AMSTRON

PRODUCT INTRODUCTION

- Automotive Relay
- New Energy Relay

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1. Company Introduction

Corporation Vision: To be the most reputable, excellent relay manufacturer and sales company in the world.

1. Company Introduction

- Professional relay R&D， Manufacturing， sales company
- National hi-tech enterprise, Top100 China electronical component enterprise
- 1 billion relays annual production capacity
- One of the biggest professional relay manufacturers in China
- Strong product development & test capability
- Complete quality assurance system
- Global marketing and service network
- Professional automatic manufacturing model
- Excellent production equipment

1. Company Introduction

Sanyou corporation limited has 8 subsidiaries and more than 3,000 employees with one united "Sanyou“ trademark.


Dongguan Sanyou


Ningbo Yongyou


Mingguang Sanyou


Mingguang Wanjia


Jingdezhen Sanyou


Sanyou North America

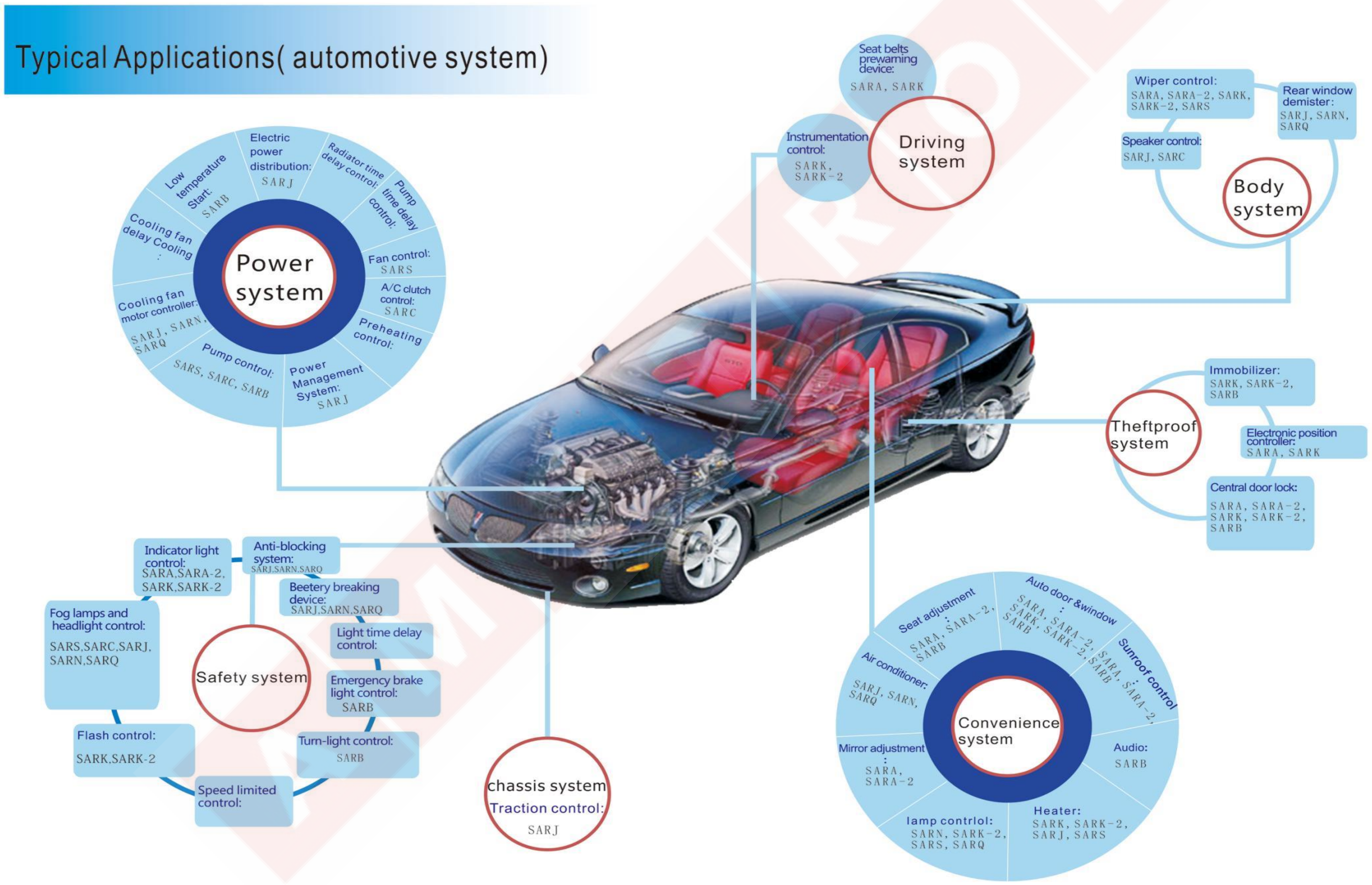

Sanyou South Korea


Sanyou Europe

1. Company Introduction-Automotive Business Unit

- The automotive division was established in 2008
- **2 production bases** : Dongguan manufacturing plant and Jingdezhen new energy manufacturing plant
- 3 fully automated production lines and 3 semi-automated production lines, with a **production capacity of 3.7 million per month**
- **Two big categories**: automotive relay and the new energy relay
- Automotive relays include **18 series/100+ products**
- New energy relay includes more than **20 series/100+ products**
- Products are widely used in the **traditional automobile/electric vehicle/dc charging pile/wind power generation/battery energy storage and other fields**

2. Automotive relay

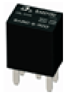
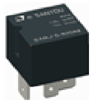


2. Automotive relay

Automotive relay is mainly used in below automobile systems:

Series	Rated contact load	Power system	Driving System	Body system	Theftproof system	Convenient system	Chassis System	Safety system
SARA	20A 14VDC 28VDC		•	•	•	•		•
SARK	25A 14VDC 28VDC		•	•	•	•		•
SARP	20A 14VDC 28VDC		•	•		•		
SARS	35A 14VDC 28VDC	•		•		•		•
SARC	35A 14VDC 28VDC	•		•	•			•
SARB	40A 14VDC 28VDC	•		•		•		•
SARQ	40A 14VDC 28VDC	•		•		•		•
SARN	50A 14VDC 28VDC	•		•		•		•
SARJ	70 A 14VDC 28VDC	•		•		•	•	•

2. Automotive relay

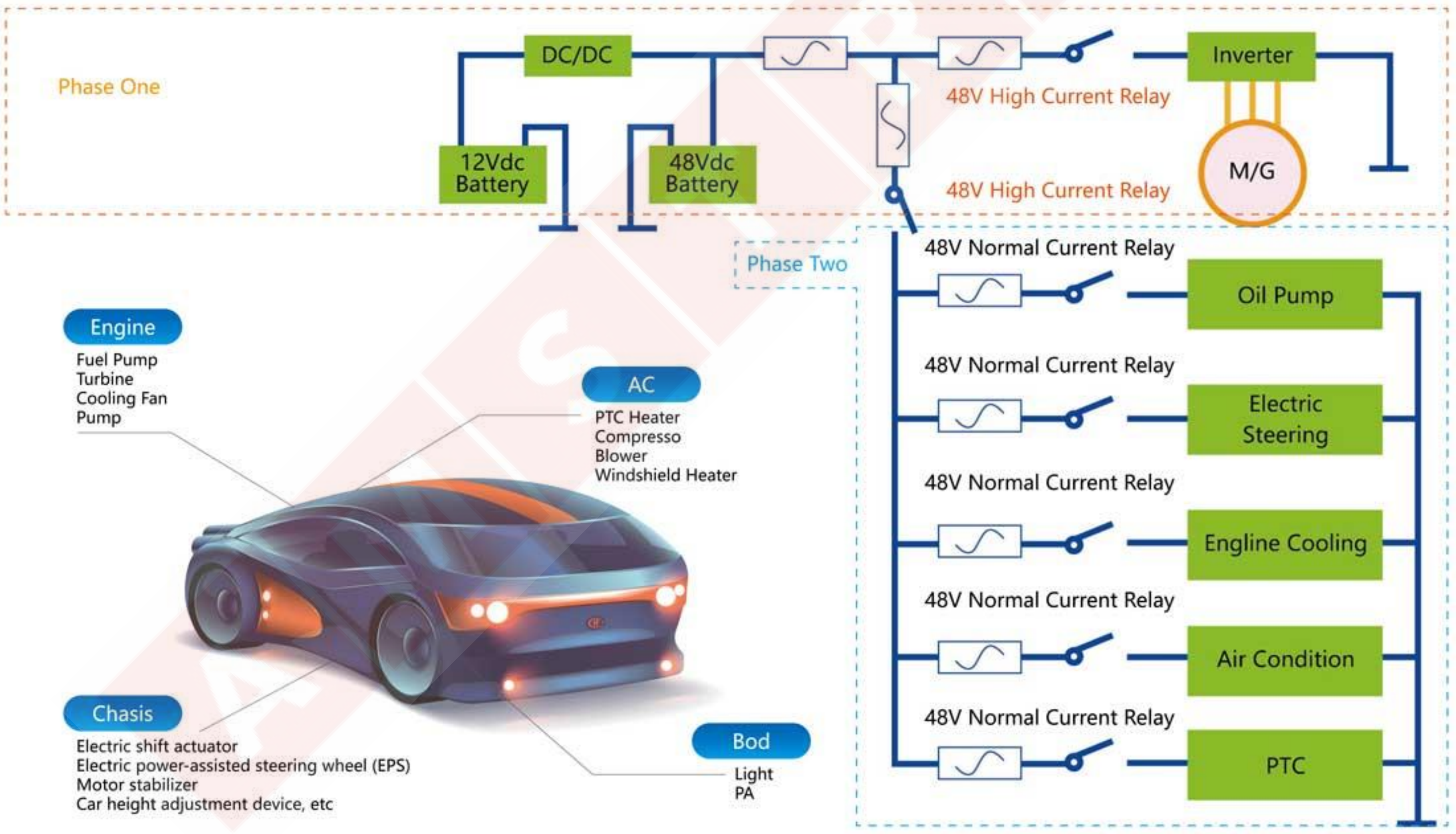
Series	Appearance	Dimensions(mm)	Terminal type	Contact form	Rated contact load	Current carrying capacity	Application
SARA		14.5*8.2*14.7	PCB	1A、1C 2A、2C	20A 14VDC	20A continuous 40A 30 minutes 60A 1 minute	Seat belts prewarning device, Wiper control, Electronic position control, Central door lock, Auto door& window, Sunroof control, Mirror adustment
SARK		12.9*12.0*10	PCB	1A、1C 2A、2C	25A 14VDC		
SARP		15.6*15.2*16.4	Socket	1A	20A 14VDC		
SARS		22.5*15*25	Socket	1A、1C	35A 14VDC	35A continuous 50A 30 minutes 80A 1 minute	Fan control, Pump control, Wiper control, Heater, Lamp control, Fog lamps and headlight control
SARC		22.5*15*25	Socket	1A、1C	35A 14VDC	35A continuous 50A 30 minutes 80A 1 minutes	
SARB		25.5*21*21.5	PCB	1A、1C	40A 14VDC	40A continuous 70A 30 minutes 100A 1 minute 120A 1 S	Pump control, Low temperature start, Central door lock, Auto door& window, Emergency brake light control, Turn-light control
SARQ		26*26*22.7	Socket, PCB	1A、1C	40A 14VDC	40A continuous 70A 30 minutes 100A 1 minute 150A 1 S	Cooling fan motor control, Rear window demister, Air conditioner, ABS, Battery breaking device
SARN		26*26*22.7	Socket, PCB	1A、1C	50A 14VDC	50A continuous 80A 30 minutes 120A 1 minute 200A 1 S	Cooling fan motor control, Rear window demister, Air conditioner, ABS, Battery breaking device
SARJ		26*26*22.7	Socket, PCB	1A	70A 14VDC	70A continuous 80A 1 hour 160A 1 minute 200A 20 S	Electric power distribution, Power management system, Traction control

