

Electrical/ Electronic

# TEST EQUIP.& SYSTEMS

**For Coil winding, Electric devices, H.V products  
Car electric parts, Electric home appliance.**

40 kinds of high precision testers/Systems are under commercial production, and using in various fields more than 2000 relating to **motor, transformer, solenoid, car electric parts, nuclear plant, mobile phone** and etc.

KAST runs its own Calibration Lab., certified from **National Institute of Tech. & Quality**, and is registered in **ISO 17025** and **ISO 9002**.

## PRODUCTS

### TEST EQUIP.

- Surge Tester (17 Models)
- Hipot (Puncture) Tester (7 Models)
- Insulation Tester
- Hipot/ Insulation Tester
- Impulse Simulation Tester
- ESD Tester
- Resistance Tester (2 Models)

### SYSTEM

- Motor Test System
- Stator Test System
- Rotor(Armature) Test System
- Transformer Test System

### Others

- High Voltage Reed Relay (patent)
- Testers for car electric parts



▲ Fan Motor Performance Tester

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## **Welcome to KAST**

***We, “Bright company, kind people” are very grateful for sharing our past, present and future with you throughout win-win business.***

***KAST, has manufactured various test equipments and systems for coil winding products, electric devices, H. voltage products and electric home appliances since the establish-ments of 1987.***

At present, 40 kinds of high accurate Test Equipments and Systems are under commercial production, and ranked as first in domestic market share.

KAST products have been used in the manufacturing fields more than 2000 relating to motor, transformer, solenoid, car electric parts, nuclear plant, mobile phone and etc.

KAST has produced these products on the basis of not only the accumulated experience ( including patents ) & the continuous R&D investments but also international regulations( ISO 9002 & ISO 17025) and the certified national calibration institute.

Our overseas marketing is also expanding every year and our endless efforts for exporting will continue in order to meet the increasing needs of overseas customers.

With the warmest hearts and the open-minded, KAST is waiting for whoever want to get in touch with us.

1987.	11	Established
· · · ·		( Abbreviated )
2000.	5	Patent for Surge Tester
2001.	3	Registered as Venture company
2001.	4	Joined consortium with technical university.
2002.	1	ISO 9002, ISO 17025
2002.	11	Award for high accuracy testing Equip.'s part
2002.	12	Award for Development of high accuracy Equip.
2002.	1	Certified as National Calibration Institute
2003.	9	Registered as INNO BIZ company.

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▲ Photo shows an example of Armature Test System. This System tests an armature of DC motor, and checks surge, hipot, 2 kinds of resistance between commutators, and Insulation. It can test 4,800 products a day (8 hours a day).

**Table 1 (Test Equip. 1/2)**

Name of Equipments	Output (Adjustable)	Model	Descriptions	Dimension W x H x D (mm)	N/W (kg)	
<b>Surge Tester</b>  <b>* KAST code</b>  <b>KT-805AL</b>  8: No of version 5: Max output voltage A: Auto decision type L: Low inductance M: Manual decision D: Digital type/Auto decision/sample memory	0~3 kV	KT-903 D	Auto/ Memory type/ Interface	420 x 190 x 540	15	
		KT-803 A	Auto /Mass test/Interface	420 x 260 x 560	32	
		KT-803 AL	Auto/ low inductance			
		KT-803 M	Manual type (results on screen)			
	0~5 kV	KT-905 D	Auto/ Memory type/ Interface	420 x 190 x 540	15	
		KT-805 A	Auto /Mass test/Interface	420 x 260 x 560	32	
		KT-805 AL	Auto/ low inductance			
		KT-805 M	Manual type (results on screen)			
	0~10 kV	KT-9010 D	Auto/ Memory type/ Interface	420 x 240 x 600	23	
		KT-8010 A	Auto /Mass test/Interface	420 x 320 x 650	45	
		KT-8010 AL	Auto/ low inductance			
		KT-8010 M	Manual type (results on screen)			
	0~20 kV	KT-9020 D	Auto/ Memory type/ Interface	600 x 1400 x 750	90	
		KT-8020 A	Auto decision type	600 x 1820 x 800	120	
		KT-8020 M	Manual type (results on screen)			
	0~40 kV	KT-9040 D	Auto/ Memory type/ Interface	See <a href="#">Note 1</a>	<a href="#">Note 1</a>	
		KT-8040 M	Manual decision type	600 x 1820 x 800		
<b>Hipot Tester (Puncture)</b>  <b>KT - 5000PD- xx</b>  P: Puncture D: Display in digital xx : max. currents	0~ 5 kV (0~2.5kV)	KT-5000PD-20	Auto decision/ Digital	420 x 190 x 510	15	
		KT-5000PD-50			18	
		KT-5000PD-100			20	
	0~ 10 kV (0~5 kV)	KT-10KPD-20	Volt/ Ampere meter,equipped  ( Ex. of 0~5(2.5) kV )  ┌ Mode1: 0~ 5 kV └ Mode2: 0~ 2.5 kV	420 x 300 x 640	<a href="#">Note 1</a>	
		KT-10KPD-50				
		KT-10KPD-100				
	0~ 20 kV (0~10 kV)	KT-20KPD-20		<a href="#">Note 1</a>		<a href="#">Note 1</a>
		KT-20KPD-50				
		KT-20KPD-100				
<b>Insulation Tester</b>	DC 1 kV (DC 0.5 kV)	KT-1000 i	Mode1: 0~2000 M $\Omega$ (DC 1kV) Mode2: 0~1000 M $\Omega$ (DC 0.5kV)	420 x 155 x 500	10	
<b>Hipot &amp; Insulation Tester</b>	Hipot; 1 kV Ins: DC 1kV	KT-5000 Pi	Combined ┌ KT-5000PD-20 └ KT-1000 i Auto/Manual selection	420 x 240 x 480	30	
<b>Lightning Impulse Simulation Tester</b>	6 kV 3 kA	KT-6030 iG	Three output waveform(option)/ 1/1000 attenuation divider/ Digital scope/ printer (option)	420 x 140 x 420	<a href="#">Note 1</a>	
<b>ESD Tester</b>	4~40 kV	KT-8040 ESD	Control Unit/ ESD Generator/ Blank for miscell.	420 x 1400 x 660	<a href="#">Note 1</a>	
<b>Resistance Tester</b>	0~40 k $\Omega$ option (0~200 k $\Omega$ )	KT-2000RD * Std. type	Display (digital, 3¾ digit)/ Temp. correction/6 range mode	420 x 140 x 420	10	
		KT-500RD * Special type	Std. type with multi-measuring step (Ex., Armature, Rotor)	<a href="#">Note 1</a>	<a href="#">Note 1</a>	

[Note 1](#) 1. Net weight, not mentioned, shall be reported ( it depends on option)  
2. Above dimension is changeable by users option.

