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Client: ZEROERR CONTROL CO., LTD.

Contact Information: 4F, Bldg 1, Unit 4, Dejin Industrial Park, 40 Fuyuan 1st Road, Fuhai St, Bao'an Shenzhen, Guangdong, P. R. China

Test item(s): 75 materials

**Identification/
Model No(s):** EROB ROTARY ACTUATOR
eRob 70F, eRob 70I, eRob 80I, eRob 90I, eRob 110I, eRob 142I, eRob 170I, eRob 70T, eRob 80T, eRob 90T, eRob 110T, eRob 142T, eRob170T

Condition at delivery: Test item complete and undamaged.

Sample Receiving date: 2023-03-27, 2023-03-31, 2023-04-10, 2023-04-18, 2023-04-28

Testing Period: 2023-03-28 - 2023-05-15

Place of testing: Chemical laboratory Guangzhou

Test Specification:	Test result:
1. Cadmium, Lead, Chromium (VI), Mercury, Polybrominated biphenyls (PBB) and Polybrominated diphenyl ethers (PBDE), ROHS Phthalates (BBP, DBP, DEHP, DIBP) According to RoHS(recast): Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment, 2011/65/EU Annex II and its amendment	PASS

Other information:

According to customer's requirement, only the appointed materials have been tested.
Country of Origin: China
The report 170387954a 001 supersedes report 170338504a 002.

For and on behalf of
TÜV Rheinland (Guangdong) Ltd.

Elaine Zhang

2024-09-05

Elaine Zhang / Assistant Manager

Date

Name/Position

Sample information is provided by customer. Test result is drawn according to the kind and extent of tests performed.
This test report relates to the above mentioned test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any safety mark on this or similar products.
"Decision Rule" document announced in our website (<https://www.tuv.com/landingpage/en/qm-gcn/>) describes the statement of conformity and its rule of enforcement for test results are applicable throughout this test report.

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Material List:

Item: EROB ROTARY ACTUATOR

eRob 70F, eRob 70I, eRob 80I, eRob 90I, eRob 110I, eRob 142I, eRob 170I, eRob 70T,
eRob 80T, eRob 90T, eRob 110T, eRob 142T, eRob170T

Material No.	Material	Color	Location
A001	Metal	silvery	Refer to photo
A002	Glue	pink	Refer to photo
A003	Plastic	yellow	Refer to photo
A004	Metal	golden	Refer to photo
A005	Plastic	beige	Refer to photo
A006	Plastic	black	Refer to photo
A007	Plastic + printing + adhesive	white/ black	Refer to photo
A008	Electronic components	black	Refer to photo
A009	Electronic components	dark grey	Refer to photo
A010	Glue	white	Refer to photo
A011	Electronic components	black	Refer to photo
A012	Electronic components	black	Refer to photo
A013	Electronic components	black	Refer to photo
A014	Electronic components	brown	Refer to photo
A015	Metal	silvery	Refer to photo
A016	Electronic components	black	Refer to photo
A017	Electronic components	dark grey	Refer to photo
A018	Electronic components	dark grey	Refer to photo
A019	Electronic components	black	Refer to photo
A020	Electronic components	black	Refer to photo
A021-1	Solder	silvery	Refer to photo(retest of A021)
A022	Electronic components	black	Refer to photo
A023	Electronic components	black	Refer to photo
A024	Electronic components	black	Refer to photo
A025	Electronic components	black	Refer to photo
A026	PCB board	black	Refer to photo
A027	Electronic components	black	Refer to photo