Note: the product specification information is subject to the latest datasheet

2. Automotive relay

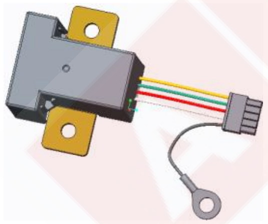
Automotive relay for 48VDC system

The EU LV148 regulation proposed that the emission regulation of 2020 should be formulated, requiring the integration of 48V system into the original 12V system through the DC/DC converter to reduce the CO_2 emissions. 48V system has become a development trend.



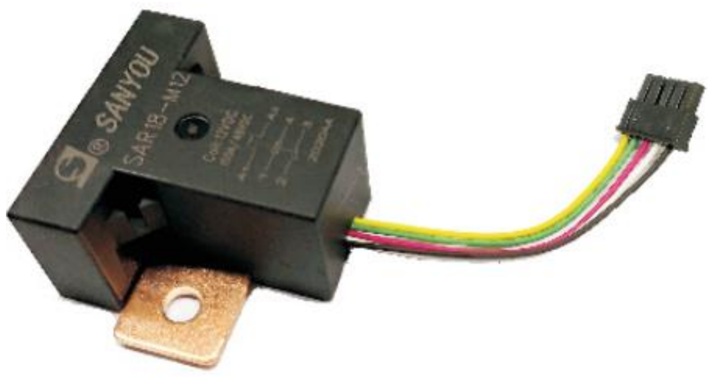
2. Automotive relay

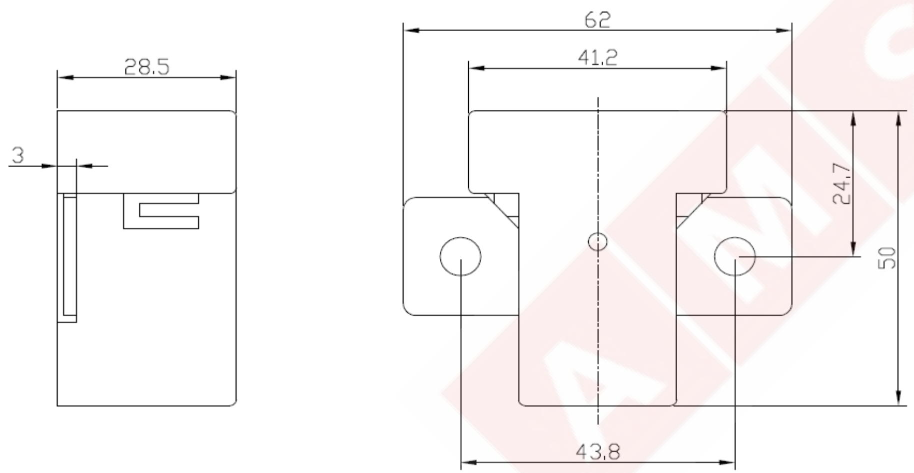
Automotive relay for 48VDC system

Series	Appearance	Contact form	Rated contact load	Current carrying capacity
SARN-U		1U	DC48V 40A	40A continuous 50A 2 hours 80A 1 minute 120A 10 S 200 1 S
SARJ-U		1U	DC48V 50A	50A continuous 60A 60 minutes 80A 20 minutes 160A 30 S 200 10 S
SAR18		1A	DC55V 150A	150A continuous 175A 15 minutes 250A 5 minutes 350A 30 S 450A 15 S 1500A 1.5 S 2000A 0.5 S 2500A 0.01 S 4000A 5 mS

2. Automotive relay

48VDC Start-stop relay





SAR18	
Coil Voltage	12VDC
Rated contact load	DC48V 150A
Contact form	1 Form A
Dielectric strength(Between coil and contact)	4,000VAC/1min
Breaking capacity	500A@55VDC 45 ops 700A@55VDC 35 ops 1000A@55VDC 20 ops 2000A@55VDC 6 ops 4000A@55VDC 2 ops

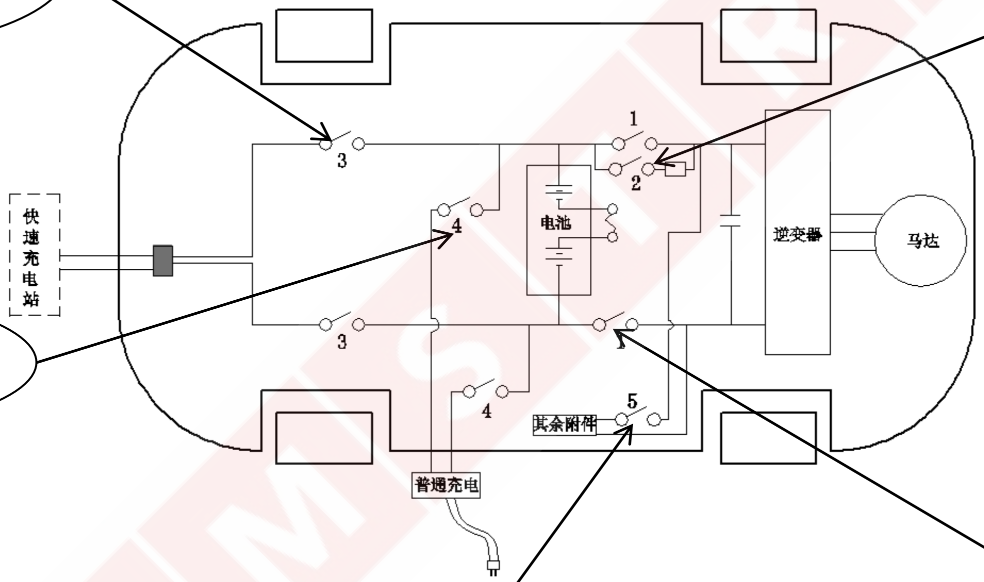
2. Automotive relay

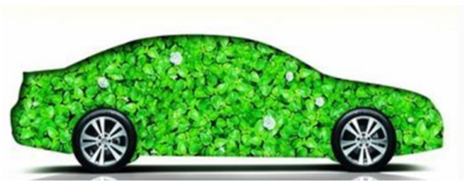
All automotive relay have passed the verification of 32 test items in Sanyou, and the tests can also be set up according to the requirements of customer.

Automotive Relay Reliability Test Items							
No.	Test item	No.	Test item	No.	Test item	No.	Test item
1	Coil resistance and current	9	Inverse peak voltage	17	Dust	25	Mounting plate drawing force test
2	Operate voltage	10	Coil inductance	18	High/ low temperature storage	26	Electrical endurance
3	Contact voltage drop	11	Over voltage	19	Liquid corrosion resistance	27	Ultimate electrical endurance
4	Release voltage	12	Short circuit current	20	Terminal holding force	28	Sinusoidal vibration
5	Operature/Release time	13	Thermal shock	21	Terminal bending	29	Random vibration
6	Dielectric strength	14	Continuous current carrying	22	Cover holding force	30	Shock resistance
7	Mechanical endurance	15	High temperature current carrying	23	Free drop test	31	Cover strength test
8	Short term electrical endurance	16	Salt spray test	24	Terminal drawing force test	32	Temperature& humidity cycling

3. New energy relay

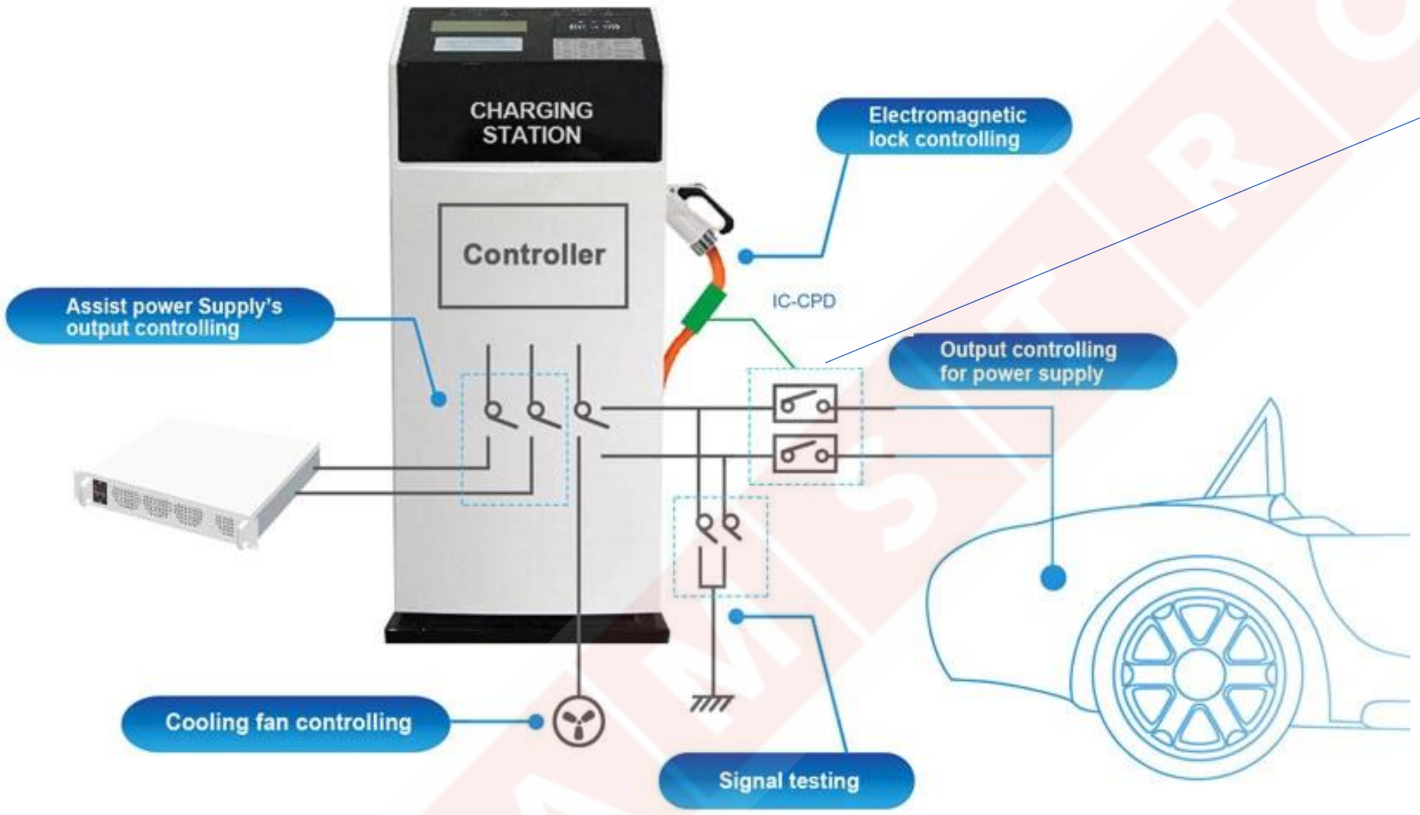
Typical application of new energy relay – **E-Vehicle**