**Table 2 (Test System 2/2)**

Name of Systems	Tests & Components		Model	Descriptions
<b>Motor Test System</b>  * Two Types - Type I: routine test - Type II: routine test/Lab.	Type I	Type II	see page 18~19	Cabinet(19" rack) & Jig table. Auto measuring in sequence. Auto decision (Good/Bad) Auto controller(Auto/manual mode)  ☞ Surge : Both ends of coil. HiPot : Between coil and core
	• Surge Tester • Hipot Tester • Auto Controller • DC power supp. • Jig table (Electric brake)	• Indust. Computer • Monitor(15" LCD) • Torque/Current/ Rotating speed • Jig table (Electric brake)		
<b>Stator Test System</b>  * Two Types - Type I: routine test - Type II: routine test/ Lab. (Indust. Computer+ 15" LCD)	Type I	Type II	KT- 905D KT- 500PD-20 KT- 2000RD	Cabinet(19" rack) & Jig table. Auto measuring in sequence. Auto decision (Good/Bad) Auto controller(Auto/manual mode)  ☞ Surge/ Hipot/ R/ Insulation test Dummy rotor : Rotation test
	• Surge Tester • Hipot Tester • Resist. Tester • Auto Controller • Jig table (dummy rotor)	• Surge Tester • Hipot Tester • Resist. Tester • Indust. Computer • Monitor(15" LCD) • Jig table (dummy rotor)		
<b>Rotor (Armature) Test System</b>	• Surge Tester ( 0~5 kV) • Hipot Tester ( 0~5(2.5) kV) • Resistance Tester ( 0~40 kΩ) (1) Special type for <sup>a</sup> and <sup>b</sup> (2) Standard type for <sup>b</sup>  • Auto Test Controller • Jig table		KT- 905D KT- 500PD-20  (1) KT- 500RD (2) KT- 2000RD  KT- 12 (PLC) -	Cabinet(19" rack) & Jig table. Auto measuring in sequence. Auto decision (Good/Bad) Auto Controller(Auto/manual mode)  Applicable test ☞ Surge : Between symm. segments of commutator  Hipot : Between coil and core Resistance : Commutator <sup>a</sup> Between adjacent segments <sup>b</sup> Between symmetrical segments
<b>Transformer Test System</b>	• Surge Tester • Hipot Tester • Auto Test Controller • Volt/Ampere meter for idling current test of 1' st coil for voltage test of 2' nd coil  • Jig table		KT- 905D KT- 500PD-20 - KT- 12 (PLC) -	Cabinet(19" rack) & Jig table. Auto measuring in sequence. Auto decision (Good/Bad) Auto controller: Auto/manual mode  ☞ Surge : Both ends of 1st, 2nd coil Hipot : Between 1st and 2nd coil. Between all coils and core.  Output voltage: for all 2' nd coil.

**Note 1** 1. Net weight, not mentioned, depends on user's options.  
 2. Components of Test System can be changeable by option

Digital/Auto decision Model : KT- 903D, 905D, 9010D, 9020D, 9040D.

Auto decision Model: KT- 803A, 805A, 8010A, 8020A.

Auto/special purpose Model : KT- 803AL, 805AL, 8010AL.

## ■ Model 1 *Digital type*



### KAST Code

#### KT-905D

9 : Version No.  
5 : Max. output voltage  
D : Digital/ auto decision  
/sample memory  
A : Auto decision  
(G/Bad)  
M : Manual type  
L : Low inductance  
(for low inductance )

Fig1 : KT- 905D : The microprocessor-controlled instruments shows a new model with a 5.7" LCD screen and various functions such as auto start, auto decision (Good/Bad), sample memory and interface.

### • Classification

Surge Testers are classified according to output voltage and its function.

Output voltage	Model	Descriptions	Dimension W x H x D (mm)	N/W (kg)
0.5~ 3 kV	KT-903D	Auto/ Memory type/ Interface	420 x 190 x 540	15
	KT-803A	Auto /Mass test/Interface	420 x 260 x 560	32
	KT-803AL	Auto/ low inductance		
	KT-803M	Manual type (results on screen)		
0.5~ 5 kV	KT-905D	Auto/ Memory type/ Interface	420 x 190 x 540	15
	KT-805A	Auto /Mass test/Interface	420 x 260 x 560	32
	KT-805AL	Auto/ low inductance		
	KT-805M	Manual type (results on screen)		
0.5~10 kV	KT-9010D	Auto/ Memory type/ Interface	420 x 240 x 600	23
	KT-8010A	Auto /Mass test/Interface	420 x 320 x 650	45
	KT-8010AL	Auto/ low inductance		
	KT-8010M	Manual type (results on screen)		
0.5~20 kV	KT-9020D	Auto/ Memory type/ Interface	600 x 1400 x 750	90
	KT-8020A	Auto decision type	600 x 1820 x 800	120
	KT-8020M	Manual type (results on screen)		
0.5~40 kV	KT-9040D	Auto/ Memory type/ Interface	See Note 1	Note 1
	KT-8040M	Manual type (results on screen)	600 x 1820 x 800	

(Note1) 1. Net weight, not mentioned, shall be reported ( it depends on option)

### • Comparison of Tester' s model (suffix letter : M, A, D)

Suffix letter	Test start		Process	Decision		Display of test result		Sample memory	Interface
	Manual	Auto	Auto	Manual	Auto	Waveform	Others		
M	○	-	○	○	-	CRT scope	-	-	-
A	○	-	○	○	○	CRT scope	Lamp, buzzer	-	○
D	○	○	○	○	○	LCD	LCD, buzzer	○	○

\* M: Manual type, A: Auto decision type, D: Digital/ Auto/ Sample memory/ Interface type

\* Sample memory : 60 kinds of sample data(waveform and its data) can be memorized for reference purpose.



## • Common specification

No	Items	Spec Value	Remarks
1	Operating power	AC 110/220 V $\pm$ 10 %	at 50/60 Hz
2	Output voltage	0.5 ~ 5 kV	Ex) KT-905D
3	Memory capacity	60 EA	for sample memory
4	Evaluation for test	Good/Bad	Lamp/Lamp+buzzer
5	Mode 1) Graphic mode 2) Text mode	1) Approx. 0.3 sec 2) Approx. 0.2 sec	Graphic or Text
6	LCD screen	5.7" mono	320 x 240 dots
7	A/Digital converter	8 bit word	at 20 MHz

## \* Surge test items

<b>Short</b>	Turn-to turn	Between near coils
	Layer to layer	Between coils in up and down layer
	Phase to phase	Between each other phases
<b>Pin hole</b>	Bad insulation of enameled wire.	
<b>Scratch in surface</b>	Scratched surface of coil	
<b>Corona discharge</b>	Arc/spark due to weak dielectric strength	
<b>Misconnection</b>	Waveform	
<b>Quality of coil( Q )</b>	Property compared with master (Std.) product.	
<b>Inductance of coil(L)</b>		

The quality of the tested product is evaluated by analyzing the peculiar free oscillation waveform originated after impressing of impulse voltage.

## • Products necessary for surge test.

Motor, Transformer, Relay, Magnet, Solenoid,  
Neon transformer, D.Y coil, SMPS transformer,  
Choke coil, Noise filter, Degaussing coil, Igniter,  
All stabilizer, Reactors, Car electric parts, etc.

All winding product during its use generates much higher impulse than real impressed operating voltage, as transient effect, and this impulse up to 10~40 times higher, which may cause to be broken by itself.

## • Benefits

\* Convenient use and reliable test result.

- Sample memory (Max 60 ea )
- Auto decision/ numeric presetting of reference range.
- Interface type( RS 232 serial port ) with other computer and auto production line.
- Adopting of "amplitude vs phase"

\* Supplied with calibration report (ISO 17025)

\* Strong design with high safety components.  
(Mainly 10 times more than reasonable capacity)

## ■ Model 2 *Analog type* *This model is one of our best selling products.*



Model KT-805A

▲ Photo shows analog type of surge tester with CRT scope, and has various functions including auto/manual decision, mass inspection and interface. This model is also popular and continuously used in the various manufacturing field.

## • Recommendable surge test voltage

$$① Es = [(Eo \times 2) + 1000] \times 1.4$$

$$② Es = Eo \times 60$$

Es: surge test voltage      Eo: using voltage of product

① ICWA' s formula  
( ICWA : International Coil Winding Association )

② KAST' s formula

When the operating voltage of product is less than 30V, KAST recommends surge test voltage according to above formula ②

**Digital Hipot Tester** : New model with digital, auto decision, output selection modes and interface function.  
(Puncture, Withstanding Voltage Tester)

*This model is one of our best selling products.*



Fig 2 : KT- 5000PD-20  
Above photo shows KT- 5000PD and has various functions such as auto/manual decision, Volt-ampere meter, output selection mode and interface.