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A028	Metal + plating	silvery/ grey	Refer to photo
A029	Plastic	black	Refer to photo
A030	Metal	silvery	Refer to photo
A031	Metal	silvery	Refer to photo
A032	Metal + plating	silvery/ grey	Refer to photo
A033	Metal + plating	silvery/ black	Refer to photo
A034	Metal	silvery	Refer to photo
A035	Metal + plating	silvery/ black	Refer to photo
A036	Metal + plating	silvery/ black	Refer to photo
A037	Metal	silvery	Refer to photo
A038	Metal	silvery	Refer to photo
A039-1	Plastic	red	Refer to photo(retest of A039)
A040	Plastic	grey	Refer to photo
A041	Plastic + printing	black/ white	Refer to photo
A042	Metal	silvery	Refer to photo
A043	Plastic	black	Refer to photo
A044	Plastic	blue	Refer to photo
A045	Plastic	red	Refer to photo
A046-1	Plastic	black	Refer to photo(retest of A046)
A047	Metal	silvery	Refer to photo
A048	Oil	transparent	Refer to photo
A049	Metal	silvery	Refer to photo
A050	Magnet	black	Refer to photo
A051	Glue	black	Refer to photo
A052	Metal + plating	silvery/ grey	Refer to photo
A053	Metal + plating	silvery/ black	Refer to photo
A054	Metal	silvery	Refer to photo
A055	Metal	silvery	Refer to photo
A056	Oil	yellow	Refer to photo
A057	Plastic	dark brown	Refer to photo
A058	Metal + plating	silvery/ grey	Refer to photo
A059	Metal + plating	silvery/ grey	Refer to photo

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A060	Metal	coppery	Refer to photo
A061	Plastic	brown	Refer to photo
A062	PCB board	dark green	Refer to photo
A063	Solder	silvery	Refer to photo
A064	Magnet	silvery	Photo1
A065	Metal	silvery	Photo1
A066	Plastic + adhesive	light yellow	Photo1
A067	Plastic	brown	Photo2
A068	Plastic	pink	Photo2
A069	Plastic	blue	Photo2
A070	Metal	silvery	Photo2
A071	Metal	coppery	Photo4
A072	Coated textile	black	Photo3
A073	Metal	silvery	Photo3
A074	Plastic	black	Photo5
A075	Plastic	black	Photo5

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1.Screening Test by XRF spectroscopy

Test Method: Cadmium, Lead, Mercury, Chromium, Bromine
 -- With reference to IEC 62321-3-1:2013

Test Result:

Material No.	Cd	Cr	Pb	Hg	Br
A001	BL	BL	BL	BL	n.a.
A002	BL	BL	BL	BL	d.(*1)
A003	BL	BL	BL	BL	d.(*1)
A004	BL	BL	d.(*1)	BL	n.a.
A005	BL	BL	BL	BL	d.(*1)
A006	BL	BL	BL	BL	d.(*1)
A007	BL	BL	BL	BL	BL
A008	BL	BL	BL	BL	BL
A009	BL	d.(*1)	BL	BL	BL
A010	BL	BL	BL	BL	d.(*1)
A011	BL	BL	BL	BL	BL
A012	BL	BL	BL	BL	d.(*1)
A013	BL	BL	BL	BL	BL
A014	BL	BL	BL	BL	BL
A015	BL	BL	d.(*1)	BL	n.a.
A016	BL	BL	BL	BL	BL
A017	BL	d.(*1)	BL	BL	BL
A018	BL	d.(*1)	BL	BL	BL
A019	BL	BL	BL	BL	BL
A020	BL	BL	BL	BL	BL
A021-1	BL	BL	BL	BL	n.a.
A022	BL	BL	BL	BL	BL
A023	BL	BL	BL	BL	BL
A024	BL	BL	BL	BL	BL
A025	BL	BL	BL	BL	BL
A026	BL	BL	BL	BL	d.(*1)
A027	BL	BL	BL	BL	BL
A028	BL	BL	BL	BL	n.a.
A029	BL	BL	BL	BL	BL
A030	BL	d.(*1)	BL	BL	n.a.
A031	BL	d.(*1)	BL	BL	n.a.
A032	BL	d.(*1)	BL	BL	n.a.
A033	BL	d.(*1)	BL	BL	n.a.
A034	BL	BL	BL	BL	n.a.
A035	BL	d.(*1)	BL	BL	n.a.
A036	BL	BL	BL	BL	n.a.
A037	BL	d.(*1)	BL	BL	n.a.