3. New energy relay

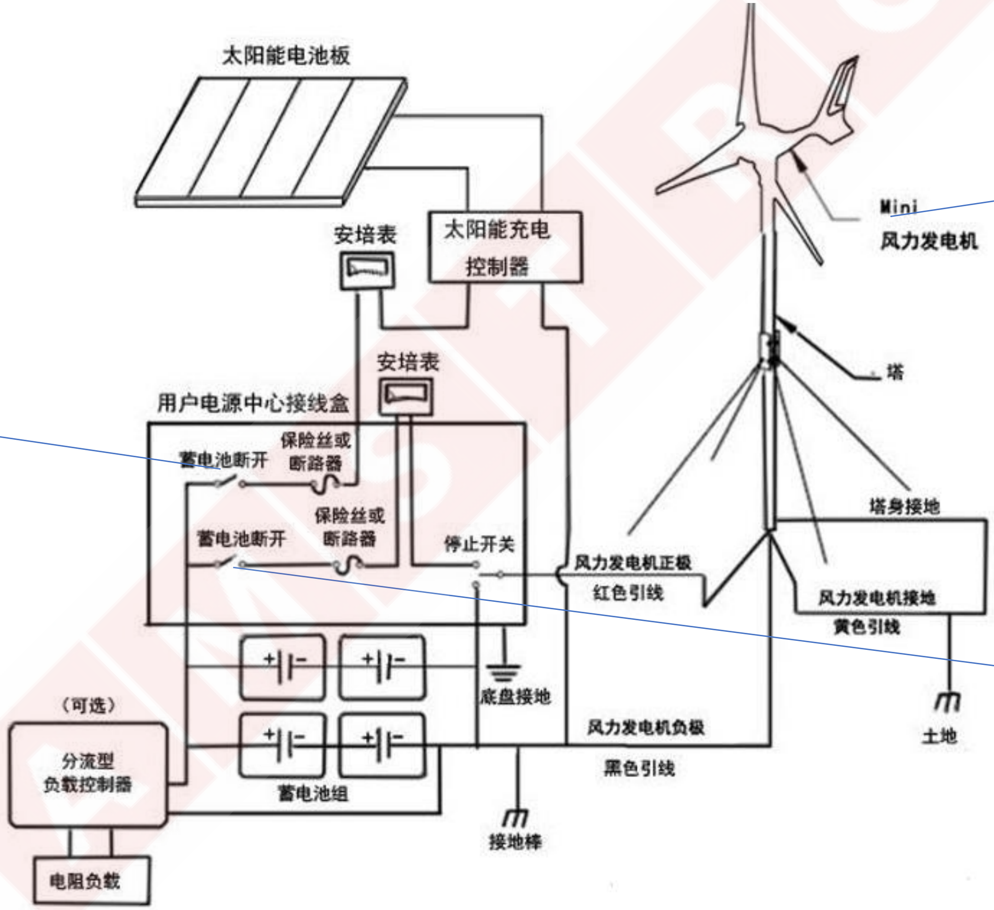
Typical application of new energy relay -- **GETC-EVDC**



It is mainly installed after the DC/DC converter to control the on-off in charging circuit.

3. New energy relay

Typical application of new energy relay --**Wind and solar power**



Junction box

Control the disconnection of battery charging circuit

Wind driven generator

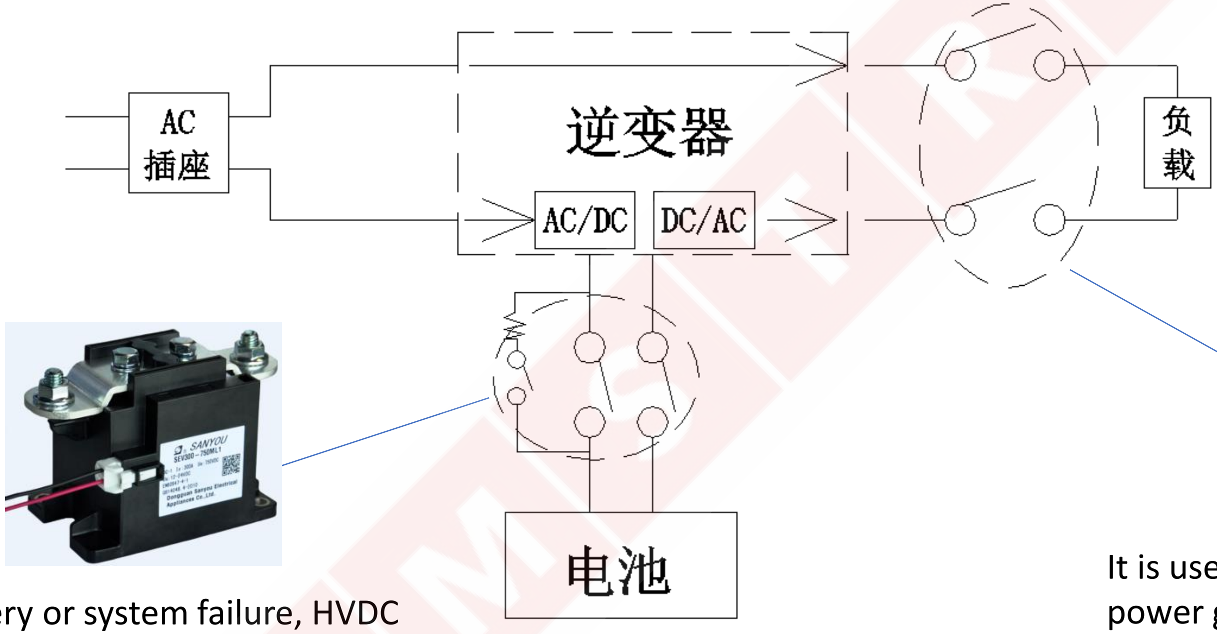
Used to control the start-up of wind turbines

Junction box

Control the disconnection of battery charging circuit

3. New energy relay

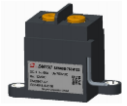
Typical application of new energy relay--**Battery Energy Storage System**



In case of battery or system failure, HVDC contactor is used as the protection element, series resistance and contactor to prevent inrush current and protect the battery.

It is used for the safety cut-off of the power grid, and the current cut-off is carried out when the abnormal situation occurs.

3. New energy relay

Series	Appearance	Dimensions(mm)	Terminal type	Contact form	Rated contact load	Current carrying capacity	Application
SEV10		66.8*44.5*36.9	Flat quick connect	1 A	10A 750VDC	10A continuous 40A 30S 100A 0.6S	Pre-charge relay Normal charge relay
SEV40		67*32.6*50.5	Female Thread	1 A	40A 750VDC	10A continuous 40A 30S 100A 0.6S	HV auxiliary relay Normal charge relay
SES60B		64*33*52.8	Female Thread	1 A	60A 750VDC	60A continuous 240A 30S 600A 0.6S	HV auxiliary relay
SES100D		76*40*67	Female Thread	1 A	100A 750VDC	100A continuous 400A 30S 900A 4S	Fast charge relay
SES150B		76*40*67	Female Thread	1 A	150A 750VDC	150A continuous 900A 30S	Fast charge relay
SES200		95*45*85	Female Thread	1 A	200A 750VDC	200A continuous 800A 30S 2000A 0.6S	Main relay
SES250		95*45*85	Female Thread	1 A	250A 750VDC	250A continuous 1000A 30S 25000A 0.6S	Main relay