## KAST Code

### KT-5000PD-xx

5 : Output voltage  
P : Puncture  
D : Display in digital  
xx : Max. current (mA)

This microprocessor-controlled instrument improves that the conventional Hi-Pot tester has many errors between the indicated voltage on its meter and the real output voltage, and also that operator can't check how much current flows during test.  
KAST's instrument attaches a voltage meter and a current meter, and its accuracy is more reliable due to adopting digital method.  
For more convenience, many input, output functions are added, and useful for mass inspection and/or the real time testing.

## • Classification

The microprocessor-controlled Hi Pot testers are classified according to output voltage and its function.  
The following table shows AC and DC Hi Pot testers, respectively

	Output voltage	Model	Current(mA) Capacity	Descriptions	Dimension W x H x D (mm)	N/W (kg)	
AC	0 ~ 5 kV (0~2.5 kV)	KT-5000PD- 20	Max. 20	Auto decision Digital type. V. A meter. Output selection. Interface type.	420 x 190 x 510	15	
		KT-5000PD- 50	Max. 50			18	
		KT-5000PD-100	Max. 100			20	
	0~ 10 kV (0~ 5 kV)	KT-10KPD- 20	Max. 20		620 x 360 x 640	reported	
		KT-10KPD- 50	Max. 50				
		KT-10KPD-100	Max. 100				
	0~ 20 kV (0~ 10 kV)	KT-20KPD- 20	Max. 20		reported		
		KT-20KPD- 50	Max. 50		620 x 1440 x 720		
		KT-20KPD-100	Max. 100				
DC	0 ~ 5 kV	KT-5000PD- 20	Max. 20		420 x 190 x 510	15	
		KT-5000PD- 50	Max. 50				
		KT-5000PD-100	Max. 100				
	0 ~ 10 kV	KT-10KPD- 20	Max. 20		620 x 360 x 640	reported	
		KT-10KPD- 50	Max. 50				
		KT-10KPD-100	Max. 100				
	0 ~ 20 kV	KT-20KPD- 20	Max. 20		reported		
		KT-20KPD- 50	Max. 50				
	0 ~ 40 kV	KT-40KPD- 5	Max. 5				
		KT-40KPD- 10	Max. 10				

► Output voltages are converted by selection mode.  
► Dimension/ Net weight can be changeable by user' s option







▲ Fig.3 Insulation Tester ( KT- 1000i )

This equipment is auto decision type and strongly designed against impulse and noise, and also used as the component of Test System.”  
When this test voltage is applied, the leakage current is occurred, and is converted into the insulation resistance ( $M\Omega$ ).

Insulation test is recommended to measure it after the application of DC 500V or DC 1000V, but there is no regulation how much voltage is applied.

**Generally, the applicable test voltage is relating to the rated voltage of the product. For example,**

- 500 V for low voltage product less than 150V,
- 1000 V for high voltage product more than 150V.

## • Classification

Output voltage	Model	Measuring range	
		Applied	Measured
DC 1kV (0.5kV)	KT - 1000i	DC 1000 V	0~2000 $M\Omega$
		DC 500 V	0~1000 $M\Omega$

If the measurement (converted value) is higher than reference value, the result is evaluated as "Good" (green lamp).

## • Benefits

- Reliable result by "three-point setting" ( reduced measuring error)
- More convenient (auto decision).
- Useful for mass inspection by short test duration (less than 0.5 sec).
- Easily presettable (Limit Set button).
- Calibration report (ISO 17025)

- Fig.4 Hipot & Insulation Tester ( KT-5000PiD)  
Photo shows a tester which proceeds insulation resistance/hipot test at the same time, and has selection mode for manual/auto operation.



Flowing current is figured out by galvanometer. Insulation tester can be easily settable, and automatically decided. This Tester has various signal input/output functions for the connection of other device / auto Line.

## • Common Specification

The performance/accuracy of this tester is shown as below:

Items	Hipot Tester	Insulation Tester
Working voltage	AC 110/220 V $\pm$ 10 % (at 50/60 Hz)	AC 110/220 V $\pm$ 10 % ( at 50/60 Hz )
Output voltage	Mode 1 AC 0~ 5 kV Mode 2 AC 0~ 1.5 kV	Mode 1 DC 500 V Mode 2 DC 1000 V
Current limit	Max 19.19 mA by 0.01mA step	-
Range of I.R (Presettable)	-	for DC 500 V: 0~1000 M $\Omega$ for DC1000 V: 0~2000 M $\Omega$
Decision method	Auto decision (Good/Bad)	Auto decision (Good/Bad)
Test procedure	Freely set up	Freely set up
Signal input and output	Bad, Reset, Enable, Real time test, GND open protect	Bad, Enable, Test ON

## • Benefits

- \* Reliable and accurate test result
  - Removing of arc by Arc Detector.
  - Removing of unnecessary impulse (SSR) (Zero Cross Detect method) instead of Relay contact.
  - Prohibition of noise or misoperation by photo coupler for the connection of other device. (Test, Reset, RTT, Enable and etc)
- \* Interface type ( RS 232 serial port ).
  - Interconnectable with other equipment/ auto production line.
- \* Calibration report ( ISO 17025 )

KAST's Impulse Generator performs the required test according to KESMS or IEEE standards. Furthermore this Impulse Generator also performs surge immunity test according to IEC 61000-4-5.

► Fig 5.1 : IMPULSE GENERATOR (model: KT-6030iG)  
Photo shows one example of Impulse Generators, manufactured by user demand.



According to domestic and international regulations, the specified products should meet the suitable shock wave immobility efficiency .

## • Common Specification

Output type	Descriptions
1. Combination wave form  <b>Output voltage: 0~6 kV</b> <b>Output current: Max 3kA</b> (When output line is short)	1. Combination waveform ① voltage waveform ( 6 kV ) $T_1$ (rising time length) : $1.2 \pm 0.36 \mu s$ $T_2$ (duty time) : $50 \pm 10 \mu s$ ② Current wave form ( 3 kA ) $T_1$ (rising time length) : $8 +1, -2.5 \mu s$ $T_2$ (duty time) : $20 +8, -4 \mu s$
2. Other wave form (option)	2. 10/200 $\mu s$
3. Other wave form (option)	3. 10/700 $\mu s$

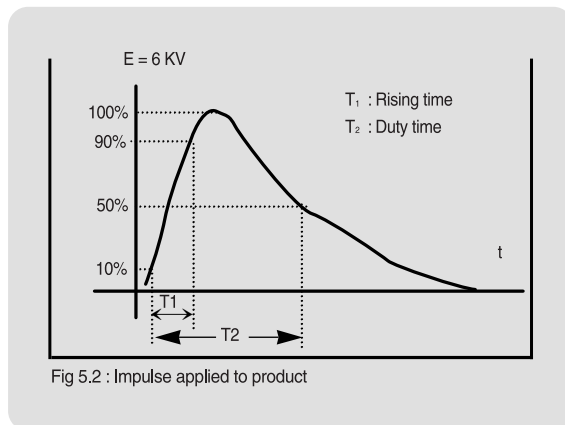
▲ The other waveforms ( No 2 & 3 ) may be changeable by user's option.

## • Products necessary for Impulse test

All switches (NFB, magnet, the circuit breaker), lightning arrester, surge arrester and etc.

- **Impulse waveform**

To record the following impulse waveform, some facilities, such as 1/1000 Attenuation Divider, Digital Storage Scope and Printer are necessary, and basically equipped.

