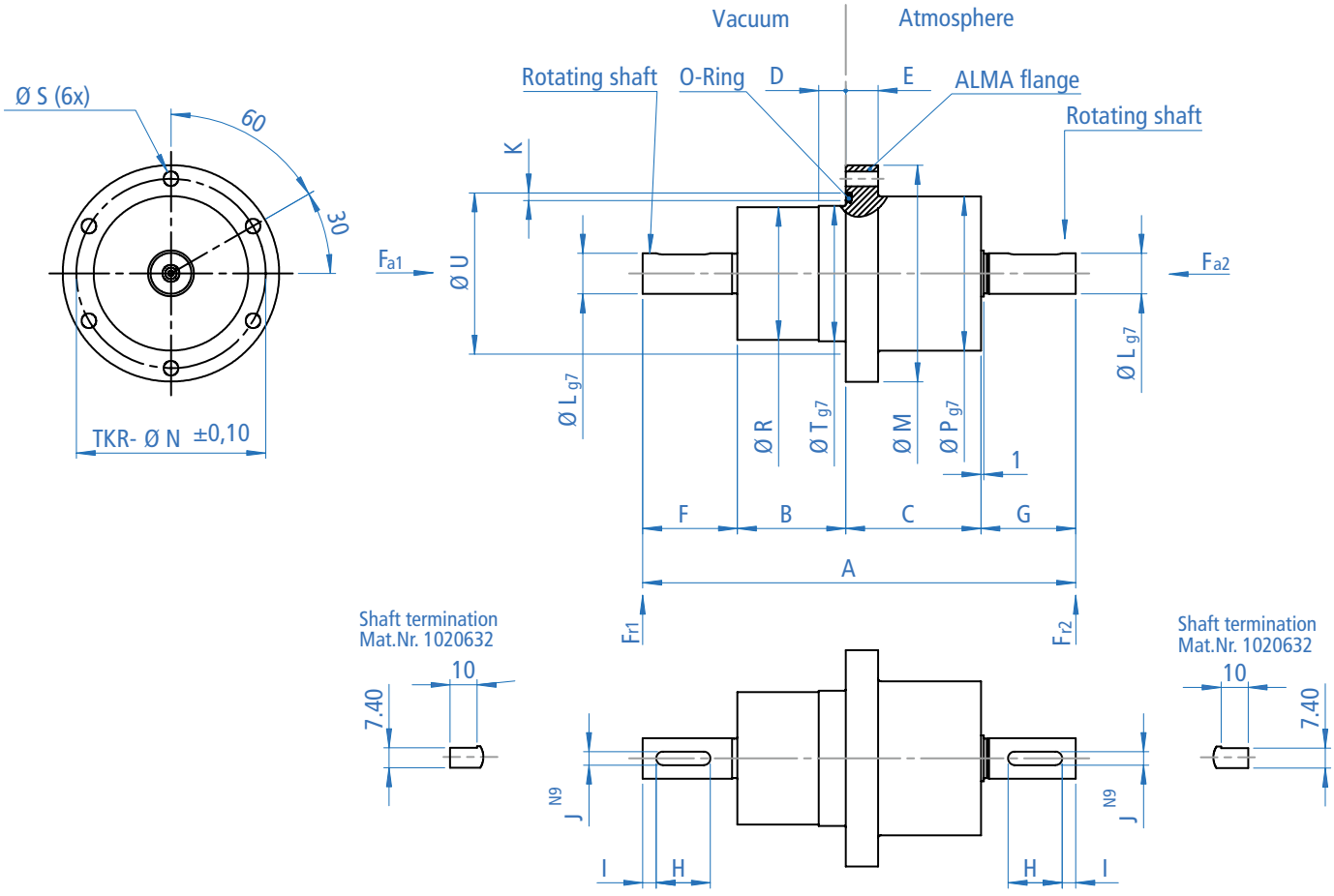
The recipient can be designed to exactly suit the individual installation requirements. Another advantage is the higher installation and positional accuracy of the rotary feedthroughs in recipients ensured by the ALMA flange. No additional components are required for centering and exact positioning.

Technical data

Leakage rate: < 1 x 10^{-8} mbar x l/s
Operating temp., non-cooled: -20 to 90 °C
Operating temperature, cooled: > 90 °C
Rotational speed: up to 10,000 rpm
Torque: up to 32 Nm
Pressure differential: up to 1 bar
Vacuum range: up to UHV
Shaft diameter: up to 15 mm
Flange diameter: up to 80 mm
Radial load: up to 200 N
Axial load: up to 150 N
Housing: Stainless steel
Shaft: Stainless steel, magnetic
Magnetic fluid: Maintenance-free

Available options

- Housing cooling
- Customer-specific versions



Model	ALMA-M-AF-008-V-U	ALMA-M-AF-010-V-U	ALMA-M-AF-012-V-U	ALMA-M-AF-015-V-U
Part number	1020632	1020631	1020630	1020629
Weight (kg)	0.300	0.550	0.950	1.600
Dimensions (mm)				
Shaft diameter, vacuum side [L_{g7}]	8.0	10.0	12.0	15.0
Shaft diameter, atmospheric side [L_{g7}]	8.0	10.0	12.0	15.0
Shaft length, vacuum side [F]	30.0	30.0	35.0	35.0
Shaft length, atmospheric side [G]	23.0	27.0	30.0	35.0
Total length [A]	95.0	115.0	150.0	160.0
Length, atmospheric side [C+G]	57.0	73.0	85.0	85.0
Length, vacuum side [B+F]	38.0	42.0	65.0	75.0
Total housing length [B+C]	42.0	58.0	85.0	90.0
Housing length, vacuum side [B]	8.0	12.0	30.0	40.0
Housing length, atmospheric side [C]	34.0	46.0	55.0	50.0
Housing fit diameter, vacuum side [T_{g7}]	28.0	30.0	37.0	50.0
Housing diameter, vacuum side [R]	—	—	36.0	49.0
Housing diameter, atmospheric side [P_{g7}]	28.0	38.0	45.0	57.0
Length of parallel-key groove [H]	—	17.0	20.0	20.0
Distance from parallel-key groove to shaft end [I]	—	4.0	5.0	5.0
Width of parallel-key groove [J^{N9}]	—	3.0	4.0	5.0
Flange diameter [M]	48.0	55.0	66.0	80.0
Flange length [E]	10.0	12.0	12.0	12.0
O-ring diameter [U]	34.0	41.0	47.0	60.0
Pitch circle diameter [N]	$40^{\pm 0.10}$	$48^{\pm 0.10}$	$56^{\pm 0.10}$	$70^{\pm 0.10}$
Through-hole diameter [S]	3.4 (6x)	4.5 (6x)	5.5 (6x)	5.5 (6x)
Shaft specification				
Max. rotational speed	10,000 min^{-1}	10,000 min^{-1}	7,500 min^{-1}	9,000 min^{-1}
Max. transmittable torque*	5.00 Nm	9.00 Nm	16.00 Nm	32.00 Nm
Friction torque	0.25 Nm	0.3 Nm	0.3 Nm	0.4 Nm
Max. axial load [F_{a1}] **	30.00 N	50.00 N	50.00 N	150.00 N
Max. axial load [F_{a2}] **	30.00 N	50.00 N	50.00 N	150.00 N
Max. radial load [F_{r1}] **	30.00 N	75.00 N	75.00 N	200.00 N
Max. radial load [F_{r2}] **	30.00 N	75.00 N	75.00 N	200.00 N

* The torque calculation is based on mean calculated values.
** The load calculation is based on assumed values, which cover 95 % of applications. Individual calculations can be made for borderline applications.

Rotary feedthroughs with highly variable ALMA flange and short solid shaft

For high transmittable torque
A wide variety of connection options
Compact design

These rotary feedthroughs guarantee maximum flexibility when connecting your attachments in a vacuum.

The short shaft end on the vacuum side is equipped with a flange connection with two centering options. To connect the follow-on components, two different thread sizes are available on one pitch circle.