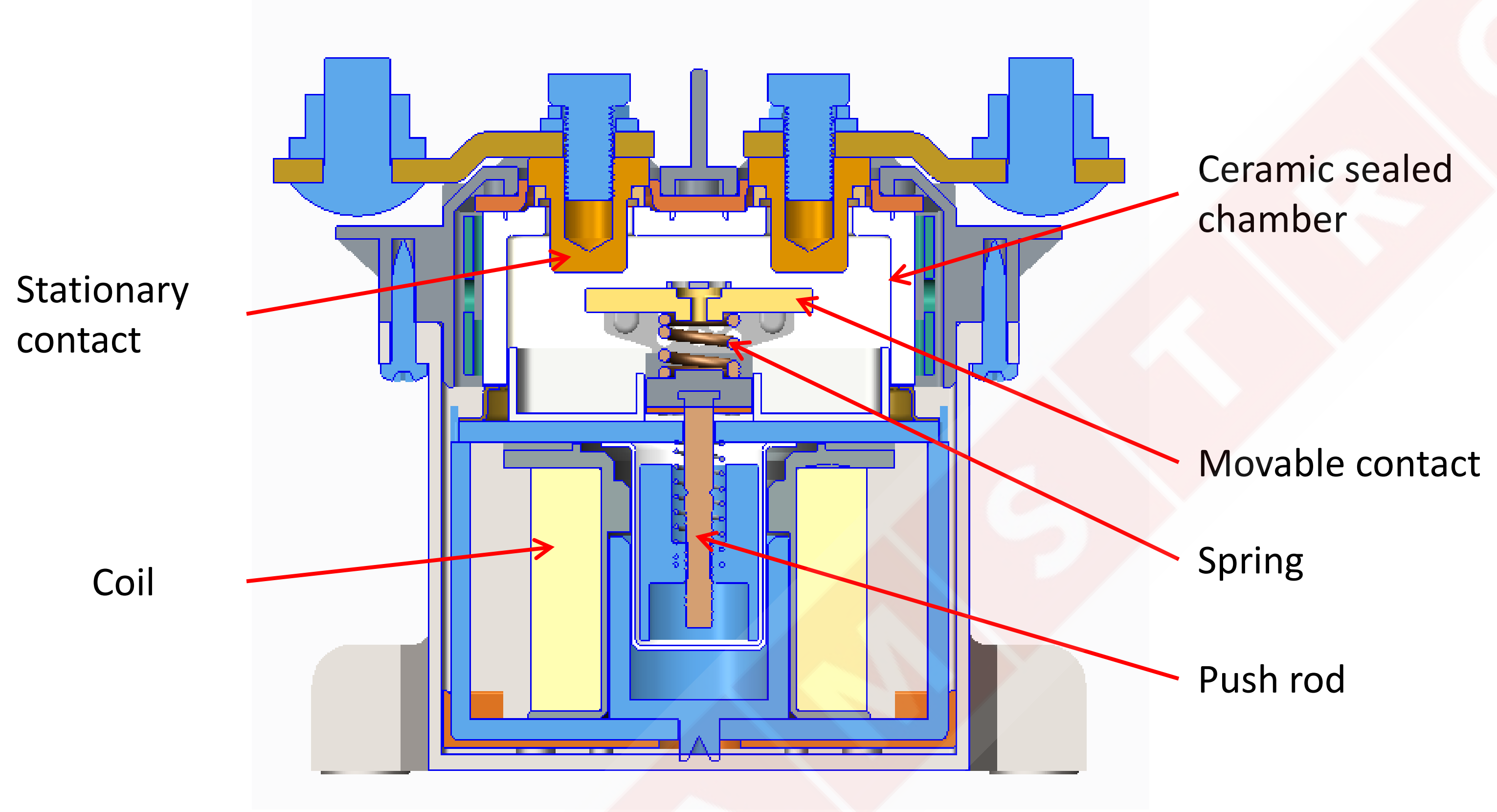
Note: the product specification information is subject to the latest datasheet

3. New energy relay

Series	Appearance	Dimensions(mm)	Terminal type	Contact form	Rated contact load	Current carrying capacity	Application
SES300		113.5*65*75.5	Male Thread	1 A	300A 750VDC	300A continuous 1200A 30S 3000A 0.6S	Main relay
SEC100		68*50.6*60.1	Female Thread	Main contact 1 A Auxiliary contact 1 A	100A 750VDC	100A continuous 600A 30S 1000A 0.6S	GETC-EVDC
SEC150		68*50.6*60.1	Female Thread	Main contact 1 A Auxiliary contact 1 A	150A 750VDC	150A continuous 900A 30S 1500A 0.6S	GETC-EVDC
SEC250		77.8*66.5*73.3	Male Thread	Main contact 1 A Auxiliary contact 1 A	250A 750VDC	250A continuous 1000A 30S 2500A 0.6S	GETC-EVDC
SEC350		77.8*66.5*73.3	Male Thread	Main contact 1 A Auxiliary contact 1 A	350A 750VDC	350A continuous 1200A 30S 3000A 0.6S	GETC-EVDC

Note: the product specification information is subject to the latest datasheet

3. New energy relay



Internal structure

Feature

The contact part is located in the ceramic sealing chamber to ensure the **safety**.

- Ceramic brazing process ensure the sealing chamber meet IP67 protection degree
- Ceramic material has high mechanical strength and is not easy to damage
- No fire or explosion

The ceramic material is resistant to high temperature and the sealing chamber filled with inert gas can effectively quench the arc

3. New energy relay

All the new energy relay have passed the verification of 35 test items in Sanyou, and the tests can also be set up according to the requirements of customer.

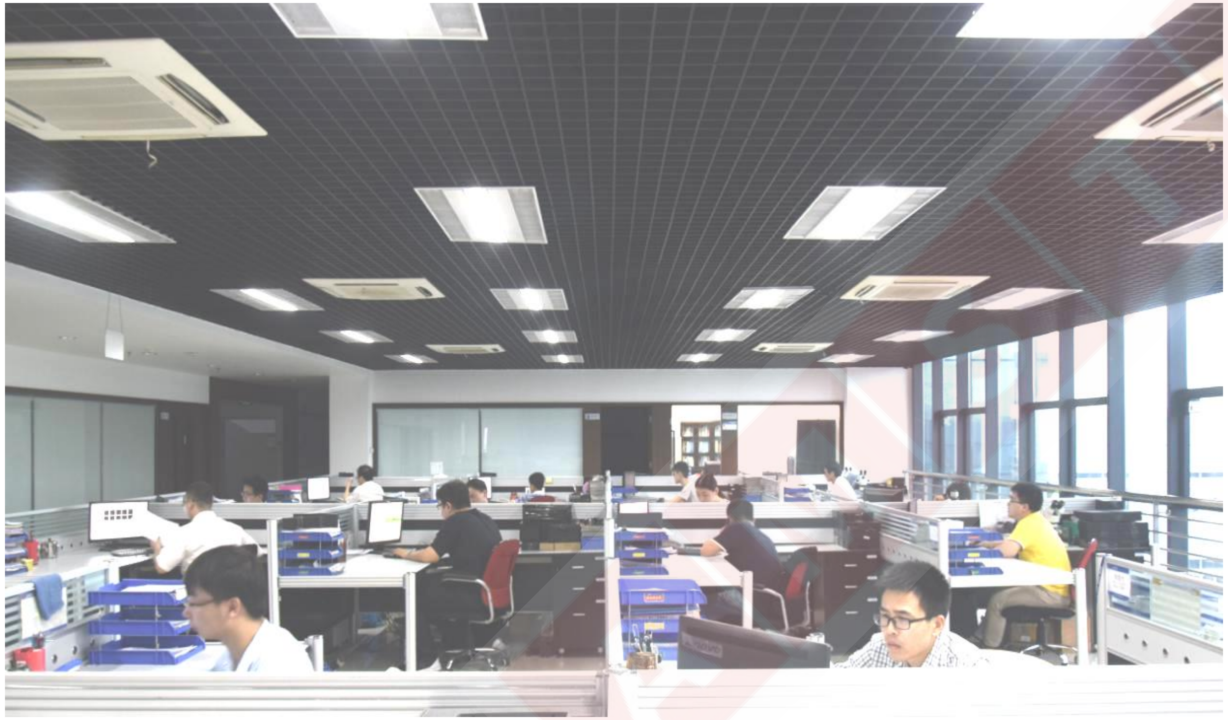
New Energy Relay Reliability Test Items

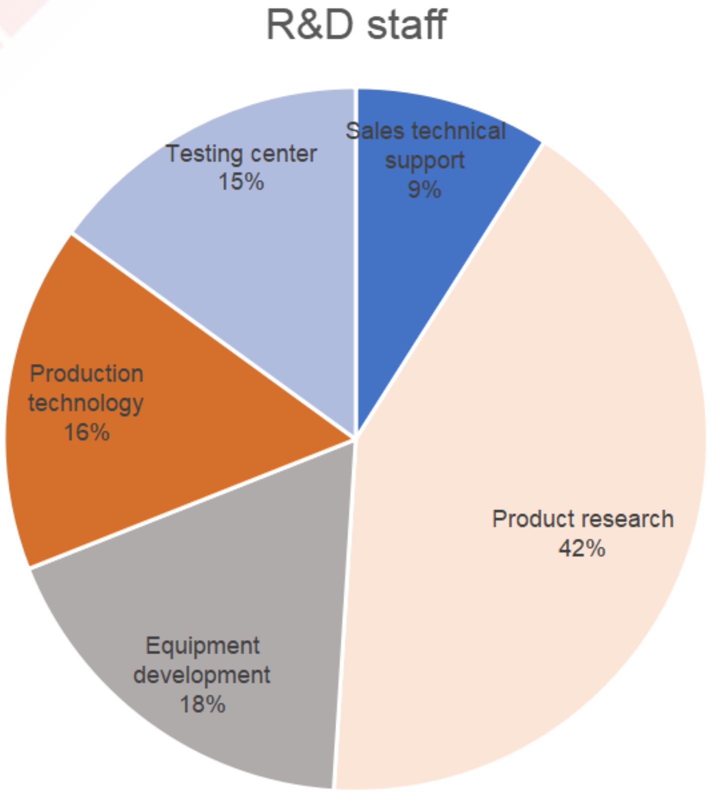
No.	Test item	No.	Test item	No.	Test item	No.	Test item
1	Operate voltage	10	On off test	19	Mechanical endurance test	28	Electrical endurance(High temp.)
2	Coil current	11	Coil voltage drop test	20	Electrical endurance(resistive)	29	Electrical endurance(Low temp.)
3	Operate voltage	12	Noise test	21	Electrical endurance(capacitive)	30	Steady damp heat test
4	Release voltage	13	Arcing time	22	Limiting current making	31	Thermal shock test
5	Operate/release time	14	Dielectric strength	23	Limiting current breaking	32	Thermal humidity cycling
6	Contact voltage drop	15	Mounting torque test	24	Short-time withstand current	33	Temperature range
7	Long term overvoltage	16	Flammability	25	Vibration test	34	Salt spray test
8	Inverse peak voltage	17	Heating	26	Shock test	35	Condensation test
9	Coil temperature	18	Current-carrying capability	27	Cover strength test		

4. Product R&D

R&D team

Sanyou Corporation Limited is a national high-tech enterprise. qualified product R&D team with more than 200 staff, and some of them are top-level elite in the relay industry.