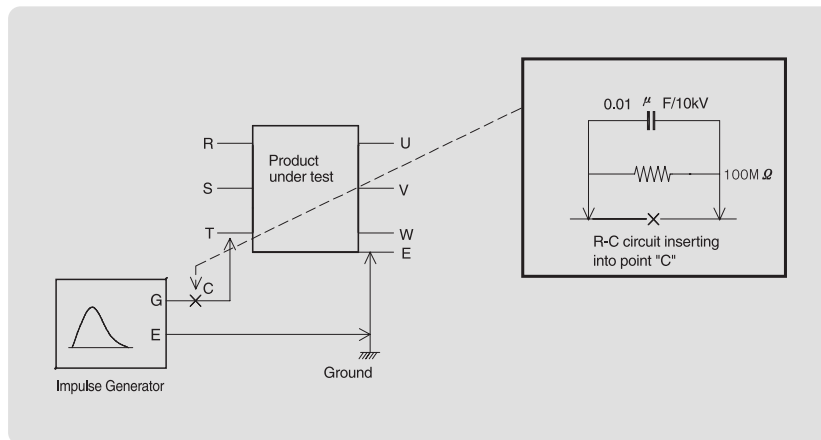


◀ Fig 5.2 : this graph shows the impulse waveform applied to the test product.

$$T_1(\text{Rising time}) = 1.2 \mu\text{s} \pm 30 \%$$

$$T_2(\text{Duty time}) = 50 \mu\text{s} \pm 20 \%$$

- **Test procedure of impulse**



◀ Fig 5.3 : photo shows NFB under impulse test, and this product must not be destroyed or occurred with any abnormal phenomena after test.  
*Before testing, R-C circuit must be inserted if the power line is active.*

Please, connect output line "E" or housing case of P.U.T to the ground.

Then, connect output line(G: hot or red) of Generator to “R”.  
Do test with “R” line like this, and then the next test shall be  
repeated according to all terminals, sequentially (R, S, T, U, V, W)

If you think the impulse test is dangerous or AC power line is active, you should test with R-C circuit, connected to "C" point.

Electro Static Discharge generator is basically similar to the test mechanism of Impulse Generator.

KAST's ESD tester also performs according to IEC 61000-4-2.

Make- up of Tester
ESD Control Unit
ESD Tester
Blank Panel

Electrostatic discharge (ESD) is a significant factor in both the premature failure of electronic equipment and the ignition of explosive devices.

ESD has become a common cause of microelectronic circuit failure.

Since it is not always possible to control the environment where electronic or explosive devices are used, the burden of product reliability falls upon the manufacturer to design and build equipment that will reduce its susceptibility to ESD.



Fig 6 : Model: KT- 8040 ESD

► Above photo shows one example of ESD tester, combined with Surge Tester, which was supplied to several customers (SS Electronics and others)

## • Common specification

Items	Descriptions
Operating power	AC 110/220 $\pm 10\%$ at 50/60 Hz
Voltage range (adjustable power supply)	0.1 ~ 40 kV (pulse) ( depends on user' s option )
Accuracy of output	Setting value $\pm 5\%$
Charge capacitor	300 pF ~ 0.1 $\mu$ F (option)
Discharge resistor	Option

N.B) Detailed specification is depending on user' s option.

## • Satisfaction of ESD test

After test,  
no destroy and/or  
no abnormal phenomena.



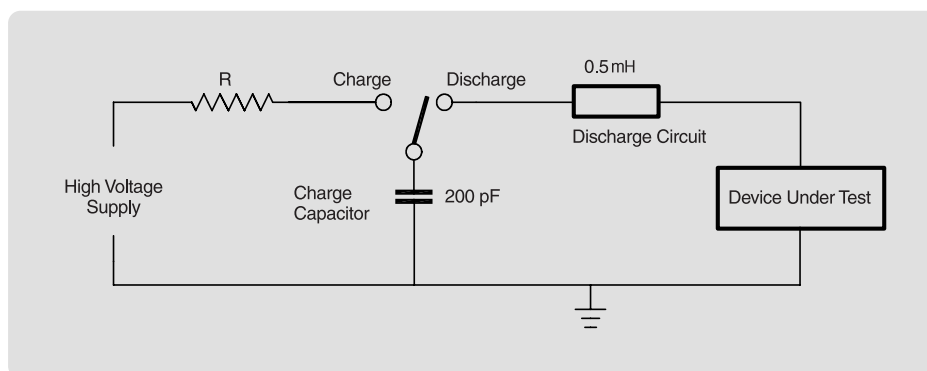
Basically, ESD simulator consists of a variable H.V power supply, H.V switch and capacitor network to simulate a specific electrostatic discharge from human body, a machine or device.

The relevant specification describes a unique waveform characteristic resulting in different ESD susceptibility levels for each model.

### • Technical specification Mechanical scheme of ESD

Some devices may be more readily damaged by discharges occurring within automated equipment, while others may be more prone to damage from handling by personnel.

### Basic Machine Model Circuit of ESD



### Typical Machine Model Circuit

▲ Photo shows a mechanic model circuit of ESD, and is similar to HBM.

According to the variable ESD occurrence, above circuit parameters (discharge circuit, voltage and charge capacitor) is quite different. So, these circuit factors depends on user's option or kinds of products.

### ESD test procedures

Make-up of Tester

HBM (Human Body Model)
MM (Machine Model)
CDM (Charged Device Model)



- Develop and measure suitable on-chip protection.
- Enable comparisons to be made between devices
- Provide a system of ESD sensitivity classification to assist in the ESD design and monitoring requirements of the manufacturing and assembly environments.
- Have documented test procedures to ensure reliable and repeatable results.



Devices failure models and device test methods define the sensitivity of the electronic devices and assemblies to be protected from the effects of ESD.

## • Comparison of 2 models

Model	Std. Test	Special test	No of resist. (Option)	
KT-2000RD	○	-	1, 2 or 4 ea	p
KT-500RD	○	○	Max. 99 ea	M

\* P : presetting type, M : memory type



▲ Fig. 7 : Model KT- 2000RD

KT-2000RD can be possible to preset four kinds of reference values ( option), test result is displayed in the numeric form with lamp ( Green/Red).  
This model is manufactured on the basis of KAST' s long experience, and strongly designed against noise and impulse that might be occurred on the bad electric condition relating to other equipments.

Microprocessor-controlled resistance tester (Model : KT-2000RD) has only one H.L preset value to judge, and Model (KT-2000RD-2) has two different preset values (preset range).  
Model(KT-500RD) can save many different preset ranges (Max. 99 different ranges, multi-measuring steps : *user's option*).

## • Common spec.

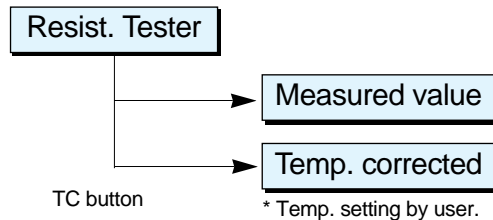
Output resistance	Description	
	Item	Details (155 x 420 x 430 mm)
0~ 40kΩ	AC Power (50/60 Hz)	110 /220V ± 10 %.
	Range selection	6 range conversion of R <span>Note 2</span>
	Limit setting	High/ Low resistance
	Auto decision	100ms or less
	Error tolerance	± 0.5%
	4 contact points	2 sensor/ 2 power ports
	Digital display	3¾ digit (14 x 8mm FND)
*Option: 0~400kΩ	Temp. correction ① OFF mode ② ON mode	Temp. compensation ① 0.2 % ± 2 digit ② 0.6 % ± 2 digit
<span>Note 1</span>	Auto decision	Good : Green lamp & buzzer <span>Note 3</span>
		Bad : Red lamp
	Measuring speed	100ms or less
	Serial comm. Port	8 data bit - Non parity, 1 stop bit - Baud rate 9600 bps

Note 1 output of resistance can be extended up to 200 kΩ..

Note 2 Range1 (0~400 mΩ ), Range2 (0~4 Ω ), Range3 (0~40 Ω ),  
Range4(0~400 Ω ), Range5(0~4 kΩ ), Range6(0~40kΩ ),

Note 3 Buzzer alarm can be controlled by buzzer ON/OFF mode in front panel.