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A038	BL	d.(*1)	BL	BL	n.a.
A039-1	BL	BL	BL	BL	BL
A040	BL	BL	BL	BL	BL
A041	BL	BL	BL	BL	BL
A042	BL	BL	BL	BL	n.a.
A043	BL	BL	BL	BL	BL
A044	BL	BL	BL	BL	BL
A045	BL	BL	BL	BL	BL
A046-1	BL	BL	BL	BL	BL
A047	BL	d.(*1)	BL	BL	n.a.
A048	BL	BL	BL	BL	BL
A049	BL	BL	BL	BL	n.a.
A050	BL	BL	BL	BL	n.a.
A051	BL	BL	BL	BL	BL
A052	BL	d.(*1)	BL	BL	n.a.
A053	BL	BL	BL	BL	n.a.
A054	BL	BL	BL	BL	n.a.
A055	BL	d.(*1)	BL	BL	n.a.
A056	BL	BL	BL	BL	BL
A057	BL	BL	BL	BL	BL
A058	BL	BL	BL	BL	n.a.
A059	BL	d.(*1)	BL	BL	n.a.
A060	BL	BL	BL	BL	n.a.
A061	BL	BL	BL	BL	d.(*1)
A062	BL	BL	BL	BL	d.(*1)
A063	BL	BL	BL	BL	n.a.
A064	BL	BL	BL	BL	n.a.
A065	BL	d.(*1)	BL	BL	n.a.
A066	BL	BL	BL	BL	BL
A067	BL	BL	BL	BL	BL
A068	BL	BL	BL	BL	BL
A069	BL	BL	BL	BL	BL
A070	BL	BL	BL	BL	n.a.
A071	BL	BL	BL	BL	n.a.
A072	BL	BL	BL	BL	BL
A073	BL	d.(*1)	BL	BL	n.a.
A074	BL	BL	BL	BL	BL
A075	BL	BL	BL	BL	BL

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Abbreviation:	Pb	=	Lead
	Cd	=	Cadmium
	Hg	=	Mercury
	Cr	=	Chromium
	Br	=	Bromine
	n.a.	=	Not applicable
	BL	=	Below limit
	OL	=	Over limit
	d.	=	Detected

Remark:

- (*1) The screening result was detected in the inconclusive region or over limits, thus the further wet chemistry tests are suggested.
- (*2) Component(s)/ materials(s) with an area of less than 2 mm x 2 mm will not be selected for testing according to RoHS Directive 2011/65/EU due to technical reason.
 For the test sample does not have detail materials information provided by client, visually identical materials (e.g. wire insulation, solder points, etc.) will be considered as the same material.
 Solder points on a printing circuit board will be examined several times based on optical anomalies or discoloration of the solder point(s) unless the solder point(s) is obviously generated automatically during production.
 All other materials will be sampled and tested at one test point representatively.
- (*3) The Chromium (Cr) and Bromine (Br) in the above result table indicate the total chromium and total bromine by means of XRF screening. PBBs, or PBDEs content shall be further confirmed with reference to IEC 62321-6:2015. Chromium (VI) shall be further confirmed with reference to IEC 62321-7-1:2015, IEC 62321-7-2:2017.

XRF Screening limits for different matrices :

Material	Concentration (%)				
	Cd	Cr	Pb	Hg	Br
Polymeric	BL≤0.006<X<0.014≤ OL	BL≤0.064<X	BL≤0.067<X<0.133≤ OL	BL≤0.066<X< 0.134≤OL	BL≤0.029<X
Metallic	BL≤0.006<X<0.014≤ OL	BL≤0.064<X	BL≤0.067<X<0.133≤ OL	BL≤0.066<X< 0.134≤OL	n.a.
Composite materials	BL≤0.004<X<0.016≤ OL	BL≤0.044<X	BL≤0.047<X<0.153≤ OL	BL≤0.046<X< 0.154≤OL	BL≤0.024<X

Remark: The symbol "X" marks the region where further investigation is necessary.