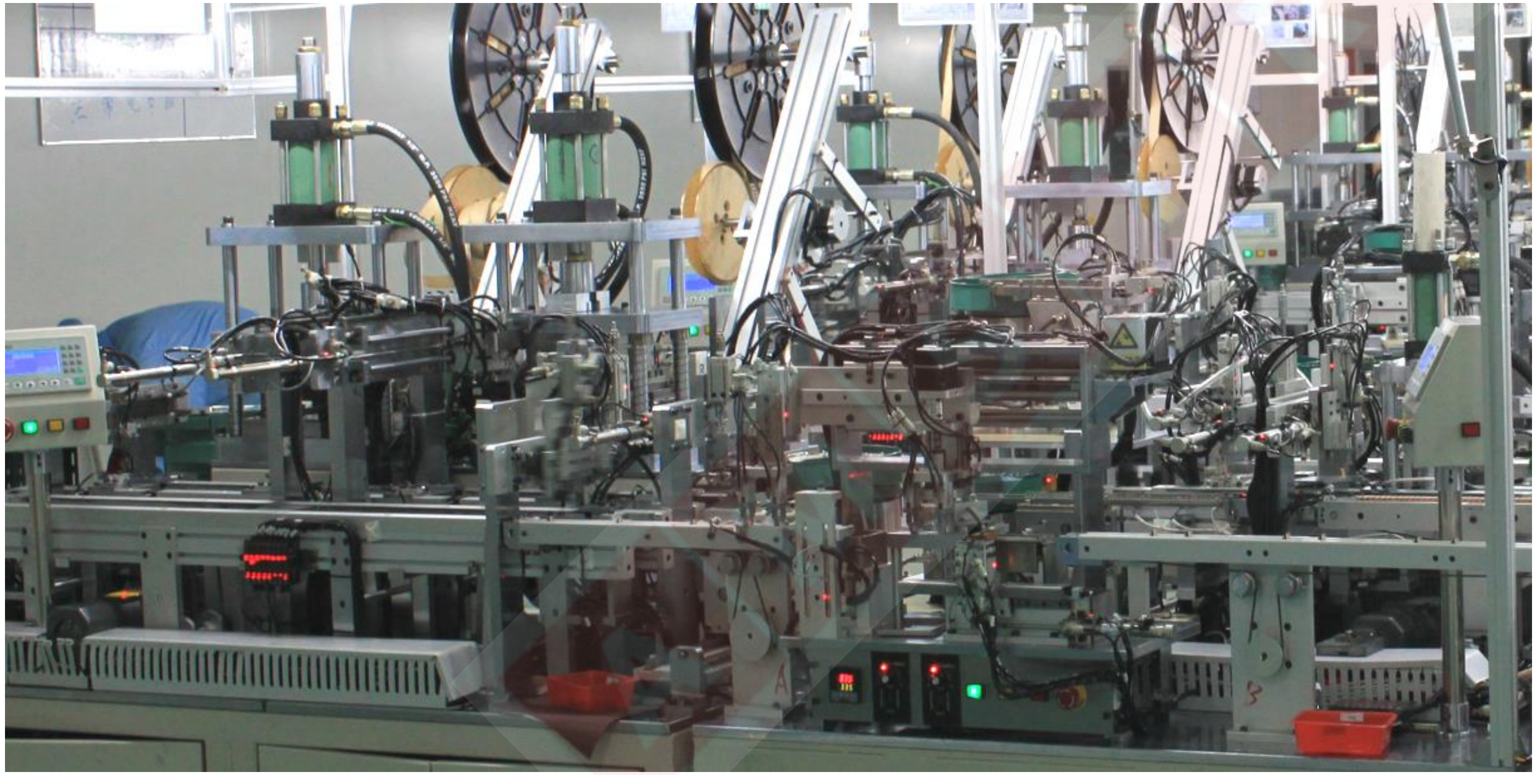


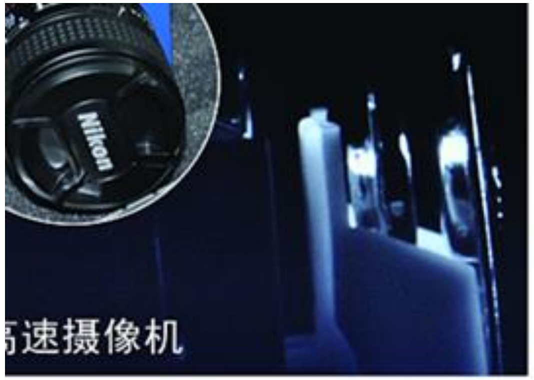


4. Product R&D

Strong equipment R&D ability

Sanyou Corporation Limited owns independent equipment R&D center and is capable to design and produce superb automatic production facilities. It invests large amount of resources to design its own automatic production lines, to improve processing procedure and to focus on core quality analysis in order to make the production process under control.

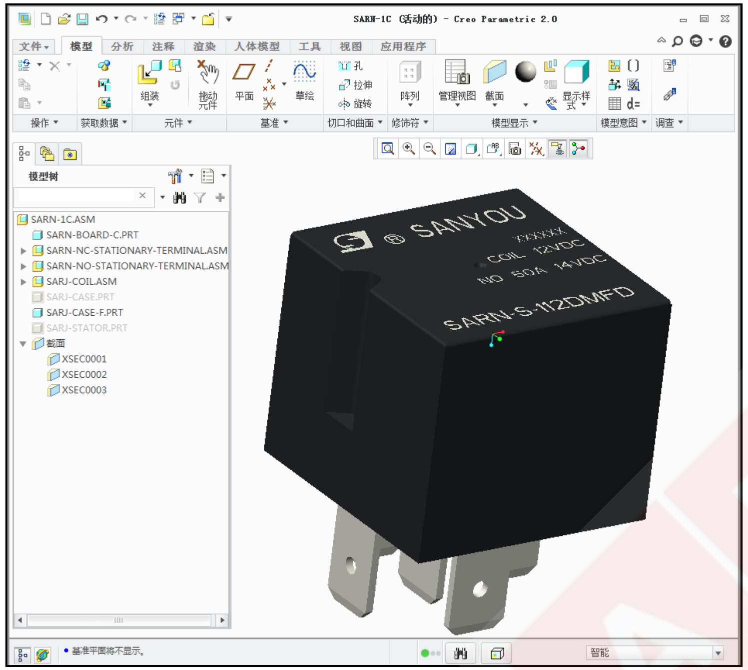


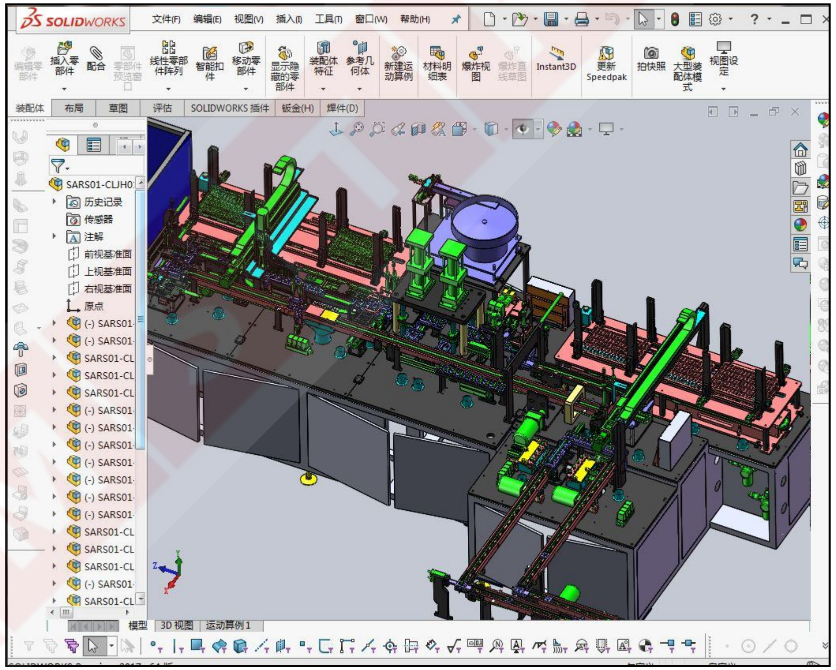


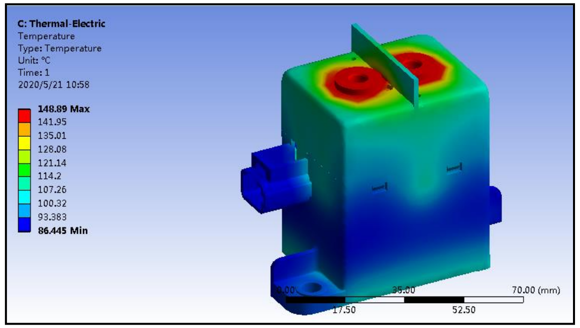
4. Product R&D

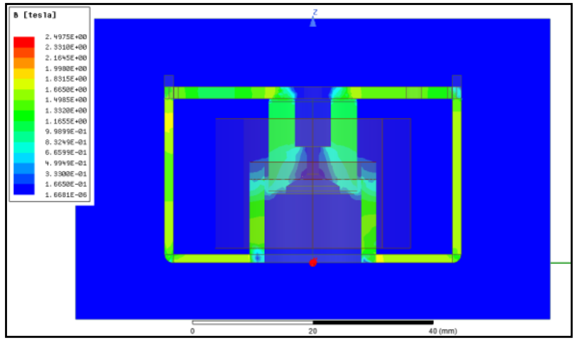
Design software

3D modeling was carried out with software such as Creo and SOLIDWROKS, and various parameters were simulated and analyzed by simulation to ensure the rationality of the design.