- **Display of test result**



- **Temperature Correction**

Temp. correction for copper is based on  
ICEA S-68-516, ASTM B 193 or equivalent.

$$R1 = \frac{R2 \times (234.5 + T1)}{234.5 + T2}$$

R1 : resist. at reference temp.  
R2 : measured resist. at test temp.  
T1 : reference temp.(°C)  
T2 : test temp.(°C)

Ex) R. increment of copper due to temp. correction

0	--->	1°C	▲ 0.426 %
20	--->	21°C	▲ 0.393 %
40	--->	41°C	▲ 0.364 %

- Importance of temperature correction

When the measurement (R2) is made at any other than a reference temperature, this resistance value should be corrected according to reference temperature.

If not corrected, the measured resistance value ( $R_2$ ) is meaningless because the resistance of copper material is influenced by the temperature.

For example, in case of 125  $\Omega$  at 20°C, it is right that the measurement data (R2) is 125  $\Omega$  at 20°C, not for 125  $\Omega$ ,

For copper of 100% conductivity and the following reference temperature, the temperature coefficient of resistance is ;

- 0.00426 (0.426%) in case of 1 °C change (0 °C → 1 °C)
- 0.00393 (0.393%) in case of 1 °C change (20 °C → 21 °C)
- 0.00364 (0.364%) in case of 1 °C change (40 °C → 41 °C)

Resistance test (KT-2000RD) displays the present temperature at which the measurement is made, and can also display either *the corrected resistance value* at reference temperature or *the actual measurement* at temperature which the measurement is made.

- **Benefits**

- \* No measuring error of low resistance by four point contacts.
- \* More convenient by temperature correction.
- \* More accuracy
  - 0.2 %  $\pm$  2 digit in case of OFF state of Temp. correction
  - 0.6 %  $\pm$  2 digit in case of ON state of Temp. correction
- \* No breakage/ misoperation by noise-filtering circuit of multi-step.
- \* Easily connectable to other auto line.
- \* Calibration report ( ISO 17025 )

## ■ Model 1

Fig 8.1 shows a prototype of Motor Test Systems (Ass'y).  
It can measure the several test items of motor at the same time(interface type)

Make- up of Test System

Surge Tester

Hipot Tester

Auto Controller

DC power supply

Jig table

\* Electric brake or dummy load



▲ Fig 8.1: DC MOTOR PERFORMANCE TEST SYSTEM ( KT- 217 )  
Above Test Systems were supplied to various customers  
(SSE, car electric device manufacturers, etc).

Mainly, two kinds of test conditions, one is idling (unloaded) , the other is performance test.  
The difference of above two tests is that the test is proceeded under "unloaded" or "loaded condition".  
Above photo shows an example of DC Motor Performance Test Systems, and in addition, AC Motor Test System is also under production, and this basic design is similar to DC MOTOR TEST SYSTEM.

### ● Test item and Condition

Test Items	Condition
1) Idling current test (Io) - DC power source - Current meter	1) Idling current ("unloaded" Current in regular operating voltage)
2) Revolution test	2) Revolution sensor (ex: Rotary Encoder & RPM meter)
Rated current test	- Electric brake or dummy load mode.
Surge test	see page 6
Hipot test	see page 8

► Basically, test items depend on the kinds of products.

### ● Sequence Controller

**The main components :**

- Various PLCs
- H.V Reed Relays

**Operation functions :**

- Testing, Reading, Good/Bad, Enable, Skip, Auto/Manual mode.

### ● Benefits

- \* More speedy
- \* More useful for accuracy and repeatable test.
- \* More convenient by Auto controller
- \* Calibration report (ISO 17025 )

## Model 2

Fig 8.2 shows the other type of Motor Test System, and this test system analysis of motor characteristics, as the source of motor quality improvements.

### Make- up of Test System

Industrial computer
Monitor (15" LCD)
Torque/ Rotating speed/ Current
Jig table

\* Electric brake



► Fig 8.2: Motor Performance Test System

This System(Ass'y) performs acceptance/rejection test with data source for quality improvement.

Industrial computer, equipped with cabinet, is more convenient for data record, control of Test System and data input. There are two kinds of test conditions, one is "no loaded" the other is "loaded" test.

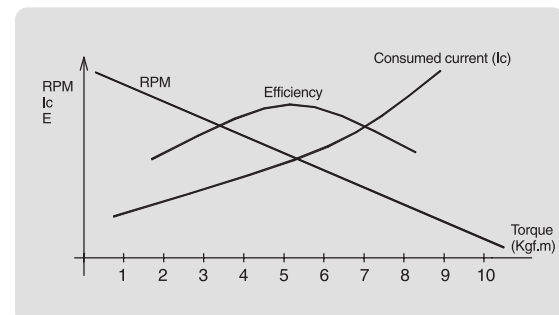
Various AC and DC motors can be evaluated by this Test System.

- **Common specification**

Items		Condition	
Operating power		AC 110/220 V $\pm 10\%$ at 50/ 60Hz	
Appearance		Cabinet (19" rack ), Jig & Jig table	
Control method		Sequence controller	
Test	Test item	<i>"No loaded"</i>	<i>"Loaded"</i>
	Current test	Idling current	Loaded current
	RPM	applied	applied
	Rotating direction	CW/CCW	CW/CCW
	Torque	-	applied
	Efficiency	-	applied
	Output power	-	applied

- Total test results are displayed on the monitor in the graphic form. Detailed test items depends on user option.

Fig 8.3 : Example of motor characteristic in torque.



PS= 735.5 W

$$PS = \frac{(T \times N)}{716.2}$$

$$T = \text{kgf} \times m$$

T: Torque

kgf : power

N : RPM

- **Benefits**

- \* More speedy.
- \* More reliable in accurate and repeatable test.
- \* More useful in analysis of overall characteristics relating to several points of variable torque.
- \* Calibration report (ISO 17025)

## ■ Model 1

Make-up of Test System

Surge Tester	KT- 905D
Hipot Tester	KT- 5000PD
Resistance Tester	KT- 500RD
Auto Controller	KT- 12
Jig table	Prototype

Dummy rotor for AC motor products

Test items for stator include surge test, hipot test, resistance test on stator.

The rotating direction test is also one of the important tests. AC motor, the alternator for cars and the similar have same tests.



▲ Fig 9.1 shows an example of Stator Test Systems (Ass'y). It is automatically performing the required tests for the overall quality of products.

### ● Common Spec. ( I )

This Test System has two lines (A, B line ) for test efficiency.

Items		Condition	
Operating power		AC 110/220 V $\pm$ 10 % at 50/ 60Hz	
Appearance		Cabinet (19" rack ), Jig & Jig table	
Control method		Sequence controller	
Test	Test item	Spec.	No of test
	Surge test	see page 6	3 times
	HiPot test	see page 8	1 time
	Resistance test	see page 16	3 times
	Rotating direction	CW/CCW	1 time

▲ Test items/conditions are depending on user's demand

### ● Comparison of R. Testers

Model	Std. test	Special test	No of resist. (option)	
KT-2000RD	○	-	1, 2 or 4	P
KT- 500RD	○	○	Max. 99 ea	M

\* P : presetting type, M : memory type

### ● Sequence Controller

#### The main components :

- Various PLCs
- H.V Reed Relays and etc

#### Operation functions :

- Testing, Reading, Good/Bad, Enable, Skip, Auto/Manual mode.