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Cadmium, Lead, Chromium (VI), Mercury, Polybrominated biphenyls (PBB) and Polybrominated diphenyl ethers (PBDE)

Test Method: Total Cadmium, Lead, Mercury, Chromium
 - Ref. to IEC 62321-4:2013+AMD1:2017 and IEC 62321-5:2013

Chromium (VI)
 - For Metal material - Ref. to IEC 62321-7-1:2015
 - For Polymer, Electronic material or others materials – Ref. to IEC 62321-7-2:2017

PBBs, PBDEs – Ref. to IEC 62321-6:2015

Test Result:

	Cd	Cr(VI)	Pb	Hg	PBBs	PBDEs
Maximum Permissible Limit (%)	0.01	0.1	0.1	0.1	0.1	0.1

Material No.	(%)					
	Cd	Cr^{VI}	Pb	Hg	PBBs	PBDEs
	RL (%)					
	0.001	0.001	0.001	0.001	0.01	0.01
A002	n.a.	n.a.	n.a.	n.a.	< RL	< RL
A003	n.a.	n.a.	n.a.	n.a.	< RL	< RL
A004	n.a.	n.a.	3.70(*3)	n.a.	n.a.	n.a.
A005	n.a.	n.a.	n.a.	n.a.	< RL	< RL
A006	n.a.	n.a.	n.a.	n.a.	< RL	< RL
A010	n.a.	n.a.	n.a.	n.a.	< RL	< RL
A012	n.a.	n.a.	n.a.	n.a.	< RL	< RL
A015	n.a.	n.a.	2.62(*3)	n.a.	n.a.	n.a.
A026	n.a.	n.a.	n.a.	n.a.	< RL	< RL
A061	n.a.	n.a.	n.a.	n.a.	< RL	< RL
A062	n.a.	n.a.	n.a.	n.a.	< RL	< RL

Material No.	Chromium VI content for metal materials (µg/cm²) (*1) RL: 0.10 µg/cm²
A030	Negative
A031	Negative
A032	Negative
A033	Negative
A035	Negative
A037	Negative
A038	Negative
A047	Negative

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A052	Negative
A055	Negative
A059	Negative
A065	Negative
A073	Negative

Material No.	Chromium VI content for other materials (%) RL: 0.01%
A009	< RL
A017	< RL
A018	< RL

Abbreviation:

Pb	= Lead
Cd	= Cadmium
Hg	= Mercury
Cr	= Chromium
Cr (VI)	= Chromium (VI)
PBBs	= Total Polybrominated Biphenyls
PBDEs	= Total Polybrominated Diphenyl Ethers
<	= Less than
RL	= Reporting Limit
n.a.	= Not Applicable
^	= The total Chromium have been determined
%	= Percentage

Remark:

(*1) The Chromium (VI) content of metal sample in surface layer have been confirmed with reference to IEC 62321-7-1:2015 Annex.

	Chromium (VI) concentration	Qualitative result
Negative	$< 0.1 \mu\text{g}/\text{cm}^2$	The sample is negative (-ve) for Cr(VI). The Cr(VI) concentration is below the limit of quantification. The coating is considered a non-Cr(VI) based coating
Inconclusive	$\geq 0.1 \mu\text{g}/\text{cm}^2$ and $\leq 0.13 \mu\text{g}/\text{cm}^2$	The result is considered to be inconclusive. Unavoidable coating variations may influence the determination. Recommendation: if additional samples are available, perform a total of 3 trials to increase sampling surface area. Use the averaged result of the 3 trials for the final determination.
Positive	$> 0.13 \mu\text{g}/\text{cm}^2$	The sample is positive (+ve) for Cr(VI). Concentration is above the limit of quantification and the statistical margin of error. The sample coating is considered to contain Cr(VI).

- (*2) The Chromium (VI) content of plastic sample or electronic sample have been confirmed with reference to IEC 62321-7-2:2017
- (*3) The Chromium (VI) content of leather sample have been confirmed with reference to EN ISO 17075-1:2017.
- (*3) According to Annex of 2011/65/EU, "Copper alloy containing up to 4% lead by weight" is exempt from the requirements of Article 4(1). This exemption applies to testing sample No. A004, A015.