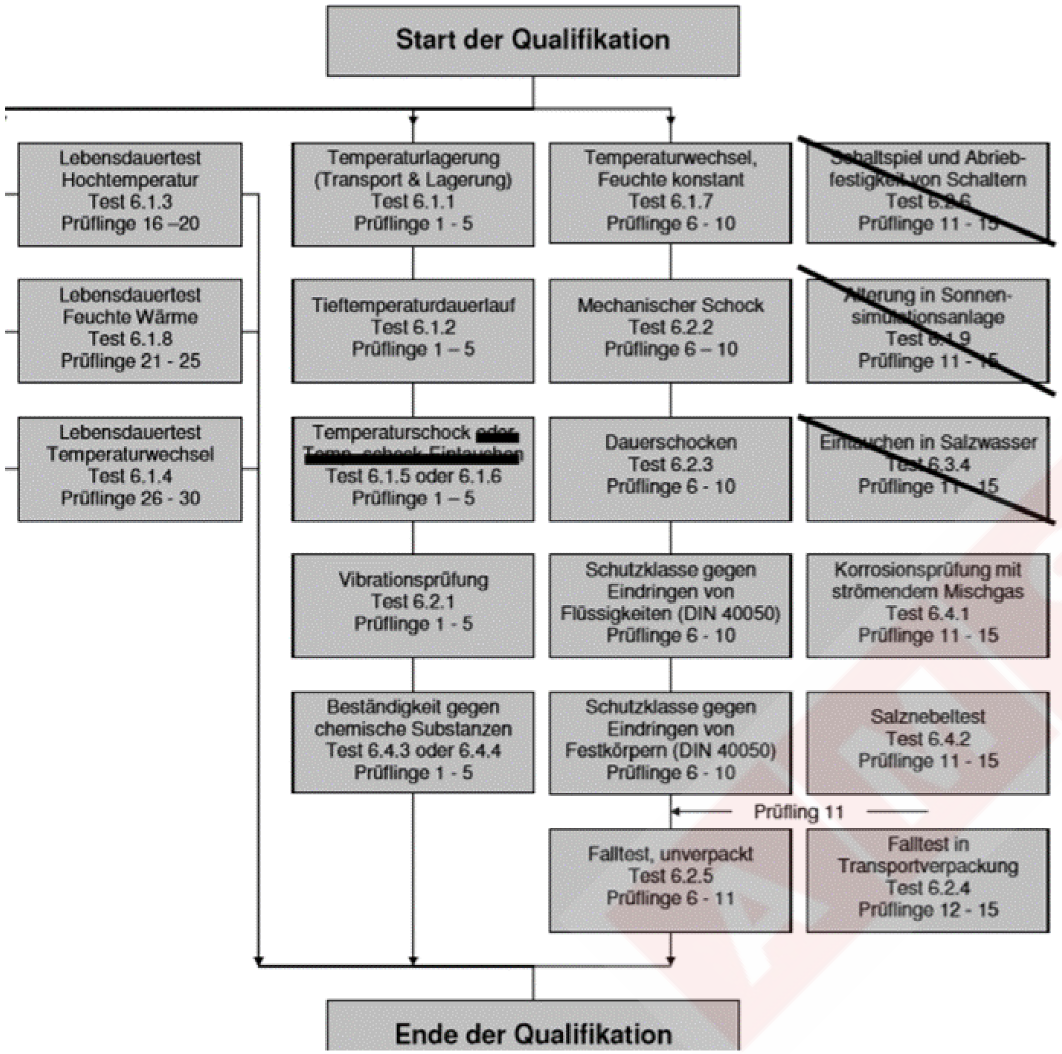
4. Product R&D

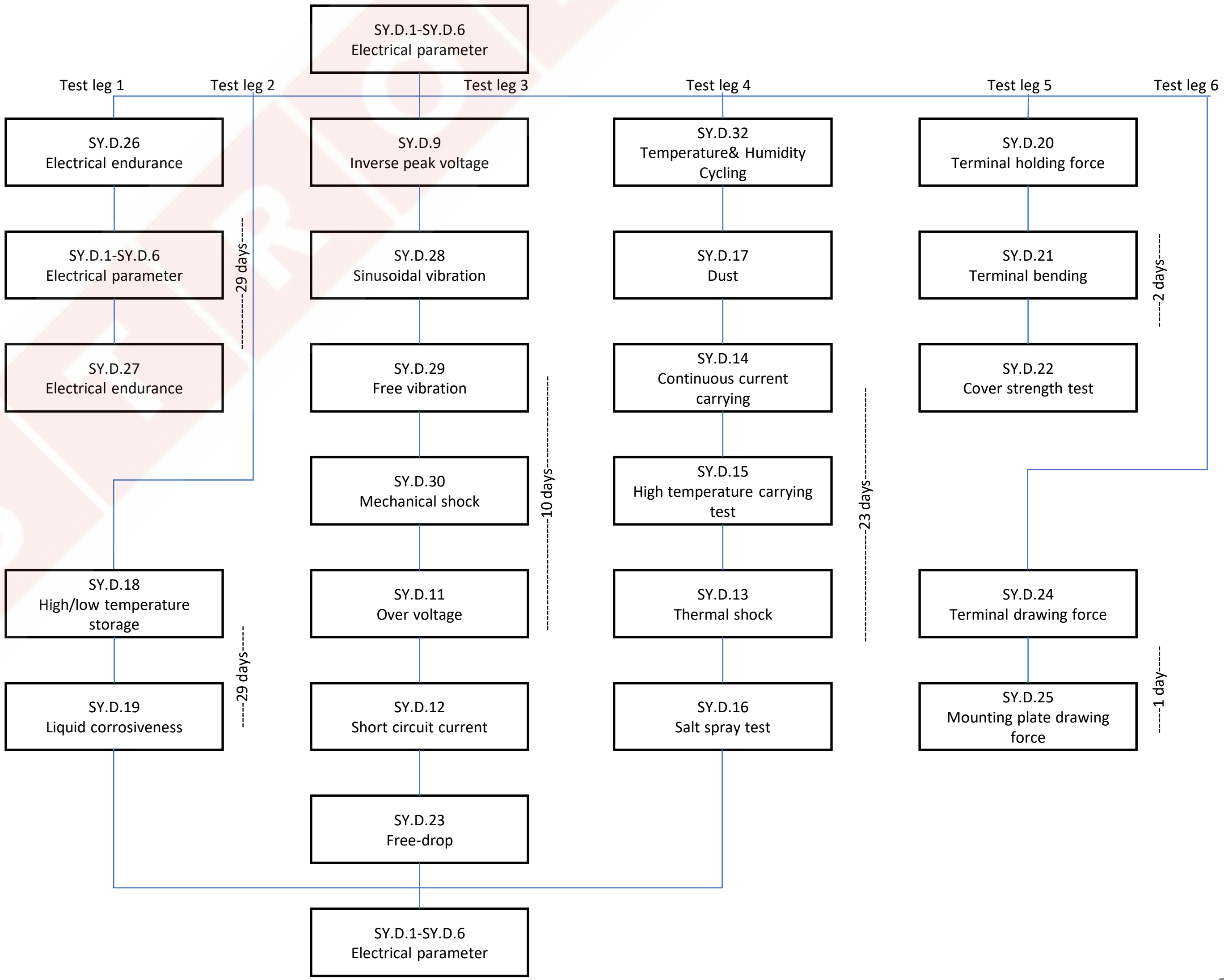
Testing center

Testing center consists of reliability laboratory, safety laboratory, material laboratory and office. It owns advanced technical relay test and analysis equipment, such as new energy HVDC life test unit, three comprehensive sinusoidal vibration system, Harbin Institute of Technology life data monitoring system, short-circuit current testing machine and more than **150** sets of supporting equipment. It has passed the certification of **UL witness laboratory**, **VDE data laboratory** and **National CNAS laboratory**.

4. Product R&D

Customized test





5. Production development

Full-automatic production lines & Perfect production equipment

Automatic production line production to ensure that the process is mature and stable.Process parameter control is accurate.





5. Production development

Own parts manufacturing system

Sanyou invests huge sum of money to build the high precision, high quality **mould, hardware, plastic parts** manufacturing system, ensure the product design, mold development, parts manufacturing and product production technology, quality and technology level, which is in a leading position among international counterparts.

Mold Center

Contact molding workshop

Injection workshop

Hardware forming workshop

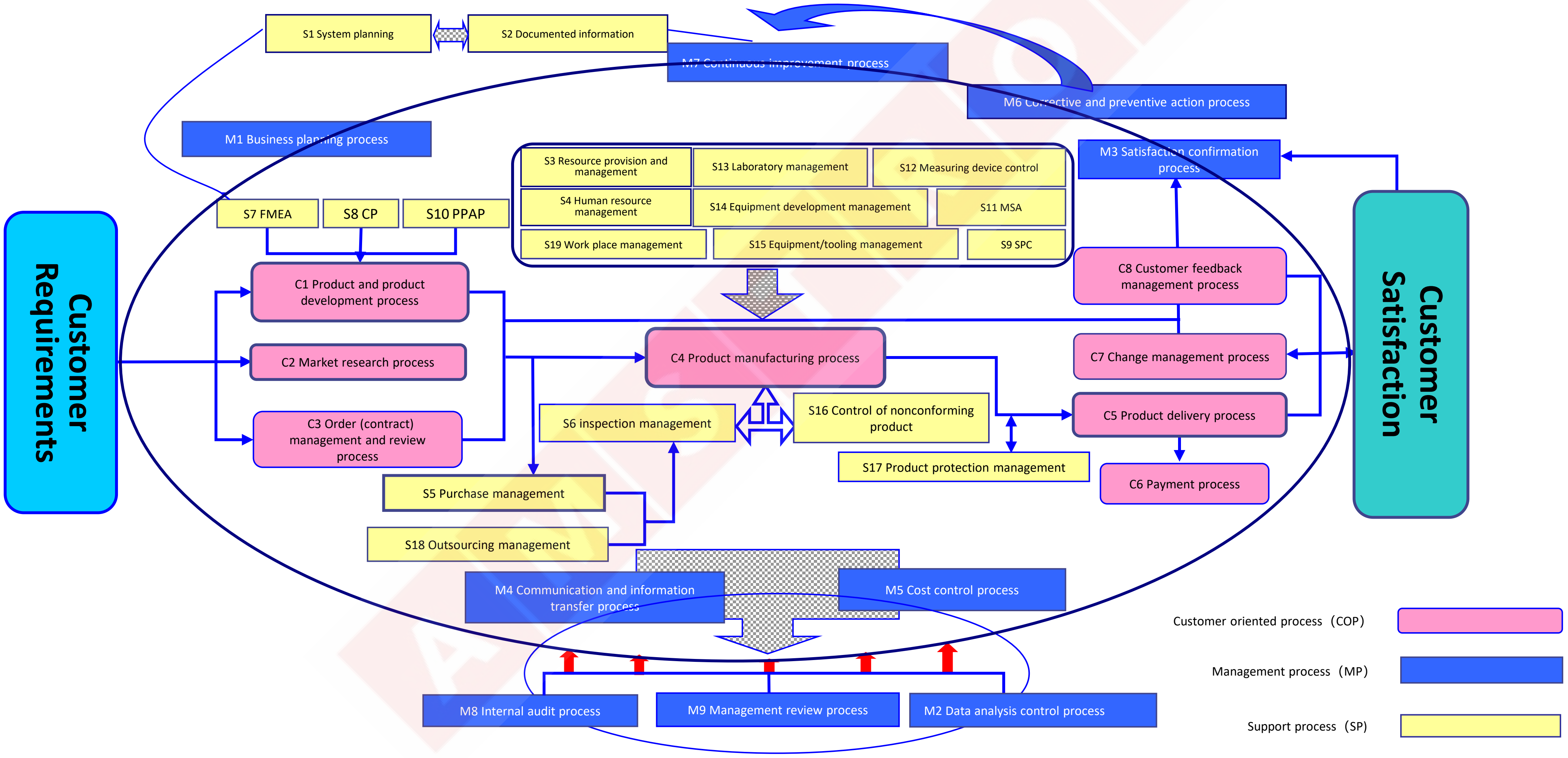
5. Production development

Production capacity of automotive division

No.	Production line	Category	Product series	Capacity (Pcs/Month)	State
1	SARS Automated line	Full-automated line	SARS	1 Million	Mass production
2	Semi-automated line 1#	Semi-automated line	SARB/SARK	300 K	Mass production
3	Semi-automated line 2#	Semi-automated line	SARJ/SARC	300 K	Mass production
4	New energy relay line	Semi-automated line	SEC/SES	100 K	Mass production
5	SARN Automated line	Full-automated line	SARN	1 Million	Commissioning, expected to mass production in 9, 2020
6	SARI Automated line	Full-automated line	SARI	1 Million	Designing, expected to mass production in 12, 2020
Total				3.7 Million	

6. Quality assurance

ISO9001&IATF16949 The relationship of Quality management system process



6. Quality assurance

Quality assurance

Integrated parts manufacturing system：

- Mold,
- hardware,
- injection molding,
- contact molding...