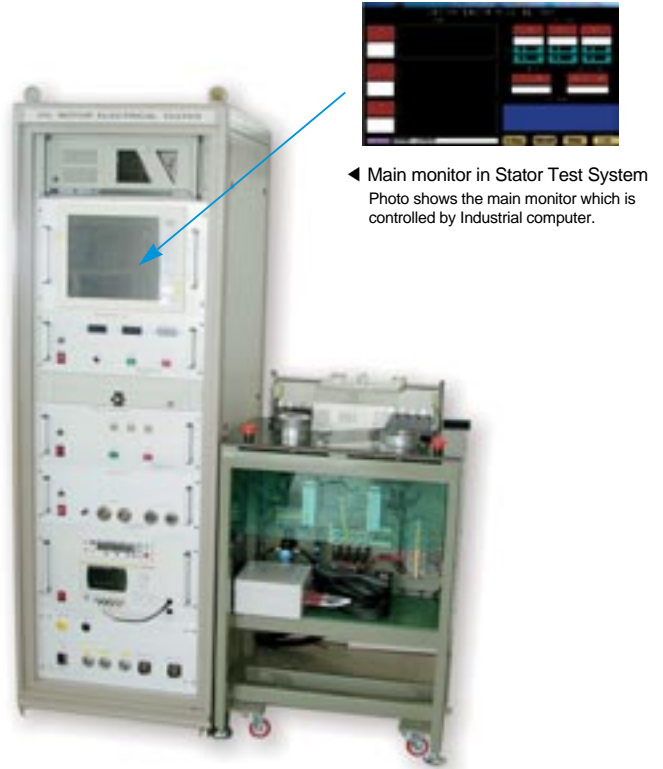
## Model 2

## Make-up of Test System

Industrial computer
Monitor (15" LCD)
Auto controller
Surge Tester
Hipot Tester
Resistance Tester
Jig table with two jigs

## Dummy rotor for AC motor products

This model is also manufactured in accordance with user's demands or international standards. When it required, one more jig can be added with additional test line.



▲ Fig 9.2 : shows the other type of Systems (Ass'y) for Stator of Induction Motor

- **Common Spec. ( II )**

All characteristics of products are automatically performed within the specified test duration as below :

Items	Descriptions	Remarks																														
Operating power	AC 110/220 V ± 10 % at 50/60 Hz	Optional																														
Appearance	Cabinet (19" rack ), Jig & Jig table																															
Control method	Sequence controller	Kinds of devices : PLC control, Magnet, H.V Reed Relay																														
Test items		<i>Test time</i> <table><tr><th>Items</th><th>Test (sec)</th><th>No of test</th><th>test interval</th><th>Sum (sec)</th><th>Test condition</th></tr><tr><td>Surge test</td><td>0.5</td><td>3~5</td><td>3~5</td><td>2.1~3.5</td><td>Main and sub coil</td></tr><tr><td>HiPot test</td><td>1.0</td><td>1</td><td>1</td><td>1.2</td><td>Each coil <b>vs</b> core</td></tr><tr><td>Resistance test</td><td>0.5</td><td>3~5</td><td>3~5</td><td>2.1~3.5</td><td>Main and sub coil</td></tr><tr><td>Rotating direction</td><td>1.0</td><td>1</td><td>-</td><td>1.0</td><td>CW/ CCW</td></tr></table>	Items	Test (sec)	No of test	test interval	Sum (sec)	Test condition	Surge test	0.5	3~5	3~5	2.1~3.5	Main and sub coil	HiPot test	1.0	1	1	1.2	Each coil <b>vs</b> core	Resistance test	0.5	3~5	3~5	2.1~3.5	Main and sub coil	Rotating direction	1.0	1	-	1.0	CW/ CCW
Items	Test (sec)	No of test	test interval	Sum (sec)	Test condition																											
Surge test	0.5	3~5	3~5	2.1~3.5	Main and sub coil																											
HiPot test	1.0	1	1	1.2	Each coil <b>vs</b> core																											
Resistance test	0.5	3~5	3~5	2.1~3.5	Main and sub coil																											
Rotating direction	1.0	1	-	1.0	CW/ CCW																											
	<i>※ Detailed spec. depends on user's demands</i>	<i>Total test time → 6.4~9.2</i> <ul style="list-style-type: none"><li>- In case of surge test with 3 times and 3 test intervals → 0.5 x 3 + 0.2 x 3 = 2.1 sec</li><li>- In case of four test times (including test interval), → 2.1(3.5)+1.2+2.1(3.5)+1.0 = 6.4 ~9.2</li><li>- In case of using of two test lines, → 6.4(9.2) ÷ 2 = 3.2 ~4.6 sec</li></ul>																														

▲ By start button of Auto Controller, the instructed tests are automatically performed in sequence.

The performable capability is depending on each test equipment, and these components are according to international standards/ user's demand.

Make- up of Test System

Surge Tester	KT- 905D
Hipot Tester	KT- 5000PD
Resistance Tester	KT- 500RD
Auto Controller	KT-12
Jig table	Prototype



► Fig 10 : ROTOR (Armature) Test System  
Photo shows an example of Armature Test System, supplied to domestic user(LG). This System has a special Resistance Tester (KT- 500RD) with multi-measuring step. The other components may be assembled by user's option.

Auto Controller in System(Ass'y) is controlled by various PLCs, several H.V Reed Relays and etc. Various operating functions such as, testing, reading, auto decision (Good/Bad), Enable, Skip and auto/manual mode are built in Auto Controller.

## • Common specification

Items	Descriptions
Operating power	AC 110/220 V $\pm 10\%$ at 50/60 Hz
Surge test	
① between coils	① Layer short/ Pin hole/ Corona
② between segments	② Short/ other material insertion
Hipot test (Puncture)	Faults or weakness in insulation/ Abnormal between core and coil/ other dirty
Resistance test	All segments of commutator are equally divided into one-third or one -fourth, and tested for the settlement state of winding.

By start button of Auto Controller, the test will be automatically performed within 0.5 second.

This Rotor Test Systems are continuously supplied to our customers, and its components are equipped with uptodate units which are under commercial production.

*The more test items for other car electric parts are briefed as page 24.*

## • Comparison

Model	Std. test	Special test	No of resist. (option)
KT-2000RD	○	-	1, 2 or 4 P
KT- 500RD	○	○	Max. 99ea M

\* P : presetting type, M : memory type

## • Sequence Controller

### The main components :

- Various PLCs
- H.V Reed Relays and etc

### Operation functions :

- Testing, Reading, Good/Bad, Enable, Skip, Auto/Manual mode.

## Make-up of Test System

Surge Tester
Hipot Tester
Volt-ampere tester
for idling current test of 1 <sup>st</sup> st coil for voltage test of 2 <sup>nd</sup> nd coil
Auto controller
Jig table
two jigs/ two test lines (option)



► Fig 11.1 : Transformer Test System

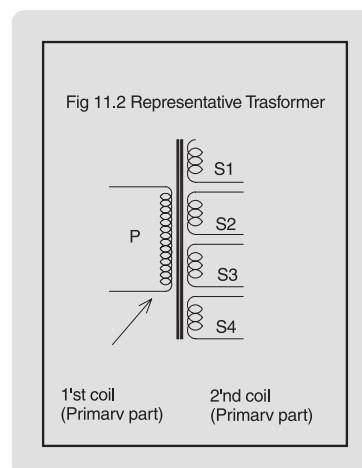
This System shows an example that Jig has two test lines(A,B) in order to shorten the loading / unloading time during test.

## • Spec. of Transformer Test System

Items		Descriptions
Operating power (50/60 Hz)		AC 110/220 V
Power supply to System		AC 110/220/380 V
Appearance		Cabinet (19" rack )
Test for SMPS transformer		Square/ Sine wave ( 20~100 kHz )
Test Items	Idling current test (Io)	For 1 <sup>st</sup> st coil, Under flowing of regular working voltage to primary part without loading of 2 <sup>nd</sup> nd coil.
	Winding voltage test (Vo)	For 2 <sup>nd</sup> nd coil, Output voltage of each 2 <sup>nd</sup> nd coil
	Surge test	For 1 <sup>st</sup> st and 2 <sup>nd</sup> nd coil
	Hi-Pot test (Puncture)	For 1 <sup>st</sup> st ,2 <sup>nd</sup> nd coil and core - between 1 <sup>st</sup> st and each 2 <sup>nd</sup> nd coil - between 1 <sup>st</sup> st and core - between 2 <sup>nd</sup> nd coil and core - between 2 <sup>nd</sup> nd coils

▲ Above test items can be also changed by option

## • Representative Transformer



▲ Photo explanation : Photo shows a basic construction having four secondary parts, and the important properties of transformer are idling current of 1<sup>st</sup> st coil, output voltage of 2<sup>nd</sup> nd coil, surge test and hipot test.