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BBP, DBP, DEHP, DIBP content

Test Method: IEC 62321-8:2017

Test Result:

	BBP	DBP	DEHP	DIBP
Maximum permissible Limit (%)	0.1	0.1	0.1	0.1

Test No.	Material No.	RL (%)			
		BBP	DBP	DEHP	DIBP
		RL (%)			
		0.005	0.005	0.005	0.005
T001	A002	< RL	< RL	< RL	< RL
T002	A003 + A026	< RL	< RL	< RL	< RL
T003	A005 + A006	< RL	< RL	< RL	< RL
T004	A010	< RL	< RL	< RL	< RL
T005	A029	< RL	< RL	< RL	< RL
T006	A039-1	< RL	< RL	< RL	< RL
T007	A040	< RL	< RL	< RL	< RL
T008	A041	< RL	< RL	< RL	< RL
T009	A043	< RL	< RL	< RL	< RL
T010	A044	< RL	< RL	< RL	< RL
T011	A045	< RL	< RL	< RL	< RL
T012	A046-1	< RL	< RL	< RL	< RL
T013	A048	< RL	< RL	< RL	< RL
T014	A051	< RL	< RL	< RL	< RL
T015	A056	< RL	< RL	< RL	0.054
T016	A057 + A061 + A062	< RL	< RL	< RL	0.017
T017	A067 + A068 + A069 + A074 + A075	< RL	< RL	< RL	< RL
T018	A066 + A072	< RL	0.005	< RL	< RL

Abbreviation: BBP= Benzylbutyl phthalate
 DBP= Dibutyl phthalate
 DEHP= Bis(2-ethylhexyl) phthalate
 DIBP= Diisobutyl phthalate
 < = less than
 RL = Reporting Limit
 %= percentage

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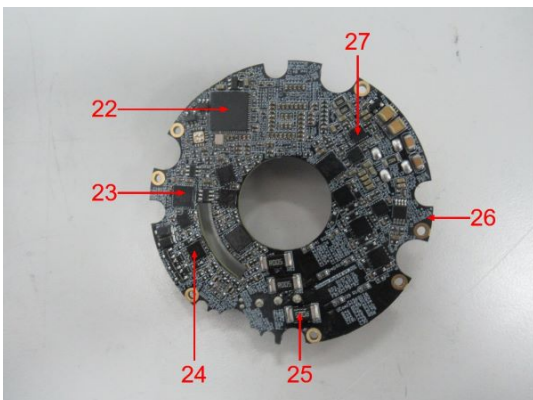
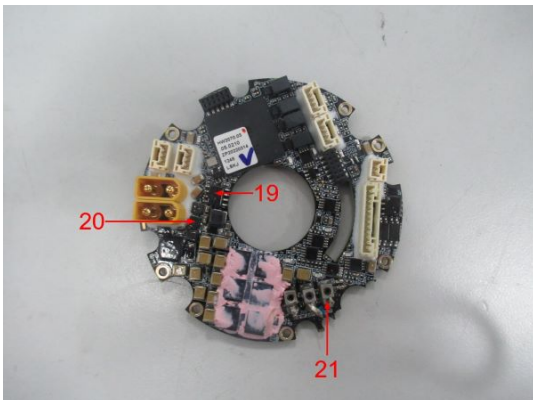
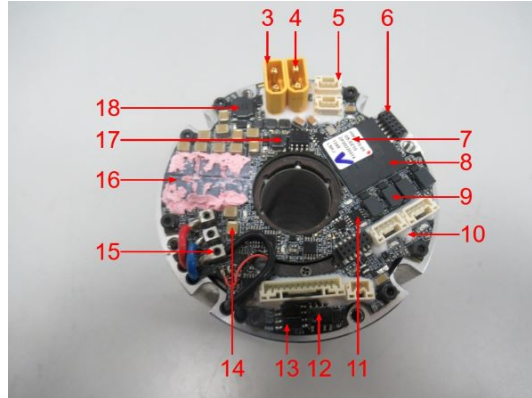
Remark:

- * The maximum permissible limit is required from the amendment (EU) 2015/863 of RoHS Directive 2011/65/EU.

