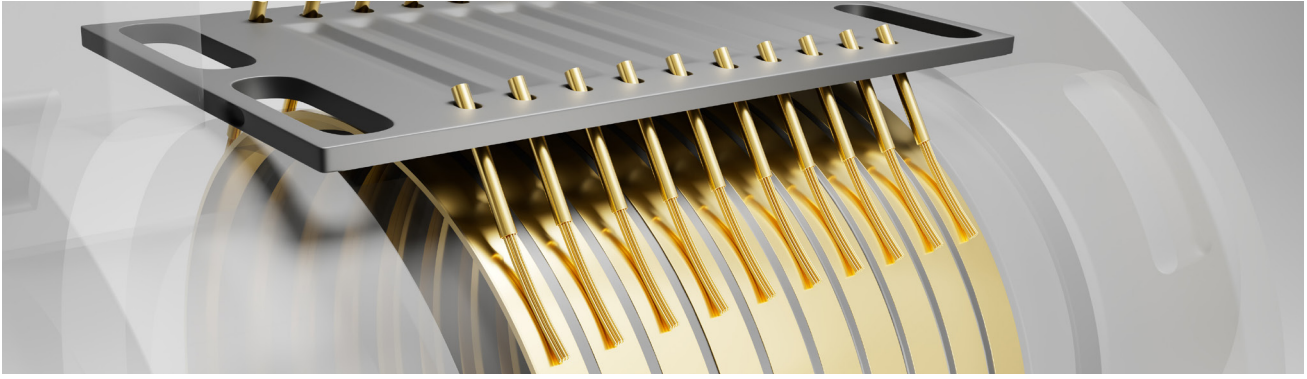




Electrical Contact Systems for Defense and Space Applications

Leading slipring solutions across all domains



Reliable Signal Transfer with Precious Metal Contacts

High-Quality Slip Ring Solutions for Optimal Performance

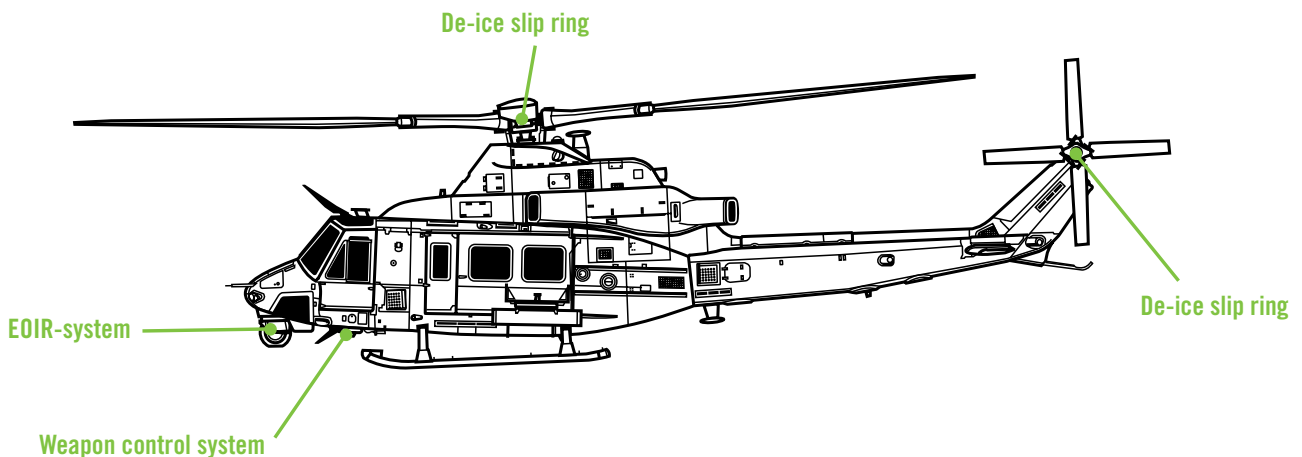
Technical challenges

- > Rotation speed
- > Signal quality - low noise
- > Stability in harsh environmental conditions
- > High vibration and shock resistance
- > Reliable data and power transfer
- > Low electrical loss - high conductivity materials
- > Right choice of optimal contact system

Our solutions for slip rings

- > Solid wire, sheet wire, multi wire wiper, multi fibre brush
- > Solid and electroplated precious metal rings
- > Pancake and drum type components
- > Precious metal components with high temperature resistance, long life time, reduced wear rate
- > Customized contact systems leading to excellent EMI shielding
- > Components suitable for air, land, sea and space

Electromechanical components enable continuous power and data transmission between static and rotary parts of a rotating 360° system.



Example application

What makes Heraeus your unique partner?

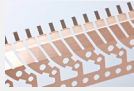
Our core competencies at a glance

- > We focus on your needs: from material choice to final design, from semi-finished products to functional components.
- > We innovate materials for your next-gen application: unique combination of material expertise, application and manufacturing know-how.
- > We manage precious metals from trading to innovative products to refining and recycling.