## 1. Testers for Car Electric Parts

*Electrical parts for cars includes all motors ( Starter Motor, Fan, Wiper, Power switch), Magnet switch, Solenoids, Magnet clutch, Alternator, Ignition coil and etc.*

These electrical parts are operated mostly by low voltage, consume a large capacity of current. A driving motor and the like need to prepare a large capacity of DC power source (for battery).

**Magnet Switch** needs surge test on P.S coil.

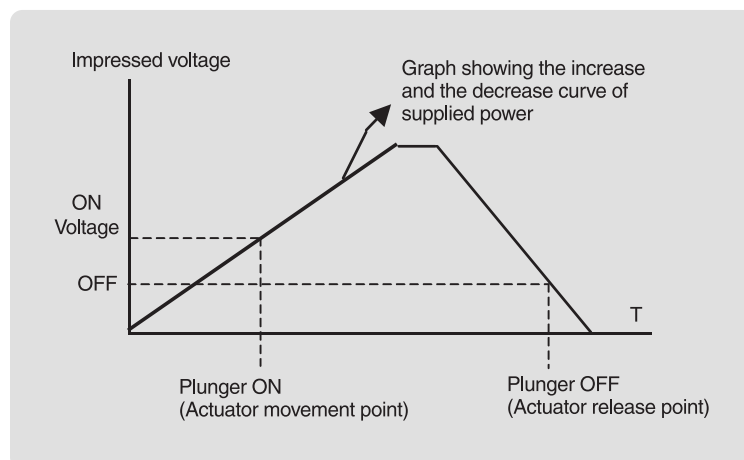
Plunger ON/OFF voltage test, Gap tests (Gap 1 & Gap 2 test ), and contact resistance at switch ON.

**Solenoid, ABS coil and Clutch coil** need surge test, ON/OFF voltage test, hipot test, and sometimes operation test (aging test).

**Alternator** and **Stator** needs rotor test (similar to motor test) should be performed. Besides, H.V voltage Surge Test System is ready for Ignition coil.

### ● ON/OFF voltage test method

The following is Plunger ON/OFF voltage test method on Magnet switch, Solenoid and etc. (Because all solenoids have hysteresis, ON voltage is higher than OFF. Checking this voltage belongs to the important test)



(Magnet Switch Test System)

### ▲ Photo explanation

It shows a Test System for magnet switch of a car, and measure a surge ON/FF voltage, distance of G1 & G2, and contact resistance at switch ON.

Total test time including loading & unloading is around 7~8 second.  
This System is able to test around 2,600 products per a day ( 8 hours basis ).

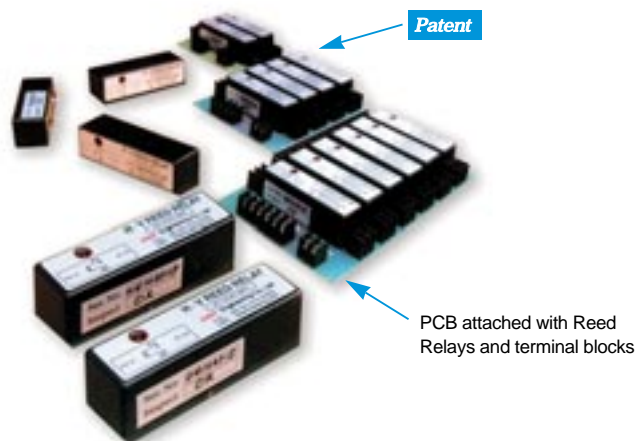
- **Test items for Car Electric Parts**

Car electric parts		Test		Test item/ condition
Devices	Inspection Object	Test (Equipment)	Test method	
Starter Motor	Armature	Surge test (Surge tester)	- Contact each pin to 4 points of commutator with 90 angle. - Test between symm. pines with electrical turning (3 times)	Short between commutators. - Test voltage : 1~1.5kV - Checking of coiled condition
		Hipot (Hipot tester)	- Between coil and core	High voltage withstanding.
Alternator	Stator Coil & Rotor Coil	Surge test (Surge tester)	- Test for each phase of 3ø (2 times ) - Compare the duplicated waveforms (3 times)	Lay short, Turning short, Coiled condition, Misconnection. - Test voltage : 1~1.5kV/sec.
		Hipot (Hipot tester)	- Between coil and core	Insulation quality
		Resist. Comparison (Resistance tester)	- Test for each phase of 3φ ( 2 times or 3 times)	Wire open of the twisted pair, Bad winding quality, Protection from other model mixing.
Magnet Switch	Magnet Coil	Surge test (Surge tester)	- 2 times for right direction winding. - 3 times for reverse direction	Layer short, Turning short, Coiled condition, Misconnection - Test voltage : 1~1.5 kV
	Contact point (copper plate)	Gap 1 distance Gap 2 distance (Gap tester)	- Move plunger by air-cylinder and check Gap1 and Gap 2 sequentially.	Assembled quality of spring. Bad contact, Contact distance. - Auto decision (Good/Bad).
	Contact operating condition	Contact voltage (ON/OFF voltage) test (Relay tester)	- Voltage increase ->ON test - Voltage decrease ->OFF test	Magnet's performance. ( operating condition of magnet) - Auto decision (Good/Bad). - Presetting of on/off voltage tolerance
Ignition Coil	1'st/ 2'nd Coil	Surge test (UHVG Surge tester)	- Apply 20~30 kV to 2'nd coil (for generation of surge waveform) - Measure 1'st and 2'nd coil.	Layer short, Corona, Coiled condition, Wire open.
Magnet Clutch (Air Conditioner)	Magnet coil	Surge test	- Between both ends of coil	Layer short, Turning short, Wire open.
		Hipot.	- Between coil and core	High voltage withstanding.
Carburetor	Valve Solenoid coil (Duty, Slow Cut)	Surge test	- Between both ends of coil	Layer short, Turning short, Wire open.
		Hipot.	- Between coil and core	High voltage withstanding.
		Resistance test	- Between both ends of coil (comparison of resistance)	Resistance. Short, Open. - Auto decision (Good/Bad).
	Plunger	ON/OFF voltage test (Relay tester)	- Voltage increase —> ON vtg - Voltage decrease -> OFF vtg	Plunger's performance (operating condition of plunger)
Motors (Fan, Blow, Wiper, Power Window, etc)	Armature Coil	Surge test (Surge tester)	- Contact each pin to 4 points of commutator with 90 angle. - Test between symm. pines with electrical turning (3 times)	Commutator short, Layer short Coiled condition, Wire open.
		Fusing test (Resistance tester)	- Contact each pin to each commutator. - Measure each resistance with electrical turning.	Bad connection (between commutator and coil)
		Hipot.	- Between coil and core.	High voltage withstanding
Others (Relay, Solenoid)	Magnet coil	Surge test	- Between both ends of coil.	Layer short, 1 time short, Coiled condition.
		Hipot.	- Between coil and core.	High voltage withstanding
		Resistance	- Between both ends of coil.	Resistance tolerance

## 2. H.V Reed Relay

Reed Relay is continuously controlling high voltage as ON/OFF switch's role. KAST's Reed Relay is very special with its innovative design.