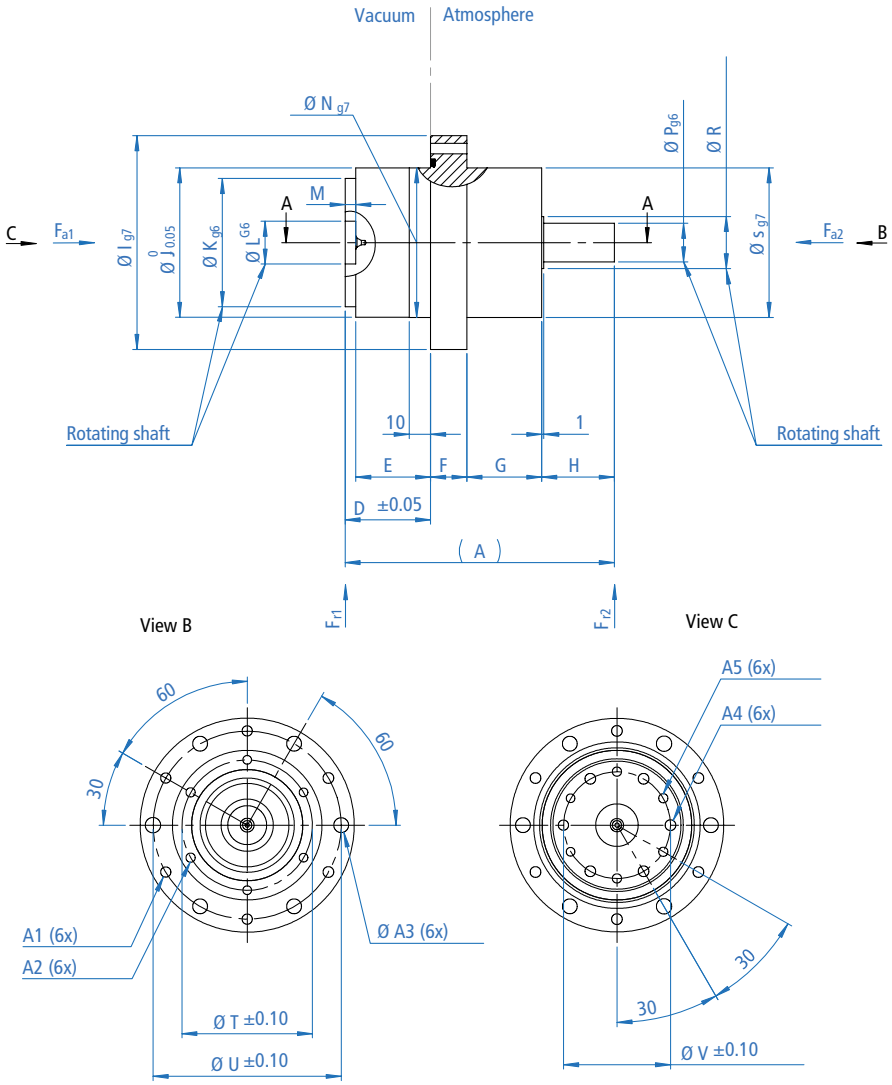
On the atmospheric side of the rotary feed-through housing there is a pitch circle with mounting threads for add-on components such as torque brackets, motor adapter flanges, etc.

Technical data

Leakage rate: < 1 x 10^{-8} mbar x l/s
Operating temp., non-cooled: -20 to 90 °C
Operating temperature, cooled: > 90 °C
Rotational speed: up to 4,000 rpm
Torque: up to 400 Nm
Pressure differential: up to 1 bar
Vacuum range: up to UHV
Shaft diameter: up to 79 mm
Flange diameter: up to 130 mm
Radial load: up to 400 N
Axial load: up to 300 N
Housing: Stainless steel
Shaft: Stainless steel, magnetic
Magnetic fluid: Maintenance-free

Available options

- Housing cooling
- Customer-specific versions



Model	ALMA-M-AF-044-A-U	ALMA-M-AF-060-A-U	ALMA-M-AF-064-A-U	ALMA-M-AF-069-A-U	ALMA-M-AF-079-A-U
Part number	1020634	1019198	1039773	1039774	1039775
Weight (kg)	1.500	3.000	5.000	5.600	7.300
Dimensions (mm)					
Shaft diameter, vacuum side [K_{g6}]	44.0	60.0	64.0	69.0	79.0
Shaft diameter, atmospheric side [P_{g6}]	14.0	18.0	22.0	28.0	38.0
Shoulder diameter, atmospheric side [R]	15.0	24.0	24.0	29.5	39.5
Internal dia. of the shaft fit, vacuum side [L^{G6}]	16.0	20.0	20.0	25.0	30.0
Centering depth shaft [M]	3.0	5.0	5.0	5.0	5.0
Total length [A]	100.0	126.0	166.0	172.0	180.0
Length, atmospheric side [F+G+H]	66.0	86.0	122.0	128.0	136.0
Length, vacuum side [$D^{\pm 0.05}$]	34.0	40.0	44.0	44.0	44.0
Total housing length [E+F+G]	75.0	87.0	110.0	110.0	110.0
Housing length, vacuum side [E]	30.0	35.0	35.0	35.0	35.0
Housing length, atmospheric side [F+G]	45.0	52.0	75.0	75.0	75.0
Housing fit diameter, vacuum side [N_{g7}]	54.0	70.0	75.0	80.0	90.0
Housing diameter, vacuum side [$J^{0}_{-0.05}$]	53.95	69.95	74.95	79.95	89.95
Housing diameter, atmospheric side [S_{g7}]	58.0	70.0	80.0	88.0	98.0
Flange diameter [I_{g7}]	80.0	100.0	115.0	120.0	130.0
Flange length [F]	15.0	17.0	25.0	25.0	25.0
O-ring diameter [D]	62,0	78,0	90,0	95,0	105,0
Pitch circle diameter [T]	$50^{\pm 0.10}$	$61^{\pm 0.10}$	$65^{\pm 0.10}$	$75^{\pm 0.10}$	$85^{\pm 0.10}$
Pitch circle diameter [U]	$72^{\pm 0.10}$	$88^{\pm 0.10}$	$103^{\pm 0.10}$	$108^{\pm 0.10}$	$118^{\pm 0.10}$
Pitch circle diameter [V]	$36^{\pm 0.10}$	$50^{\pm 0.10}$	$55^{\pm 0.10}$	$60^{\pm 0.10}$	$70^{\pm 0.10}$
Tapped hole (Ø x T) [A1]	M5 x 15 (6x)	M6 x 17 (6x)	M6 x 12 (6x)	M6 x 12 (6x)	M6 x 12 (6x)
Tapped hole (Ø x T) [A2]	M4 x 8 (6x)	M5 x 10 (6x)	M6 x 12 (6x)	M6 x 12 (6x)	M6 x 12 (6x)
Through-hole (Ø) [A3]	5.5 (6x)	7 (6x)	7 (6x)	7 (6x)	7 (6x)
Tapped through-hole (Ø x T) [A4]	M5 x 6 (6x)	M6 x 8 (6x)	M5 x 11 (6x)	M6 x 11 (6x)	M6 x 11 (6x)
Tapped through-hole (Ø x T) [A5]	M4 x 6 (6x)	M5 x 8 (6x)	M4 x 11 (6x)	M5 x 11 (6x)	M5 x 11 (6x)
Shaft specification					
Max. rotational speed	4,000 min^{-1}	2,000 min^{-1}	200–2,000 min^{-1}	200–2,000 min^{-1}	200–2,000 min^{-1}
Max. transmittable torque*	30.00 Nm	70.00 Nm	80.00 Nm	150.00 Nm	400.00 Nm
Friction torque	0.45 Nm	0.5 Nm			
Max. axial load [F_{a1}] **	300 N	300 N	300 N	300 N	300 N
Max. axial load [F_{a2}] **	300 N	300 N	150 N	150 N	150 N
Max. radial load [F_{r1}] **	300 N	300 N	300 N	350 N	400 N
Max. radial load [F_{r2}] **	300 N	300 N	300 N	350 N	400 N

* The torque calculation is based on mean calculated values.

** The load calculation is based on assumed values, which cover 95 % of applications. Individual calculations can be made for borderline applications.

Rotary feedthroughs with highly variable ALMA flange and short hollow shaft

For high transmittable torque
A wide variety of connection options
Compact design

These rotary feedthroughs guarantee maximum flexibility when connecting your attachments in a vacuum. Media can be conducted through the hollow shaft, e.g. hoses or cables.

The short shaft end on the vacuum side is equipped with a flange connection with two centering options. To connect the driven components, two different thread sizes are available on one pitch circle diameter.

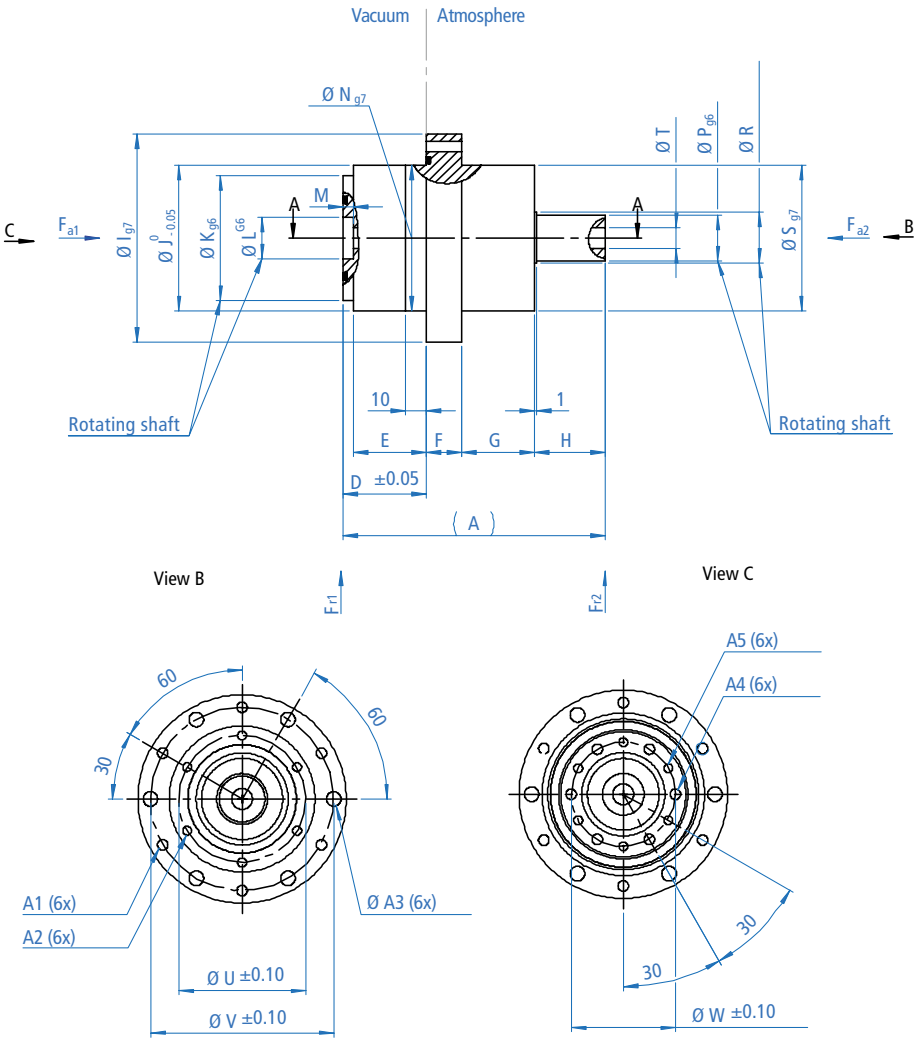
On the atmospheric side of the rotary feedthrough housing there is a pitch circle with mounting threads for add-on components such as torque brackets, motor adapter flanges, etc.