Management system:

- ISO9001
- IATF16949
- ISO14001

Certification

Meet customer certification requirements

Institutionalized audit：

- Process audit
- Product audit
- Layered audit

Online automatic detection：

- Key product parameters
- Key process parameters
- SPC

6. Quality assurance

Process quality control

Key process parameters are full-inspected by CCD

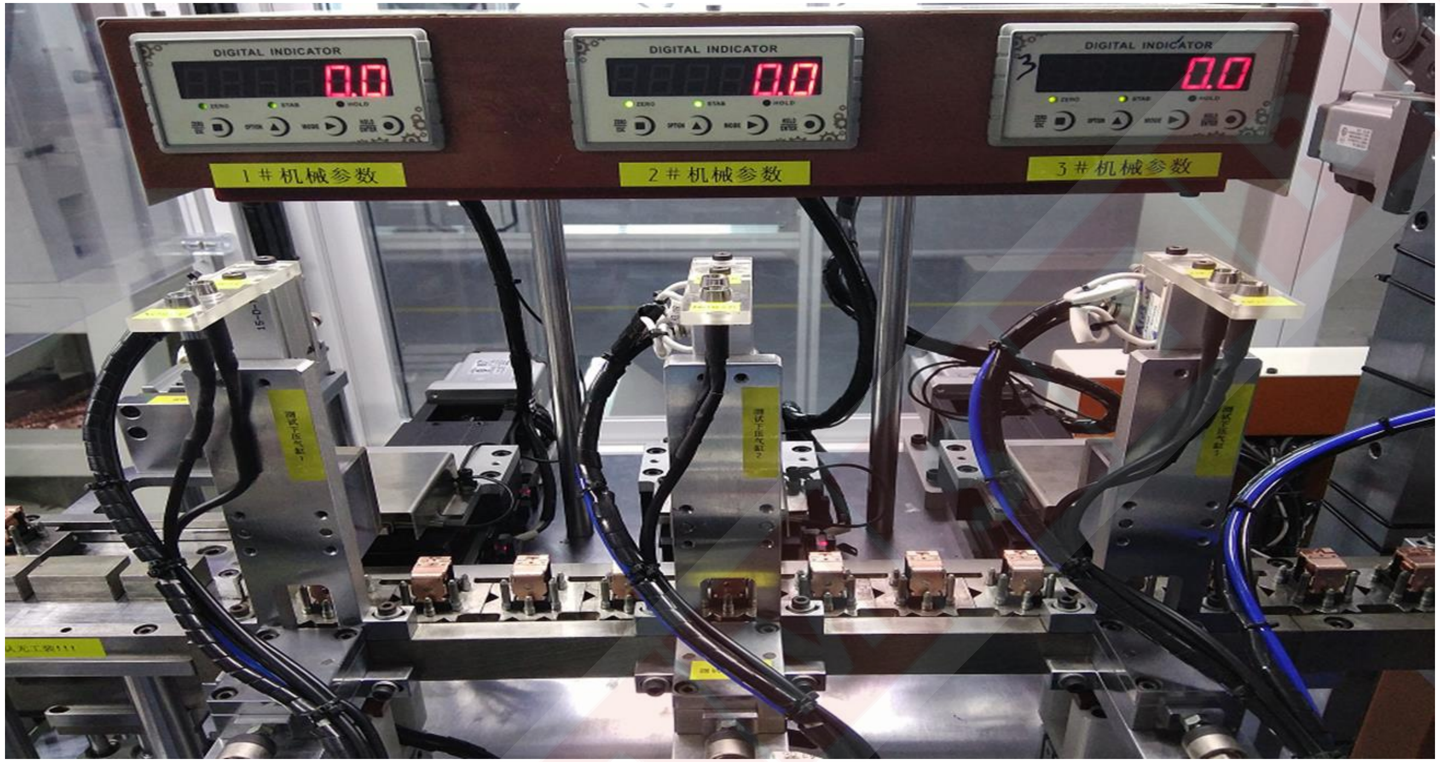
Process parameter detection items

- Riveting dimensions and appearance of parts
- Notch width and appearance of terminal
- Terminal position

6. Quality assurance

Process quality control

Mechanical parameters are automatic full-inspected



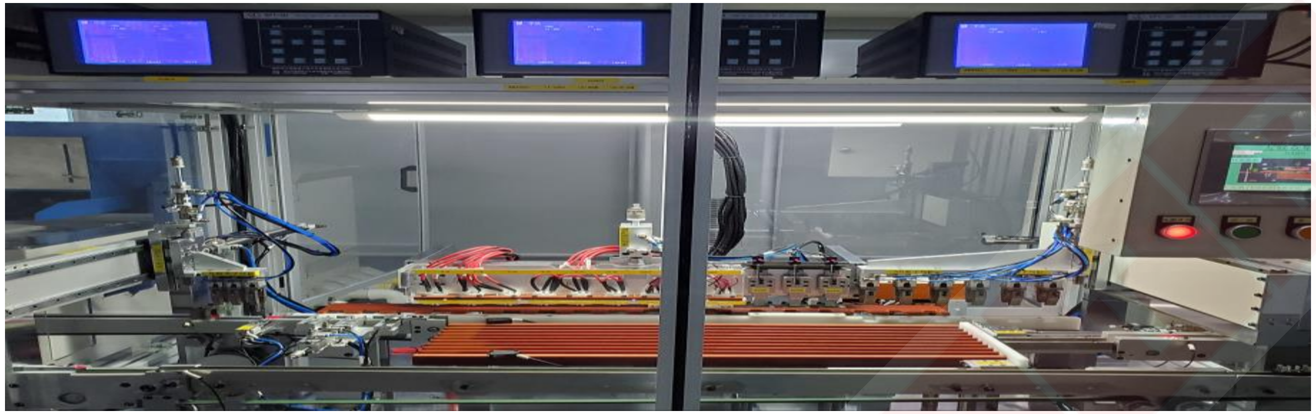
Mechanical parameter testing items

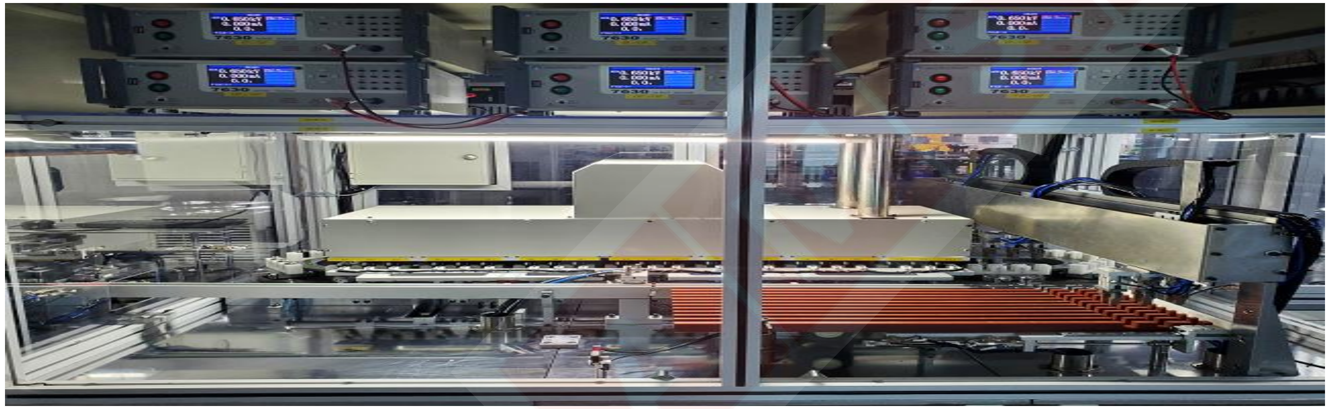
- Contact gap
- Contact pressure
- Contact follow