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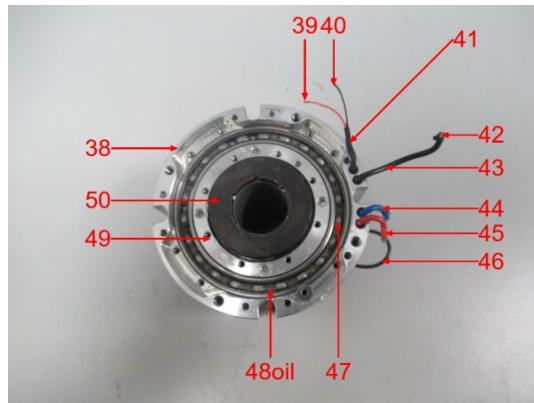
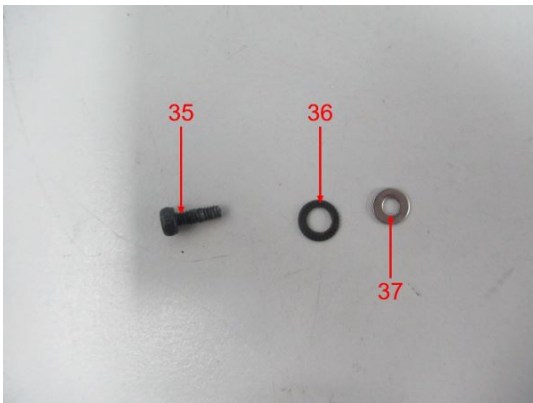
Sample Photos



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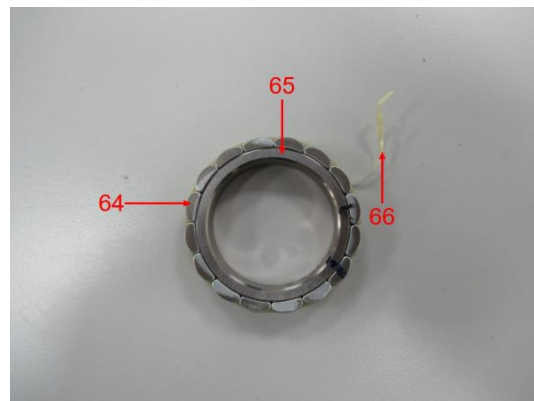
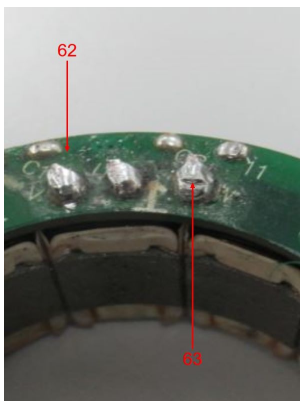
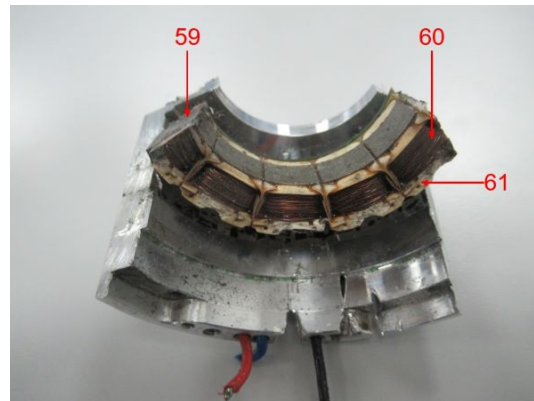
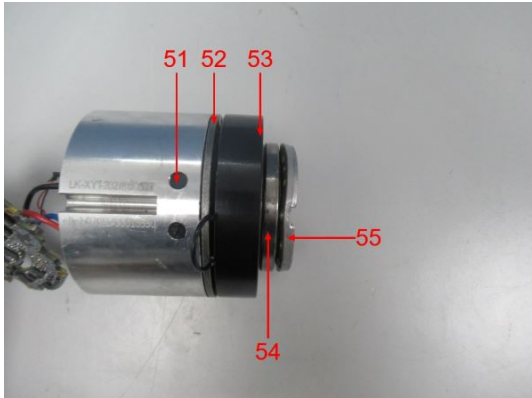
Sample Photos