Technical data

Leakage rate: < 1 x 10^{-8} mbar x l/s
Operating temp., non-cooled: -20 to 90 °C
Operating temperature, cooled: > 90 °C
Rotational speed: up to 4,000 rpm
Torque: up to 400 Nm
Pressure differential: up to 1 bar
Vacuum range: up to UHV
Hollow shaft, internal dia.: up to 25 mm
Flange diameter: up to 130 mm
Radial load: up to 400 N
Axial load: up to 300 N
Housing: Stainless steel
Shaft: Stainless steel, magnetic
Magnetic fluid: Maintenance-free

Available options

- Housing cooling
- Customer-specific versions



Model	ALMA-H-AF-008-A-U	ALMA-H-AF-010-A-U	ALMA-H-AF-015-A-U	ALMA-H-AF-020-A-U	ALMA-H-AF-025-A-U
Part number	1020635	1019200	1039772	1027453	1022452
Weight (kg)	1.500	3.000	4.700	5.200	6.500
Dimensions (mm)					
Internal diameter, hollow shaft [T]	8.0	10.0	15.0	20.0	25.0
Shaft diameter, vacuum side [K_{g6}]	44.0	60.0	64.0	69.0	79.0
Shaft diameter, atmospheric side [P_{g6}]	14.0	22.0	22.0	28.0	38.0
Shoulder diameter, atmospheric side [R]	15.0	$24.4^{\ 0}_{-0.05}$	24.0	29.5	39.5
Internal dia. of the shaft fit, vacuum side [L^{G6}]	16.0	20.0	20.0	25.0	30.0
Centering depth shaft [M]	3.0	5.0	5.0	5.0	5.0
Total length [A]	100.0	126.0	166.0	172.0	180.0
Length, atmospheric side [F+G+H]	66.0	86.0	122.0	128.0	136.0
Length, vacuum side [$D^{\pm 0.05}$]	34.0	40.0	44.0	44.0	44.0
Total housing length [E+F+G]	75.0	87.0	110.0	110.0	110.0
Housing length, vacuum side [E]	30.0	35.0	35.0	35.0	35.0
Housing length, atmospheric side [F+G]	45.0	52.0	75.0	75.0	75.0
Housing fit diameter, vacuum side [N_{g7}]	54.0	70.0	75.0	80.0	90.0
Housing diameter, vacuum side [$J^{\ 0}_{-0.05}$]	53.95	69.95	$74.95^{\ 0}_{-0.05}$	$79.95^{\ 0}_{-0.05}$	$89.95^{\ 0}_{-0.05}$
Housing diameter, atmospheric side [S_{g7}]	58.0	70.0	80.0	88.0	98.0
Flange diameter [I_{g7}]	80.0	100.0	115.0	120.0	130.0
Flange length [F]	15.0	17.0	25.0	25.0	25.0
Pitch circle diameter [U]	$50^{\pm 0.10}$	$61^{\pm 0.10}$	$65^{\pm 0.10}$	$75^{\pm 0.10}$	$85^{\pm 0.10}$
Pitch circle diameter [V]	$72^{\pm 0.10}$	$88^{\pm 0.10}$	$103^{\pm 0.10}$	$108^{\pm 0.10}$	$118^{\pm 0.10}$
Pitch circle diameter [W]	$36^{\pm 0.10}$	$50^{\pm 0.10}$	$55^{\pm 0.10}$	$60^{\pm 0.10}$	$70^{\pm 0.10}$
Tapped through-hole (Ø) [A1]	M5 (6x)	M6 (6x)	M6 (6x)	M6 (6x)	M6 (6x)
Tapped hole (Ø x T) [A2]	M4 x 8 (6x)	M5 x 10 (6x)	M6 x 12 (6x)	M6 x 12 (6x)	M6 x 12 (6x)
Through-hole (Ø) [A3]	5.5 (6x)	7 (6x)	7 (6x)	7 (6x)	7 (6x)
Tapped hole (Ø x T) [A4]	M5 x 6 (6x)	M6 x 8 (6x)	M5 x 11 (6x)	M6 x 11 (6x)	M6 x 11 (6x)
Tapped hole (Ø x T) [A5]	M4 x 6 (6x)	M5 x 8 (6x)	M4 x 11 (6x)	M5 x 11 (6x)	M5 x 11 (6x)
Shaft specification					
Max. rotational speed	4,000 min^{-1}	2,000 min^{-1}	200–2,000 min^{-1}	200–2,000 min^{-1}	200–2,000 min^{-1}
Max. transmittable torque*	30.00 Nm	70.00 Nm	80.00 Nm	150.00 Nm	400.00 Nm
Friction torque	0.45 Nm	0.5 Nm			
Max. axial load [F_{a1}] **	300 N	300 N	300 N	300 N	300 N
Max. axial load [F_{a2}] **	300 N	300 N	150 N	150 N	150 N
Max. radial load [F_{r1}] **	300 N	300 N	300 N	350 N	400 N
Max. radial load [F_{r2}] **	300 N	300 N	300 N	350 N	400 N

* The torque calculation is based on mean calculated values.

** The load calculation is based on assumed values, which cover 95 % of applications.
Individual calculations can be made for borderline applications.

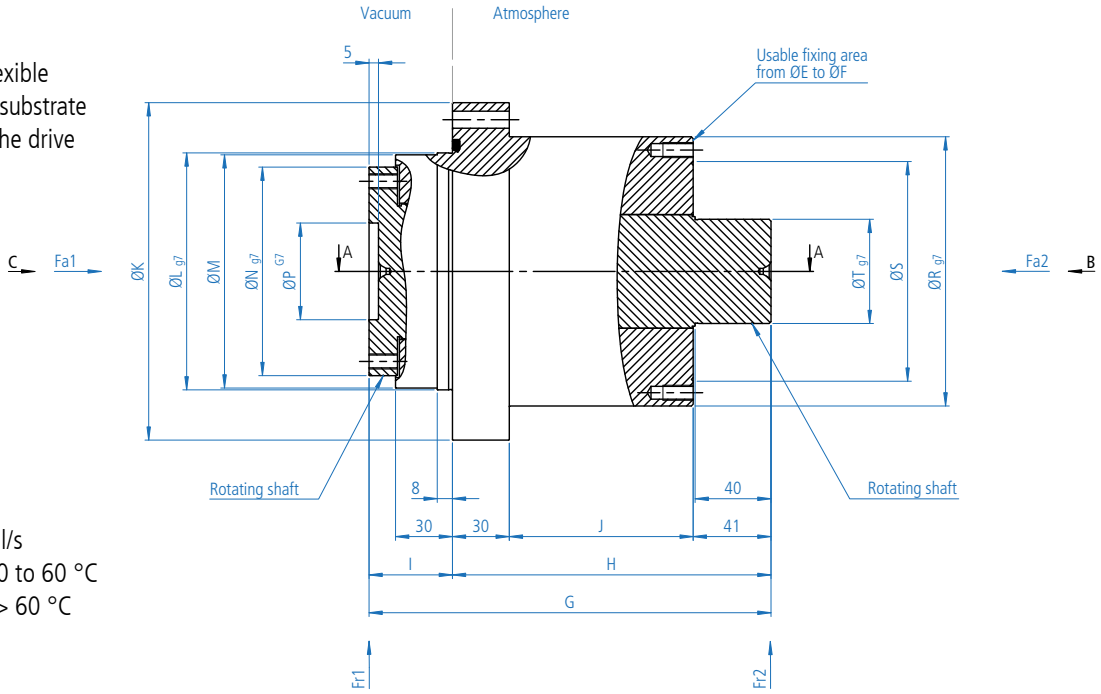
Rotary feedthroughs for very high axial loads, with ALMA flange and short solid shaft

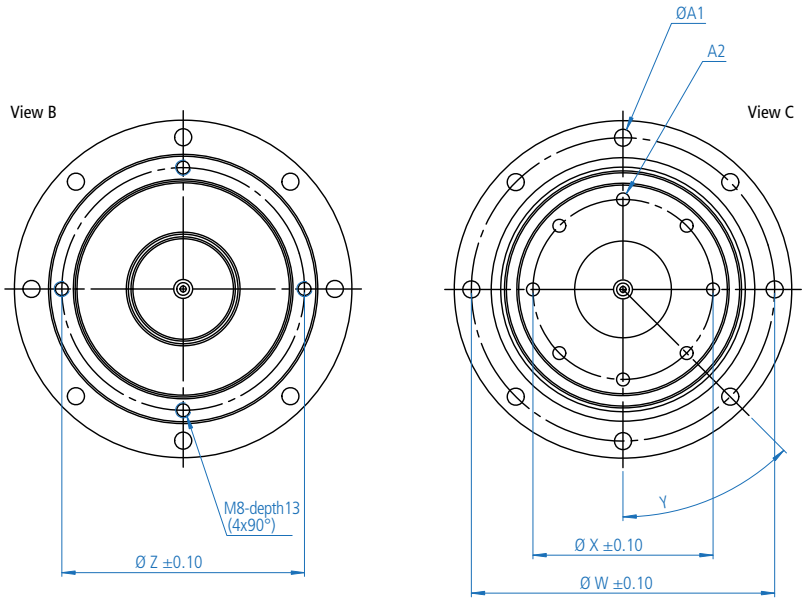
For very high axial loads
For high transmittable torque
A wide variety of connection options

These rotary feedthroughs are ideal for applications involving high axial loads combined with low rotational speeds and high output torques.