6. Quality assurance

Process quality control

Electrical parameters are automatic full-inspected





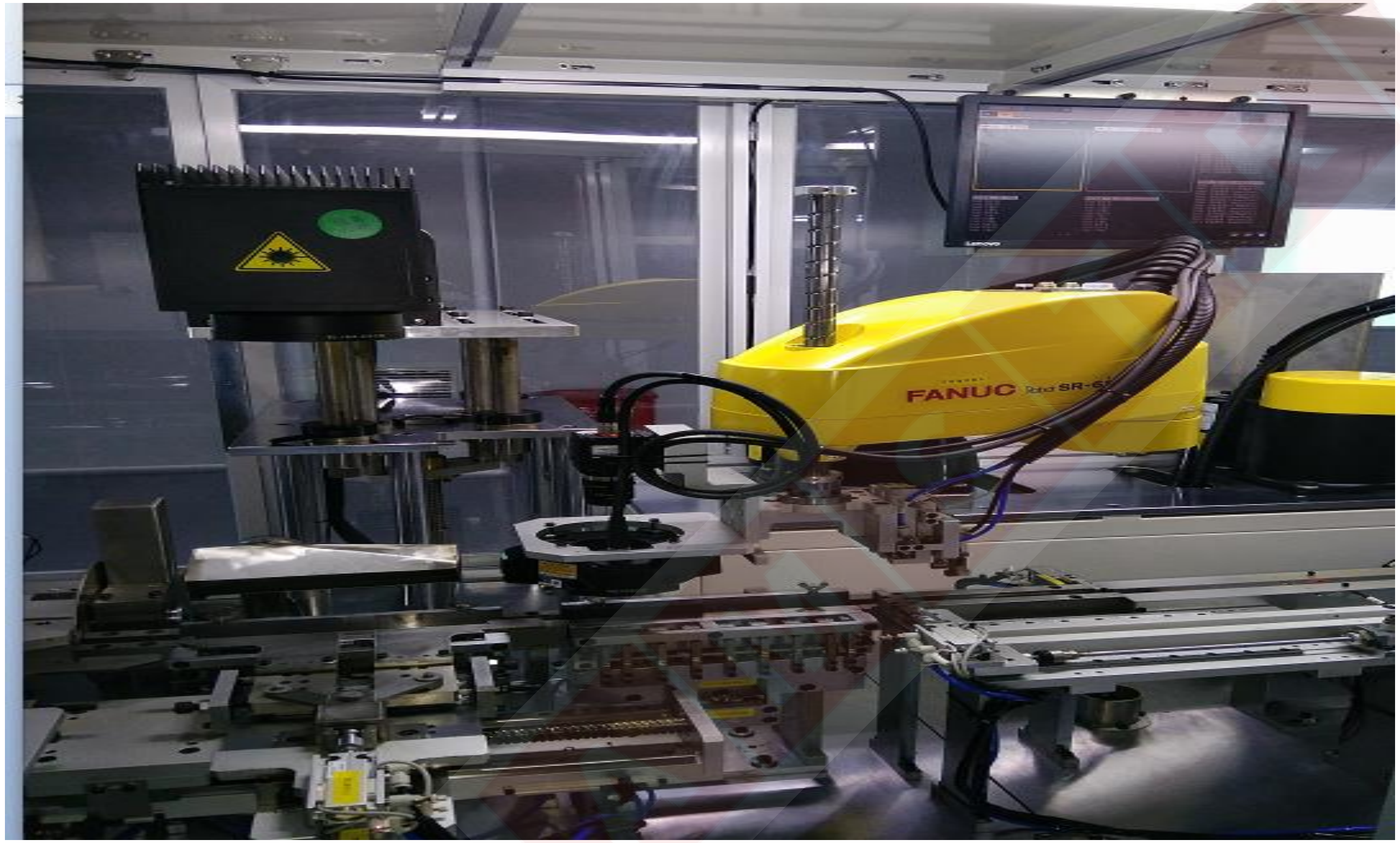
Electrical parameter detection items

- Coil resistance
- Contact resistance
- Operate voltage
- Release voltage
- Operate time
- Rease time
- Dielectric strength

6. Quality assurance

Process quality control

Appearance of end product are full-inspected by CCD



Appearance inspection items

- Marking
- Terminal
- The glue effect
- Scratch

三友繼電器 SANYOU RELAYS

敬业 诚信 团结 创新

AMSTRON

6. Quality assurance

Process quality control

Process characteristic parameters are controlled by SPC

SARK yoke riveting height X-R chart

Series	SARK	Limit	H=1.4-1.5mm	Control limits	X	R	Statistics Department	QA	Chart No.	
Process	Spring and yoke riveting	USL	1.5	UCL	1.463	0.0515	Sampling method	4PCS/4H	Inspector	唐新军
Parameter	Riveting height	SL	1.45	CL	1.451	0.0258	Machine No.	SYLZ020142	Reviewer	张军民
Date	2020/1/1-2020~	LSL	1.4	LCL	1.439	0	Operator	徐云贵	Approver	吴军

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Date		1/4	1/8	1/9	1/10	3/22	3/28	4/4	4/5	4/6	4/11	4/12	4/18	4/9	4/19	4/28	4/29	5/6	5/7	5/8	5/9
No.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
Sample measurement X1	1.47	1.45	1.45	1.45	1.44	1.45	1.45	1.44	1.43	1.44	1.46	1.46	1.43	1.46	1.45	1.44	1.45	1.46	1.46	1.44	1.45
X2	1.44	1.45	1.48	1.43	1.46	1.46	1.45	1.43	1.45	1.45	1.45	1.43	1.47	1.45	1.44	1.45	1.45	1.44	1.46	1.44	1.44
X3	1.46	1.44	1.45	1.46	1.46	1.46	1.45	1.45	1.44	1.48	1.44	1.45	1.44	1.45	1.44	1.46	1.45	1.47	1.45	1.45	1.46
X4	1.44	1.48	1.46	1.45	1.45	1.45	1.43	1.45	1.46	1.46	1.45	1.44	1.46	1.47	1.46	1.45	1.46	1.43	1.44	1.45	1.48
X5																					
X6																					
ΣX	5.81	5.82	5.84	5.79	5.81	5.82	5.78	5.77	5.78	5.83	5.80	5.78	5.80	5.83	5.79	5.80	5.81	5.80	5.81	5.78	5.83
X	1.45	1.46	1.46	1.45	1.45	1.46	1.45	1.44	1.45	1.46	1.45	1.45	1.45	1.46	1.45	1.45	1.45	1.45	1.45	1.45	1.46
R	0.03	0.04	0.03	0.03	0.02	0.01	0.02	0.02	0.03	0.04	0.02	0.03	0.04	0.02	0.02	0.02	0.01	0.04	0.02	0.01	0.04

Coefficient table

	4	5	6
A_2	0.729	0.577	0.483
d_2	2.059	2.326	2.534
D_3	0	0	0
D_4	2.282	2.114	2.004

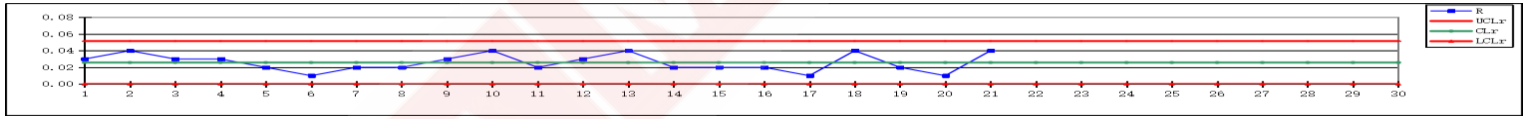
$$UCL_x = \bar{\bar{X}} + A_2\bar{R}$$
$$CL_x = \bar{\bar{X}}$$
$$LCL_x = \bar{\bar{X}} - A_2\bar{R}$$

$$UCL_R = D_4\bar{R}$$
$$CL_R = \bar{R}$$
$$LCL_R = D_3\bar{R}$$

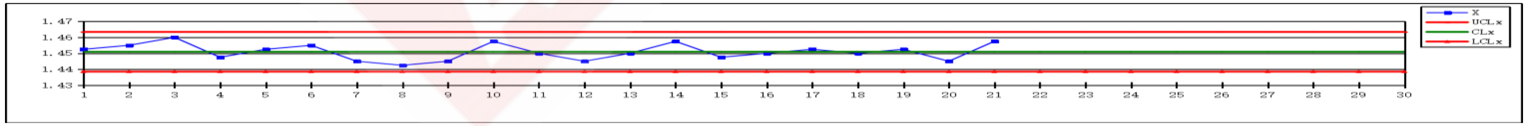
$$CpL = (\bar{\bar{X}} - LSL)/(3\bar{R}/d_2)$$
$$CpU = (USL - \bar{\bar{X}})/(3\bar{R}/d_2)$$
$$Cpk = \min(CpL, CpU)$$

	121.88	Cpk	1.36
ΣX	30.47	x	1.45
ΣR	0.54	R	0.03

X Control Chart



R Control Chart



Cause analysis

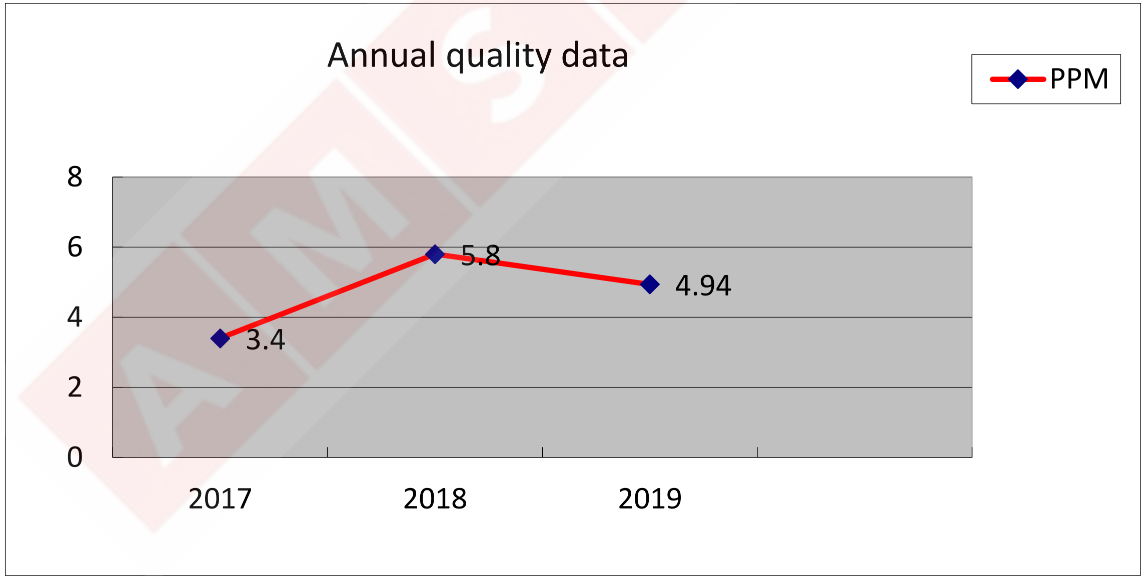
When the following abnormalities occur in the control diagram, cause analysis should be conducted:
1. Any point is out of control
2. Seven points in a row on one side of the centerline
3. Seven straight points up or down
4. Significantly more than a third of the points fell close to the control line, or significantly less than two-thirds of the points fell in a third of the area.

6. Quality assurance

Process quality control

Annual quality data tracking and continuous improvement

Year	2017	2018	2019
Sales volume(PCS)	444,540,000	471,055,594	490,565,200
Number of complained products(PCS)	1,513	2,731	2,422
PPM	3.40	5.80	4.94



7. Main customer

The main customers of Automotive relay

宇通集团	比亚迪汽车 BYD AUTO	中国一汽
山东众汽	吉利汽车 GEELY AUTO	陕西华沃思特
DFAC	SANY	Yinlong 银隆新能源

7. Main customer

The main customers of New energy relay

宇通集团

Chunlan

Schneider Electric

BAK

POWER SYSTEMS 惠州市亿鹏能源科技有限公司

恒大集团 世界500强

LISHEN Power Your Life!

YUDO 云度

Yinlong 银隆新能源

THANK YOU!

谢谢大家！