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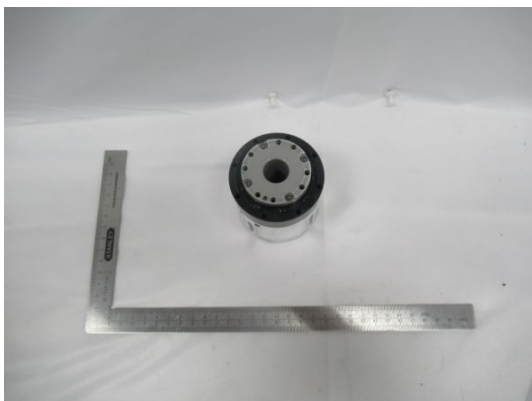
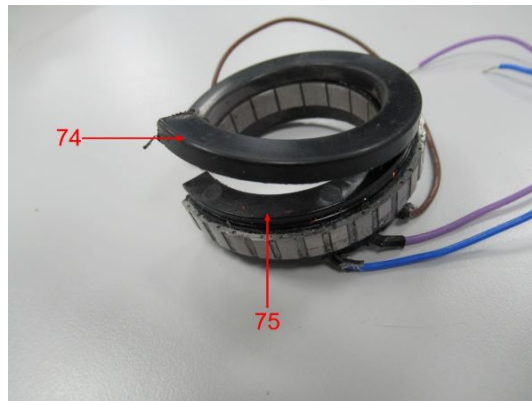
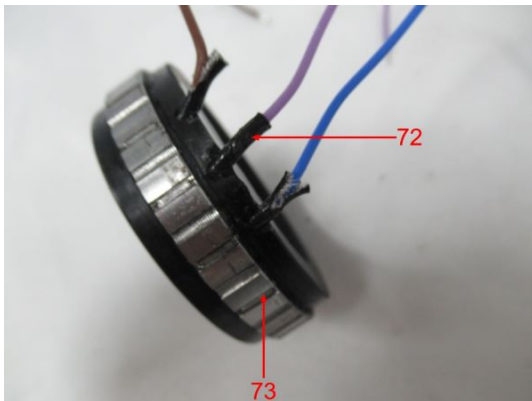
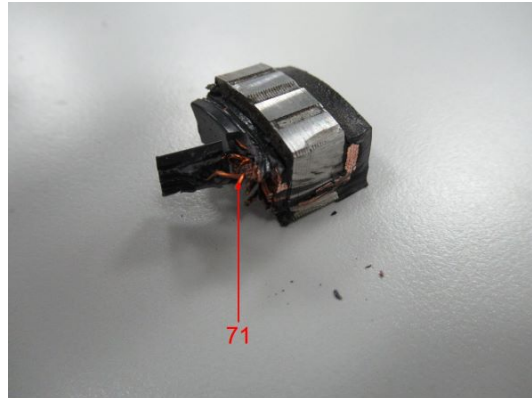
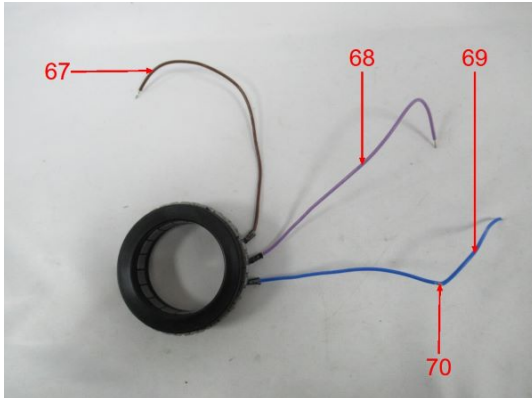
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Sample Photos



Product

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