The figures given are approximate values, which can change if one of the other parameters varies. In this case, we will recalculate these figures according to your specification.

The ALMA flange has a highly flexible mounting geometry for both the substrate carrier on the vacuum side and the drive design on the atmospheric side.



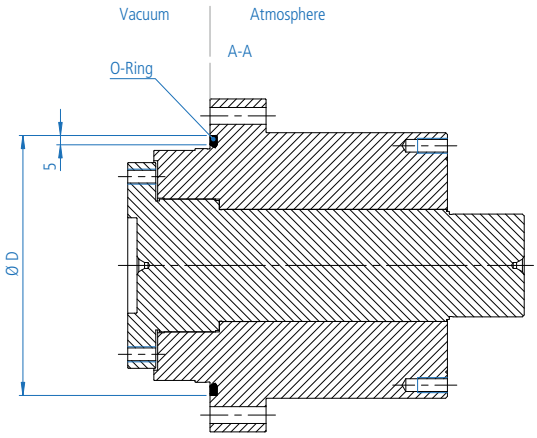


Technical data

Leakage rate: < 1 x 10^{-8} mbar x l/s
Operating temp., non-cooled: -20 to 60 °C
Operating temperature, cooled: > 60 °C
Rotational speed: up to 300 rpm
Torque: up to 1,200 Nm
Pressure differential: up to 1 bar
Vacuum range: up to UHV
Shaft diameter: up to 130 mm
Flange diameter: up to 198 mm
Radial load: up to 500 N
Axial load: up to 10,000 N
Housing: Stainless steel
Shaft: Stainless steel, magnetic
Magnetic fluid: Maintenance-free

Available options

- Housing cooling
- Customer-specific versions



Model	ALMA-M-AF-080-A-U	ALMA-M-AF-110-A-U	ALMA-M-AF-130-A-U
Part number	1023751	1023752	1039776
Weight (kg)	11.500	23.000	33.000
Dimensions (mm)			
Shaft diameter, vacuum side [N_{g7}]	80.0	110.0	130.0
Shaft diameter, atmospheric side [T_{g7}]	40.0	55.0	75.0
Internal diameter of the shaft fit, vacuum side [p^{G7}]	36.0	51.0	66.0
Total length [G]	180.0	212.0	244.0
Length, atmospheric side [H]	140.0	168.0	197.0
Length, vacuum side [I]	40.0	44.0	47.0
Total housing length [J+60.0]	129.0	157.0	186.0
Housing length, atmospheric side [J]	69.0	97.0	126.0
Housing fit diameter, vacuum side [L_{g7}]	100.0	125.0	145.0
Housing diameter, vacuum side [M]	98.0	123.0	143.0
Housing diameter, atmospheric side [R_{g7}]	116.0	142.0	162.0
Flange diameter [K]	140.0	178.0	198.0
Flange length	30.0	30.0	30.0
Shaft nut diameter [S]	91.0	116.0	131.0
O-ring diameter [D]	114.0	139.0	159.0
Available mounting surface [E]	91.0	116.0	131.0
Available mounting surface [F]	116.0	142.0	162.0
Pitch circle diameter [W]	$128^{\pm 0.10}$	$160^{\pm 0.10}$	$180^{\pm 0.10}$
Pitch circle diameter [X]	$68^{\pm 0.10}$	$95^{\pm 0.10}$	$113^{\pm 0.10}$
Pitch circle diameter [Z]	103.0	128.0	$145^{\pm 0.10}$
Through-hole (Ø) [A1]	7 (6x)	9 (8x)	9 (8x)
Tapped through-hole (Ø x T) [A2]	M6 x 11 (6x)	M8 x 15 (8x)	M8 x 18 (8x)
Shaft specification			
Max. rotational speed	300 min^{-1}	300 min^{-1}	300 min^{-1}
Max. transmittable torque*	200.00 Nm	450.00 Nm	1,200.00 Nm
Friction torque	3 Nm	4 Nm	8 Nm
Max. axial load [F_{a1}] **	3,000 N	7,000 N	10,000 N
Max. axial load [F_{a2}] **	3,000 N	7,000 N	10,000 N
Max. radial load [F_{r1}] **	500 N	500 N	500 N
Max. radial load [F_{r2}] **	500 N	500 N	500 N

* The torque calculation is based on mean calculated values.
** The load calculation is based on assumed values, which cover 95 % of applications.
Individual calculations can be made for borderline applications.

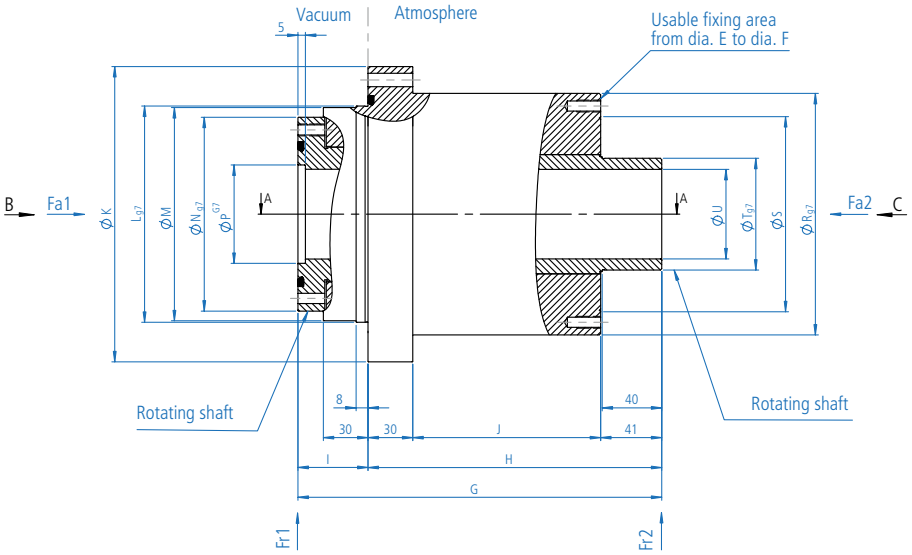
Rotary feedthroughs for very high axial loads, with ALMA flange and short hollow shaft

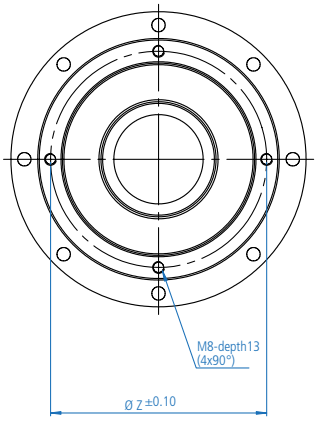
For very high axial loads
For high transmittable torque
Large internal diameter of hollow shaft
A wide variety of connection options

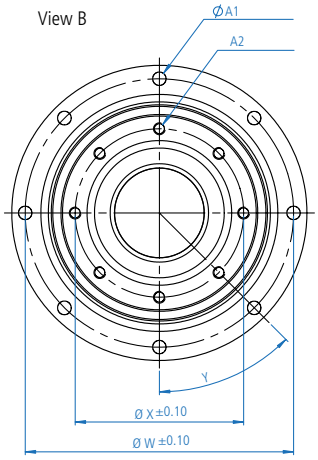
These rotary feedthroughs are much more than just "hollow-shaft seals". They perform important support and load-bearing functions within the assembly.

In conventional solutions the shaft was often installed by the customer. Here the hollow shaft is integrated, not only allowing one sealing position to be omitted, but also ruling out damage during assembly.

The ALMA flange has a highly flexible mounting geometry for both the substrate carrier on the vacuum side and the drive design on the atmospheric side.