Specialized in contact technology

- > Broad portfolio of precious metal based materials with tailored functional properties
- > Consistent and stable high quality standard and fast delivery
- > Reliable player in different markets such as power electronics, sensors, control modules and energy distribution
- > Long experience in aerospace and military applications

Contact Components in Slip Rings

	Pan cake design / Multi-wire wiper	Multi fibre brush	Single wire / single ribbon / sheet wire
Design			
Load [A]	0 – 2 (single wiper)	2 – 15	1 – 5
Voltage [V]	5 – 1500	5 – 5000	5 – 5000
Rotation speed [m/sec]	Up to 1	Up to 0.75	Up to 0.5
Signal noise	low	very low	medium
Contact resistance [mOhm]	< 15	< 10	< 50
Life cycles	25 kk	100 kk	30 kk
Friction / wear	low	medium	medium
Corrosion resistance	high	medium	high
Temperature range [°C]	-40 + 100	-40 + 250	-40 + 250

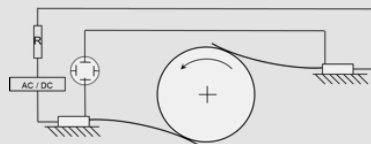
All product types shown in the table are to be used in combination with electroplated Au or Ag rings.

From our laboratory

Test combinations and results

Slip Ring	Sliding Contact	Voltage (U)	Current (I) [A]	Rotation speed (f)	Contact force (F _k) / Deflection	Total revolutions
Ag 15 µm + Au Flash Ø 20 mm	VDS 6 x Hera 649 90 µm radius	24 V	0.130	180 1/min	12 cN / 1.1 mm	100 Mio ± 6.238 km
AuCo 5 µm V-Groove Ø 60 mm	CuBe2-Hera238 MTL-wire 15 µm Ø 0.5 mm	24 V	0.5	100 1/min	5 cN / 3.9 mm	19.2 Mio ± 3.619 km
AuCo 3 µm Ø 50 mm	AgCu20 BB 33 x 0.25 mm	24 V	12.5	50 1/min	18 cN / 4 mm	77.2 Mio ± 12.054 km

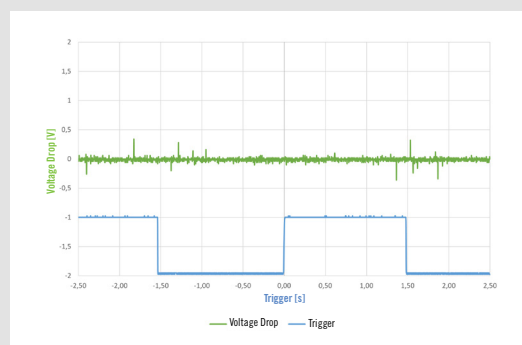
Schematic test setup



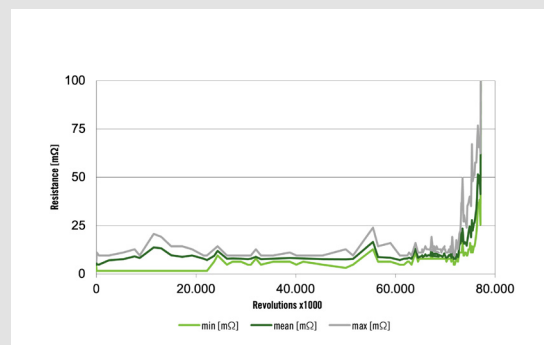
Lab testing parameters

Dimension ring Ø10-140 mm, current 10[mA] – 15[A], contact resistance < 100[mΩ], contact force 1-20[cN], speed up to 300 [rpm], durability up to 108[rev.], data analysis during test + summary.

Voltage drop per revolution



Resistance curve over lifetime



Selection of Contact Materials

	Hera 3261	Hera 238	Hera 249	Hera 2488	Hera 648	Hera 649
Metal composition	AgCu20	Au70Ag20Cu10	Au72,5Ag4Pt8,5 alloy	Au71,5Ag4,5Pt8,5 alloy	PdAg30Au10Pt10 alloy	Pd44Ag38 alloy
Density [g/cm³]	10.13	15.03	15.8	15.9	11.8	10.85
Electrical resistivity [μOhm*cm]	2.2 - 2.5	13.7 - 13.8	21.9 - 23.5	14.5 - 22.5	33.8-35.9	25.3 - 25.5
IACS [%]	70	12.46	7.3 – 7.9	7.3 – 7.9	4.8 – 5.1	6.6 – 7,0
Young's Modulus [GPa]	85	87	100	105	108	106
Melting range [C°]	779 – 820	865 – 895	930	925	1130 – 1180	1070 – 1130
Hardness [HV]	130 – 190	280 – 340	280 – 360	290 – 370	330 – 400	320 – 390
UTS [MPa]	450 – 700	850 – 1100	1000 – 1400	1000 – 1400	1100 – 1400	1000 – 1300
Elongation [%]	2 – 4	< 5	1 – 10	1 – 10	< 3	< 3



Further alloys based on Ag, Au, Pd are listed in the Heraeus Material Database.
heraeus.pm/material-database

Need personal advice?



Contact our experts at Heraeus
heraeus.pm/slip-rings
precious.metals@heraeus.com