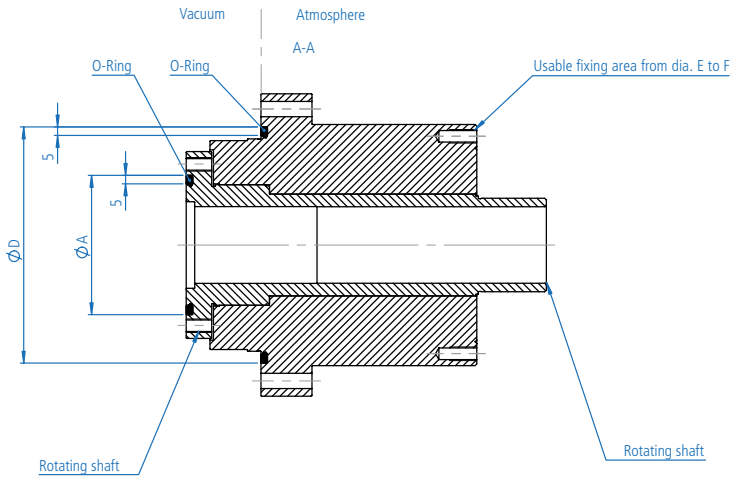






Technical data
Leakage rate: < 1 x 10^{-8} mbar x l/s
Operating temp., non-cooled: -20 to 60 °C
Operating temperature, cooled: > 60 °C
Rotational speed: up to 300 rpm
Torque: up to 1,200 Nm
Pressure differential: up to 1 bar
Vacuum range: up to UHV
Shaft diameter: up to 130 mm
Flange diameter: up to 198 mm
Radial load: up to 500 N
Axial load: up to 10,000 N
Housing: Stainless steel
Shaft: Stainless steel, magnetic
Magnetic fluid: Maintenance-free

Available options
- Housing cooling
- Customer-specific versions



Model	ALMA-H-AF-030-A-U	ALMA-H-AF-045-A-U	ALMA-H-AF-060-A-U
Part number	1022755	1022446	1022445
Weight (kg)	10.500	18.000	27.000
Dimensions (mm)			
Internal diameter, hollow shaft [U]	30.0	45.0	60.0
Shaft diameter, vacuum side [N_{g7}]	80.0	110.0	130.0
Shaft diameter, atmospheric side [T_{g7}]	40.0	55.0	75.0
Internal diameter of the shaft fit, vacuum side [p^{G7}]	36.0	51.0	66.0
Total length [G]	180.0	212.0	244.0
Length, atmospheric side [H]	140.0	168.0	197.0
Length, vacuum side [I]	40.0	44.0	47.0
Total housing length [J+60.0]	129.0	157.0	186.0
Housing length, vacuum side [J]	69.0	97.0	126.0
Housing fit diameter, vacuum side [L_{g7}]	100.0	125.0	145.0
Housing diameter, vacuum side [M]	98.0	123.0	143.0
Housing diameter, atmospheric side [R_{g7}]	116.0	142.0	162.0
Flange diameter [K]	140.0	178.0	198.0
Flange length [F]	30.0	30.0	30.0
Shaft nut diameter [S]	91.0	116.0	131.0
O-ring diameter [A]	57.0	82.0	97.0
O-ring diameter [D]	114.0	139.0	159.0
Available mounting surface [E]	91.0	116.0	131.0
Available mounting surface [F]	116.0	142.0	162.0
Pitch circle diameter [W]	$128^{\pm 0.10}$	$160^{\pm 0.10}$	$180^{\pm 0.10}$
Pitch circle diameter [X]	$68^{\pm 0.10}$	$95^{\pm 0.10}$	$113^{\pm 0.10}$
Pitch circle diameter [Z]	$103.0^{\pm 0.10}$	$128.0^{\pm 0.10}$	$145^{\pm 0.10}$
Through-hole (Ø) [A1]	7 (6x)	9 (8x)	9 (8x)
Tapped hole (Ø x T) [A2]	M6 x 11 (6x)	M8 x 15 (8x)	M8 x 18 (8x)
Shaft specification			
Max. rotational speed	300 min^{-1}	300 min^{-1}	300 min^{-1}
Max. transmittable torque*	200.00 Nm	450.00 Nm	1,200.00 Nm
Friction torque	3 Nm	4 Nm	8 Nm
Max. axial load [F_{a1}] **	3,000 N	7,000 N	10,000 N
Max. axial load [F_{a2}] **	3,000 N	7,000 N	10,000 N
Max. radial load [F_{r1}] **	500 N	500 N	500 N
Max. radial load [F_{r2}] **	500 N	500 N	500 N

* The torque calculation is based on mean calculated values.
** The load calculation is based on assumed values, which cover 95 % of applications.
Individual calculations can be made for borderline applications.

Rotary feedthroughs with KF flange

Low-priced standard models
For high rotational speeds

These rotary feedthroughs are available with the following flanges: KF-DN 25, 32, 40 and 50. They are delivered with a suitable O-ring, which is also available as a spare part.

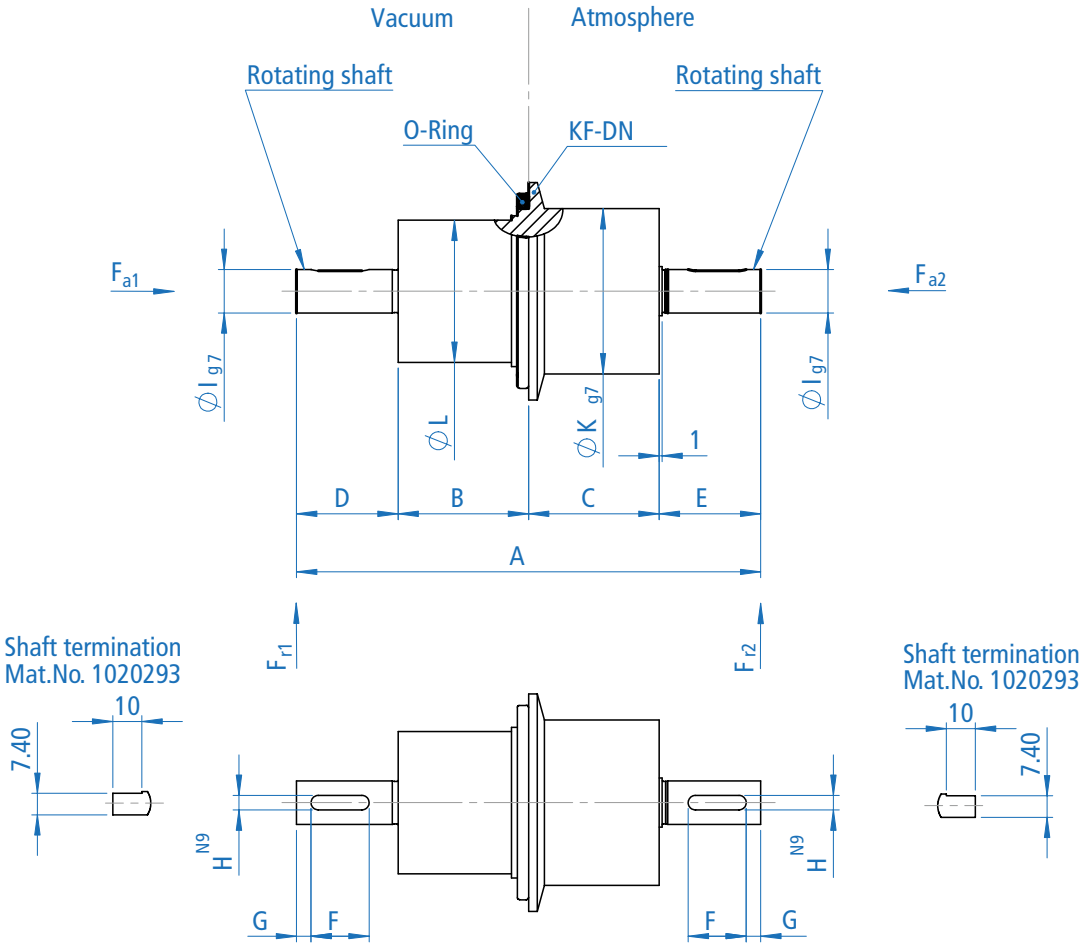
The shaft is connected using parallel keys.

Technical data

Leakage rate: < 1 x 10^{-8} mbar x l/s
Operating temp., non-cooled: -20 to 90 °C
Operating temperature, cooled: > 90 °C
Rotational speed: up to 10,000 rpm
Torque: up to 32 Nm
Pressure differential: up to 1 bar
Vacuum range: up to UHV
Shaft diameter: up to 15 mm
Flange diameter: up to 50 mm
Radial load: up to 200 N
Axial load: up to 150 N
Housing: Stainless steel
Shaft: Stainless steel, magnetic
Magnetic fluid: Maintenance-free

Available options

- Housing cooling
- Customer-specific versions



Model	ALMA-M-KF-008-V-U	ALMA-M-KF-010-V-U	ALMA-M-KF-012-V-U	ALMA-M-KF-015-V-U
Part number	1020293	1020294	1020292	1020295
Weight (kg)	0.230	0.500	0.850	1.400
Dimensions (mm)				
Shaft diameter, vacuum side [l_{g7}]	8.0	10.0	12.0	15.0
Shaft diameter, atmospheric side [l_{g7}]	8.0	10.0	12.0	15.0
Shaft length, vacuum side [D]	36.0	30.0	35.0	35.0
Shaft length, atmospheric side [E]	23.0	27.0	30.0	35.0
Total length [A]	95.0	115.0	150.0	160.0
Length, atmospheric side [C+E]	59.0	65.0	85.0	80.0
Length, vacuum side [B+D]	36.0	50.0	65.0	80.0
Total housing length [B+C]	36.0	58.0	85.0	90.0
Housing length, vacuum side [B]	—	20.0	30.0	45.0
Housing length, atmospheric side [C]	36.0	38.0	55.0	45.0
Housing diameter, vacuum side [L]	—	30.00	36.0	49.0
Housing diameter, atmospheric side [K_{g7}]	28.0	38.0	45.0	57.0
Length of parallel-key groove [F]	—	17.0	20.0	20.0
Distance from parallel-key groove to shaft end [G]	—	4.0	5.0	5.0
Width of parallel-key groove [H^{N9}]	—	3.0	4.0	5.0
Flange diameter [KF]	KF-DN 25	KF-DN 32	KF-DN 40	KF-DN 50
Shaft specification				
Max. rotational speed	10,000 min^{-1}	10,000 min^{-1}	7,500 min^{-1}	9,000 min^{-1}
Max. transmittable torque*	5.00 Nm	9.00 Nm	16.00 Nm	32.00 Nm
Friction torque	0.25 Nm	0.3 Nm	0.3 Nm	0.4 Nm
Max. axial load [F_{a1}] **	30.00 N	50.00 N	50.00 N	150.00 N
Max. axial load [F_{a2}] **	30.00 N	50.00 N	50.00 N	150.00 N
Max. radial load [F_{r1}] **	30.00 N	75.00 N	75.00 N	200.00 N
Max. radial load [F_{r2}] **	30.00 N	75.00 N	75.00 N	200.00 N

* The torque calculation is based on mean calculated values.
** The load calculation is based on assumed values, which cover 95 % of applications. Individual calculations can be made for borderline applications.

Rotary feedthroughs with CF flange

These rotary feedthroughs can be easily adapted to suit their recipients using the CF flange. The corresponding CF copper gasket is included and also available as a spare part.

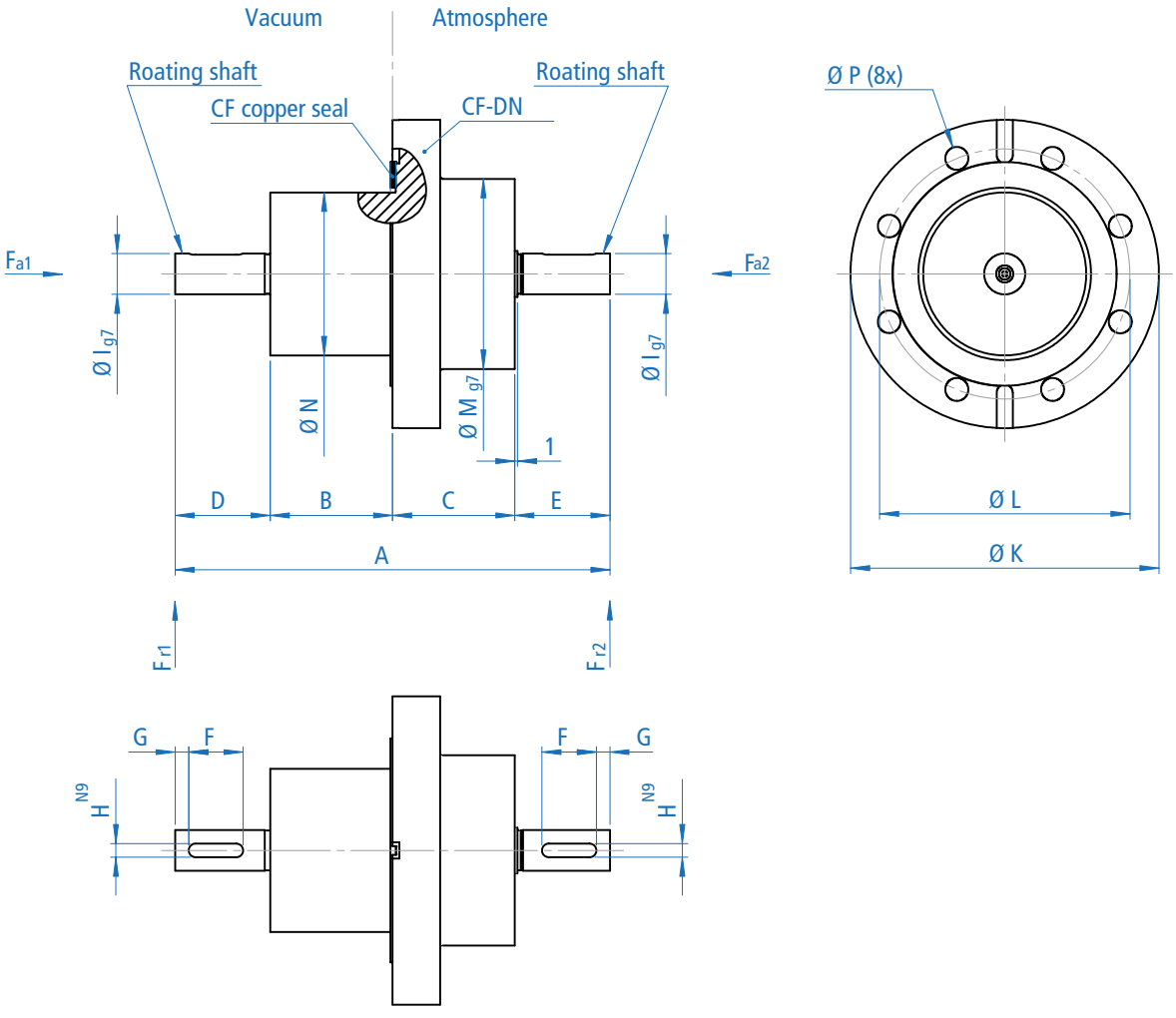
The shaft is connected using parallel keys.

Technical data

Leakage rate: < 1 x 10^{-8} mbar x l/s
Operating temp., non-cooled: -20 to 90 °C
Operating temperature, cooled: > 90 °C
Rotational speed: up to 10,000 rpm
Torque: up to 32 Nm
Pressure differential: up to 1 bar
Vacuum range: up to UHV
Shaft diameter: up to 15 mm
Flange diameter: up to 63 mm
Radial load: up to 200 N
Axial load: up to 150 N
Housing: Stainless steel
Shaft: Stainless steel, magnetic
Magnetic fluid: Maintenance-free

Available options

- Housing cooling
- Customer-specific versions



Model	ALMA-M-CF-010-V-U	ALMA-M-CF-015-V-U
Part number	1020627	1020180
Weight (kg)	0.700	2.250
Dimensions (mm)		
Shaft diameter, vacuum side [l_{g7}]	10.0	15.0
Shaft diameter, atmospheric side [l_{g7}]	10.0	15.0
Shaft length, vacuum side [D]	30.0	35.0
Shaft length, atmospheric side [E]	27.0	35.0
Total length [A]	115.0	160.0
Length, atmospheric side [C+E]	73.0	80.0
Length, vacuum side [B+D]	42.0	80.0
Total housing length [B+C]	58.0	90.0
Housing length, vacuum side [B]	12.0	45.0
Housing length, atmospheric side [C]	42.0	45.0
Housing diameter, vacuum side [N]	30.0	60.0
Housing diameter, atmospheric side [M_{g7}]	46.0	70.0
Length of parallel-key groove [F]	17.0	20.0
Distance from parallel-key groove to shaft end [G]	4.0	5.0
Width of parallel-key groove [H^{N9}]	3.0	5.0
Flange [KF]	CF-DN 40	CF-DN 63
Flange diameter [K]	69.5	113.5
Pitch circle diameter [L]	58.7	92.1
Through-hole (Ø) [P]	6.6 (6x)	8.4 (8x)
Shaft specification		
Max. rotational speed	10,000 min^{-1}	9,000 min^{-1}
Max. transmittable torque*	9.00 Nm	32.00 Nm
Friction torque	0.3 Nm	0.4 Nm
Max. axial load [F_{a1}]**	50 N	150 N
Max. axial load [F_{a2}]**	50 N	150 N
Max. radial load [F_{r1}]**	75 N	200 N
Max. radial load [F_{r2}]**	75 N	200 N

* The torque calculation is based on mean calculated values.
** The load calculation is based on assumed values, which cover 95 % of applications. Individual calculations can be made for borderline applications.

Rotary feedthrough with ISO-K flange

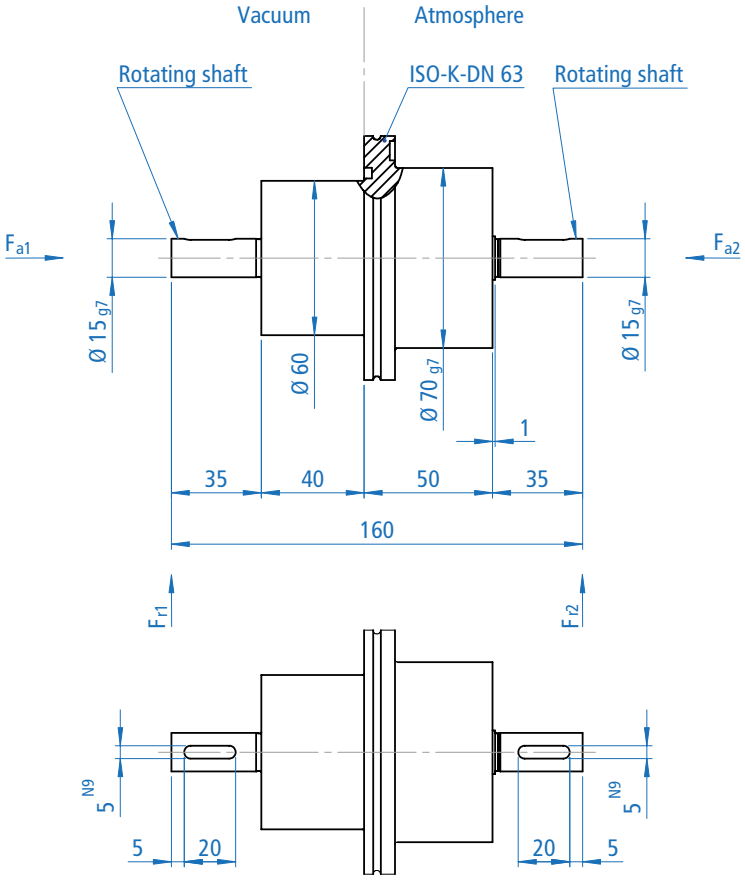
This standard rotary feedthrough is designed to be mounted on an ISO-K flange and is available ex stock. The shaft is connected using parallel keys.

Technical data

Leakage rate: < 1 x 10^{-8} mbar x l/s
Operating temp., non-cooled: -20 to 90 °C
Operating temperature, cooled: > 90 °C
Pressure differential: up to 1 bar
Vacuum range: up to UHV
Housing: Stainless steel
Shaft: Stainless steel, magnetic
Magnetic fluid: Maintenance-free

Available options

- Housing cooling
- Customer-specific versions



Model	ALMA-M-ISO-K-015-V-U
Part number	1020628
Weight (kg)	2.400
Dimensions (mm)	
Shaft diameter, vacuum side	15_{g7}
Shaft diameter, atmospheric side	15_{g7}
Shaft length, vacuum side	35.0
Shaft length, atmospheric side	35.0
Total length	160.0
Length, atmospheric side	85.0
Length, vacuum side	75.0
Total housing length	90.0
Housing length, vacuum side	40.0
Housing length, atmospheric side	50.0
Housing diameter, vacuum side	60.00
Housing diameter, atmospheric side	70_{g7}
Length of parallel-key groove	20.0
Distance from parallel-key groove to shaft end	5.0
Width of parallel-key groove	5^{N9}
Flange diameter	ISO-K DN63
Shaft specification	
Max. rotational speed	9,000 min^{-1}
Max. transmittable torque*	32.00 Nm
Friction torque	0.4 Nm
Max. axial load [F_{a1}] **	150 N
Max. axial load [F_{a2}] **	150 N
Max. radial load [F_{r1}] **	200 N
Max. radial load [F_{r2}] **	200 N

* The torque calculation is based on mean calculated values.
** The load calculation is based on assumed values, which cover 95 % of applications.
Individual calculations can be made for borderline applications.

Rotary feedthrough with ISO-K flange for high loads and high torques

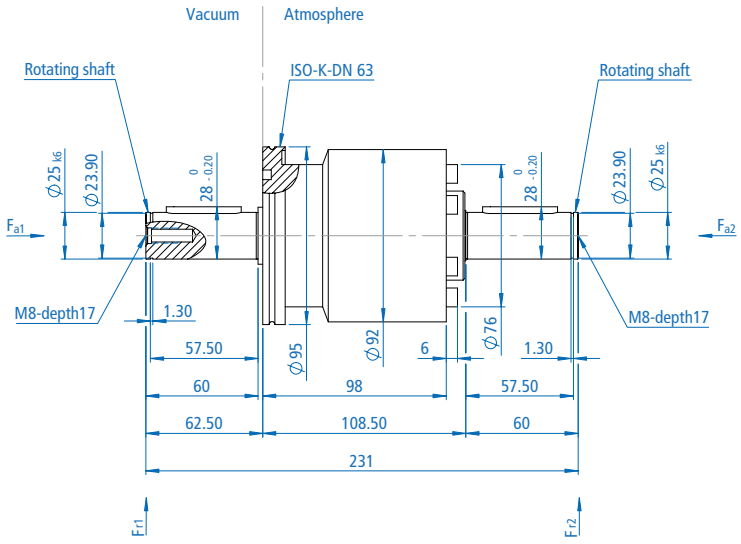
This rotary feedthrough with an ISO-K flange has been designed for high output torques. Moreover, it is suitable for high radial loads. The shaft is connected using parallel keys.

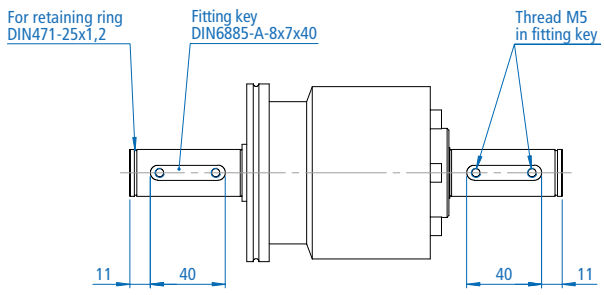
Technical data

Leakage rate: < 1 x 10^{-8} mbar x l/s
Operating temp., non-cooled: -20 to 90 °C
Operating temperature, cooled: > 90 °C
Pressure differential: up to 1 bar
Vacuum range: up to UHV
Housing: Stainless steel
Shaft: Stainless steel, magnetic
Magnetic fluid: Maintenance-free

Available options

- Housing cooling
- Customer-specific versions





Model	ALMA-M-ISO-K-025-A-U
Part number	1017627
Weight (kg)	4.800
Dimensions (mm)	
Shaft diameter, vacuum side	25_{k6}
Shaft diameter, atmospheric side	25_{k6}
Shaft length, vacuum side	62.5
Shaft length, atmospheric side	60.0
Total length	231.0
Length, atmospheric side	168.5
Length, vacuum side	62.5
Total housing length	108.5
Housing length, vacuum side	—
Housing length, atmospheric side	108.5
Housing diameter, vacuum side	—
Housing diameter, atmospheric side	92.0
Length of parallel-key groove	40.0
Distance from parallel-key groove to shaft end	11.0
Width of parallel-key groove	DIN6885-A-8x7x40
Flange diameter	ISO-K DN63
Shaft specification	
Max. rotational speed	1,500 min^{-1}
Max. transmittable torque*	110.00 Nm
Friction torque	0.8 Nm
Max. axial load [F_{a1}] **	300 N
Max. axial load [F_{a2}] **	300 N
Max. radial load [F_{r1}] **	500 N
Max. radial load [F_{r2}] **	500 N

* The torque calculation is based on mean calculated values.
** The load calculation is based on assumed values, which cover 95 % of applications.
Individual calculations can be made for borderline applications.

High-performance cooling systems for rotary feedthroughs

Reliable cooling systems for every application

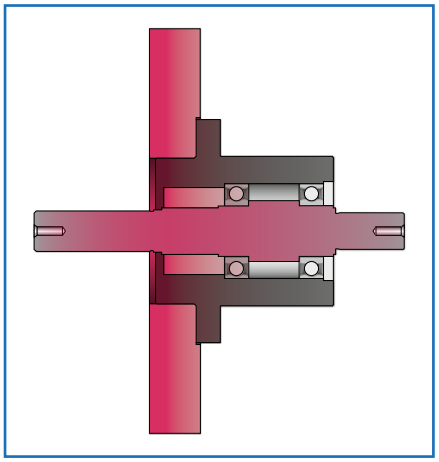
ALMA offers a comprehensive range of cooling systems for rotary feedthroughs. The product range includes simple cooling sleeves, housing and shaft cooling systems as well as combined solutions.

The use of integrated ALMA cooling systems means that the customer does not need to design his own system or purchase a third-party system. This makes the cooling more reliable, economical and compact and also easier to assemble.

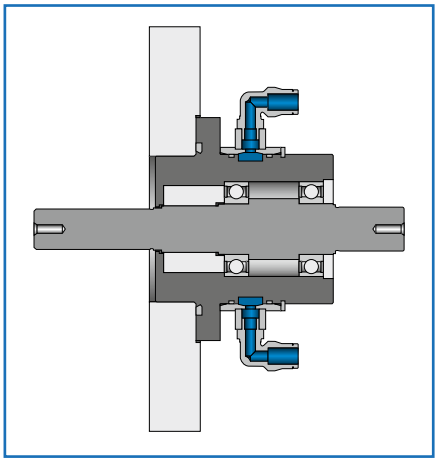
Depending on the type of thermal loading, ALMA uses a standard solution or develops a cooling concept tailored to the requirements for the specific application.

Please feel free to contact us!

Thermal loading through the recipient wall

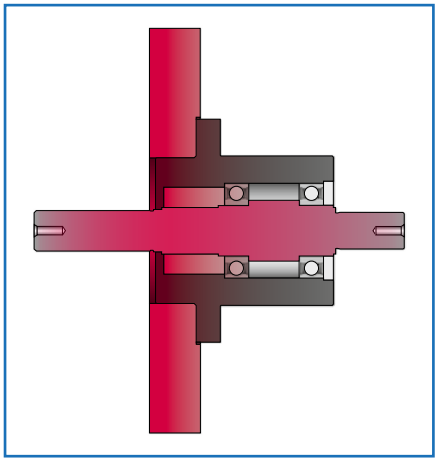


Temperature reduction using a cooling sleeve

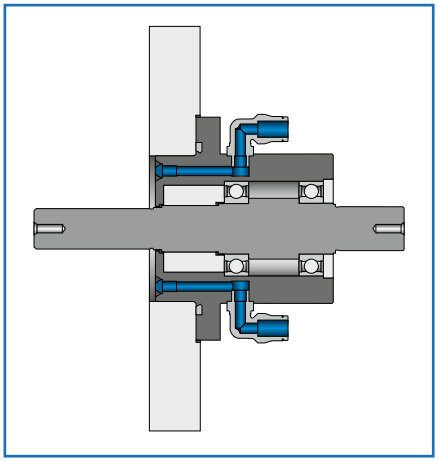


If the heat loading via the recipient wall is moderate, a low-cost cooling sleeve is used, which is hermetically separated from the sealing medium.

High thermal loading through the recipient wall



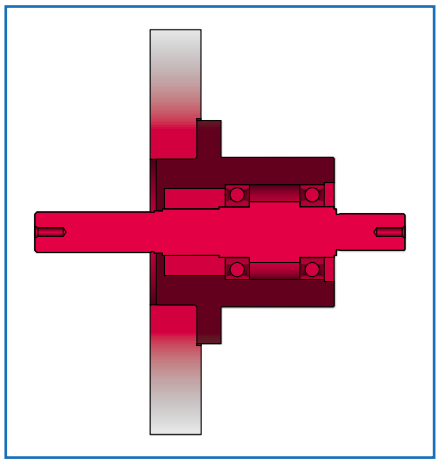
Temperature reduction by cooling the housing



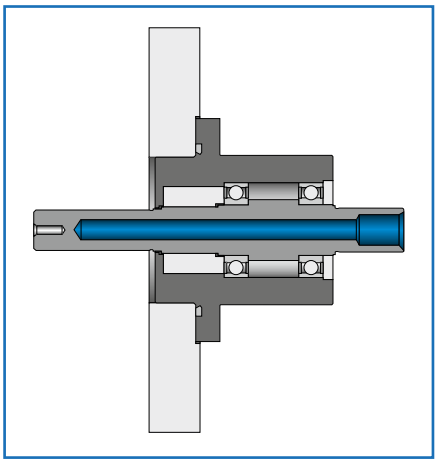
If the heat loading via the recipient wall is higher, a cooling passage, which is hermetically separated from the sealing medium, is integrated into the housing, enabling a higher cooling capacity.

Rotary feedthrough
with housing cooling

High thermal loading via the shaft

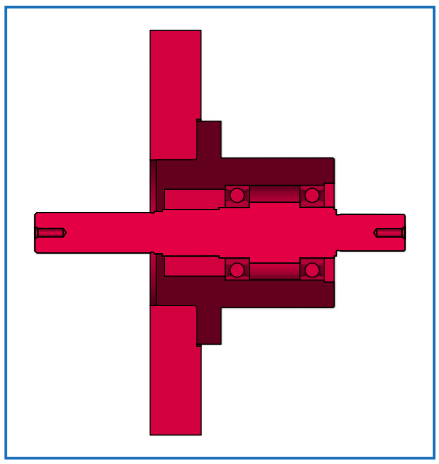


Temperature reduction by cooling the shaft

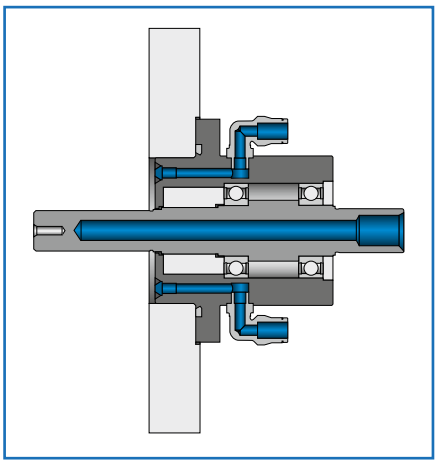


In the case of high thermal loading via the shaft end on the vacuum side, the shaft itself is cooled. For this purpose our standard product range includes a rotational water input connection.

Very high thermal loading via the recipient wall and the shaft



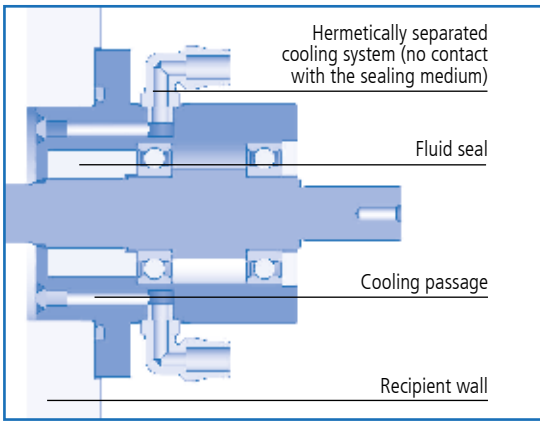
Temperature reduction by cooling the housing and shaft



If the thermal loading is very high, the cooling concepts can be combined to achieve maximum cooling efficiency.

The design concept of ALMA cooling systems

As a general rule, in ALMA cooling systems no cooling medium is in direct contact with the sealing medium. It is always hermetically separated from static O-rings and the fluid seal. This prevents water penetrating the vacuum in the event of an O-ring failure.



Because the fluid seal should not be subjected to temperatures above 90 °C, we design the cooling accordingly. The fluid itself can withstand higher temperatures, but experienced engineers know that at temperatures above 90 °C thermal expansion can occur in the other materials employed, resulting in leakage if the cooling is insufficient.

Rotary feedthrough with shaft cooling

Customer-specific rotary feedthroughs

Bespoke solutions for individual applications

In addition to providing standard products, one of ALMA's major strengths is its ability to come up with solutions tailored to the customer's needs. Depending on customer's requirements, our services start with the concept phase, and continue throughout the design and manufacturing phases right through to installation, commissioning and reliable support on-site.

Special designs with know-how for the most varied requirements

We develop individual rotary feedthroughs tailored to the customer's requirements, for example with regard to special recipient adaptations, the magnetic fluid used, the design and position of roller bearings and bespoke cooling systems.

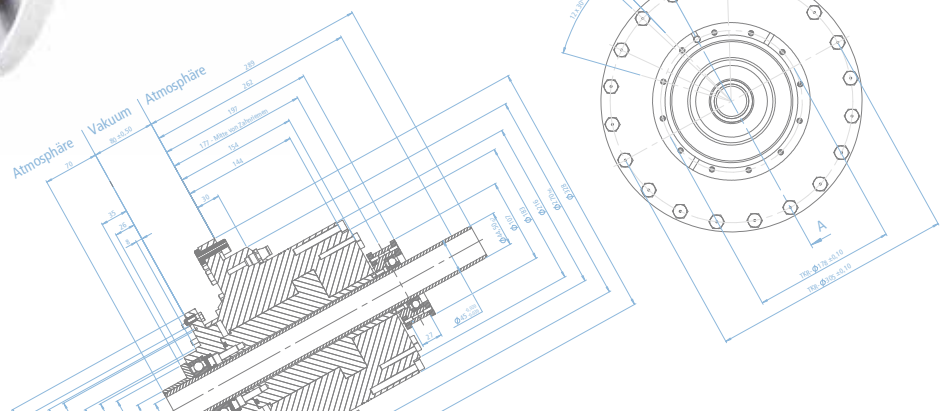
ALMA flange, solid shaft,
with cooling, short design,
integrated right-angled drive, for high radial loads

ALMA flange, hollow shaft,
metallic sealing for ultra-high vacuums

ALMA flange, hollow shaft,
very flat design with a large internal diameter,
integrated roller bearings for extremely high loads

ALMA flange, hollow shaft, with cooling,
drive via integrated synchronous belts

ALMA flange, solid shaft,
exceedingly compact design for tight installation conditions



Tailor-made drive solutions

Bespoke motorized vacuum rotary feedthroughs

ALMA also produces high-performance direct drives to transmit rotary motion in vacuum chambers.

These motorized rotary feedthroughs display the specific ALMA design characteristics in order to guarantee the hermetic sealing on the vacuum side and to support high loads; the best possible sealing technology and optimized bearings.

Customized rotary feedthrough as a direct drive for a rotary vacuum module

Vacuum servo drives with magnetic fluid sealing

In order to transmit rotary motion in vacuum vessels, ALMA also offers drive solutions in which a standard high-performance motor is combined with a magnetic fluid seal.

This drive is the optimum solution when the vacuum system application requires low rotational speeds, high torques and high axial loads.

It goes without saying that our vacuum servo drives are available in either hollow-shaft or solid-shaft versions and provide the well-known benefits expected from ALMA products, for example our maintenance-free ALMA magnetic fluid. High-performance cooling systems can also be integrated.

Drive system assemblies made up of standard components

On request, we can also provide modular drive components for our rotary feed-throughs.

These allow rotary feedthroughs, motor flanges and standard drives to be combined in high-performance motorization packages.

Assembly made up of a rotary feedthrough, a motor flange and a standard drive

Load-optimized vacuum servo drive consisting of an application-specific magnetic fluid seal combined with a high-performance standard motor

ALMA
driving elements

ALMA driving elements GmbH
Obere Heeg 5
97852 Schollbrunn
Germany
Tel: +49 (0) 93 94 / 97 00 - 0
Fax: +49 (0) 93 94 / 97 00 - 30
E-mail: info@alma-driving.de
www.alma-driving.de

ALMA rotary feedthroughs:

Exceedingly flexible flange geometry
Optimized bearing design
Innovative sealing technology