- Photo explanation : Photo shows PCB attached with H.V Reed Relays.  
When ordered, PCB can be supplied for simple installation of 2, 4, 6, 8 or 10 Reed Relays.



### • Products comparison in use

	Glass tube Maker	Tube Installation in Reed Relay	ON/OFF Indicator	Connection
Conventional type	Japan, Germany France	Protrusion of both ends of tube	-	-
KAST's type	Same as above	Inside of Reed Relay	ON/OFF LED lamp built in top of Relay	Std. PCB for 2,4 6, 8 or 10 of Relay
	Same or equal	More strong against shock	Patented structure (No 0361374)	-

### • Benefits

- Simply installed with standard PCB.
- The attached Indicator for ON/OFF operation.
- Strong structure of glass tube. (no protrusion of both ends of glass tube)
- Small purchasing is also available.

### • Characteristic of H.V Reed Relay

Test items		Spec. Value	Unit	Test items		Spec. Value	Unit
Breakdown voltage		At least 15	kV	Life time	for light load	Max. 10 exp 8	times
Arc occurrence		At least 11	kV		for the other load	Max. 10 exp 7	times
Time	On delay	Less than 3	ms	No of On/Off contact per sec (Min. guaranteed value)		Min. 30	times
	Off delay	Less than 1.5	ms				
Turn on voltage		Min. 15	V	Contact current		Max. 3	A
Turn off voltage		Less than 9	V	Resistance of coil in Relay at 20℃		Approx. 680	Ω
Power		Nom. 50	W	Contact sensitivity		120~200	A/T
Contact resistance		Max. 10	mΩ				

Note) A/T = Ampere /turn



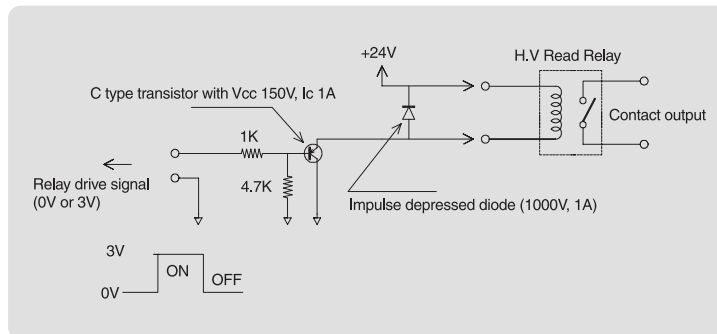


## ◀ Photo explanation

Photo shows H.V Reed Relay built in Auto Controller,  
which is suitable for

- H.V on/off controller.
- Low-resistance contact circuit for high accuracy.
- Open/short circuit for protection of equipment.

\* Drive circuit of Reed Relay.

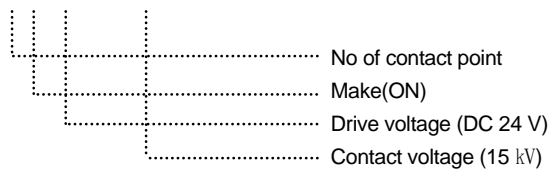


## Application

- H.V ON/OFF control circuit.
- High accuracy equipments.
- Circuit for flip-flop use.
- Medical facilities.
- Test Instruments.
- High speed ON/OFF circuit.
- Circuit for reliability & precision.

**KAST code**

**KT - 1A24 - 15K**

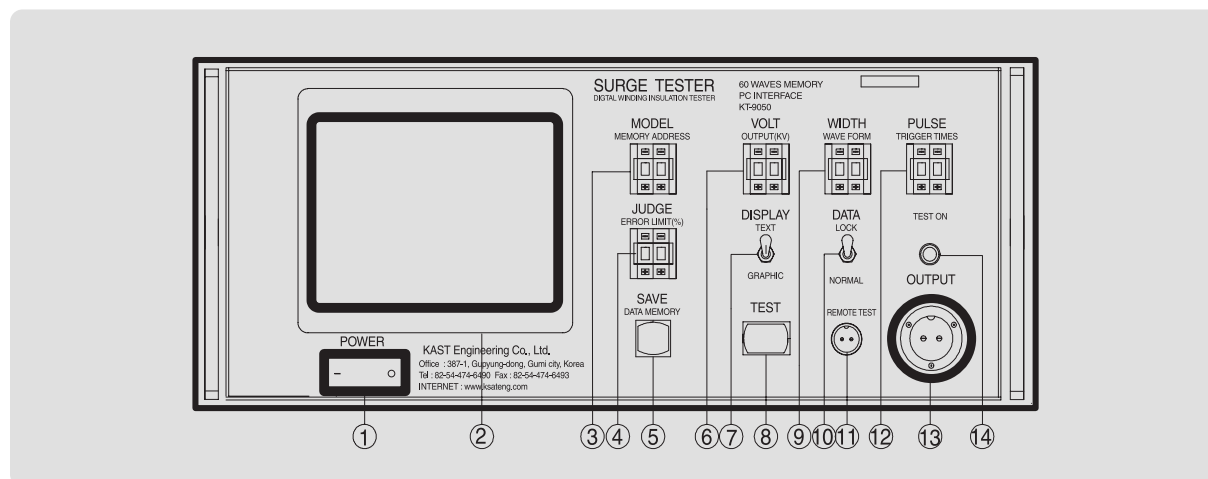


### *H.V Reed Relay of KAST*

- **H.V Reed Relay** is more reliable.
  - The body of glass tube is built in R. Relay, more safe against shock.”  
KAST is the only maker in Korea, for the finished products.”  
KAST has used a lot of our Reed Relays in our test equipments.  
It means that KAST is a big consumer as well as R. Relay maker.
- **H.V Reed Relay for 15 kV rated** is more convenient for use.
  - ON/OFF LED lamp is built in the top of R. Relay (patent license No: 0361374)
  - PCB having terminals and blocks is provided.
- All products are outgoing after final inspection & serial number.

## ■ How to operate digital Surge Tester

### 1. Description of panel in front



#### ① Power switch

ON/OFF switch with 2A, rated fuse.

#### ② Display screen in 5.7" LCD

A LCD screen displays two waveforms in graphic (sample and product under test), and its numeric data is also displayed at the same time.

#### ③ Model selection (digital) switch (00~60)

This switch selects the memorized number to recall the stored sample waveform and its text.

The selected data (waveforms of sample and its text) is stored at the indicated memory area, called as address number. Its capacity of memory for sample waveform is maximum 60 samples, ranging from 00 to 60.

#### ④ Judge selection (digital) switch ( 00~99%)

This digital switch compares/evaluates the waveforms between sample and product. If test result is out of the preset limit which was set by user, and then it is evaluated as a failure, "Bad".

For example, if preset limit is set to 05 and then test result is exceeded to 5%, this product under test is also found to be "Bad".

#### ⑤ Program storage button

This button stores sample waveform and its related data  
(tested voltage, error setting limit(%) and number of pulse)

Once this button is pressed, preset test voltage, sample waveform, pulse number and limit setting is stored into the preset number.

Preset memory number is selected by model selection switch ③, and storage time for each mode is around 2.5 seconds.

### ⑥ Test voltage selection (digital) switch

It is used to set a suitable test voltage according to the various products.

- In case of 3 KV surge tester, it is presettable to the value ranging from 05 to 30.
- In case of 5 KV surge tester, it is presettable to the value ranging from 05 to 50.

### ⑦ Text/Graphic mode selection switch

This switch is used to determine whether both graphical waveform and its text are displayed or its text is only displayed ( % setting, volume, good/bad)”

- In graphic mode, two waveforms (master sample and product under test) are displayed on the screen whenever tested.
- In text mode, text is only displayed, so it is possible to reduce the test time during automatic test.

⑧ **Width Selection (digital) switch (8 modes from 00 to 07)**

This switch is used to select one of 8 different kinds of waveform widths.

- The more increase the setting level, the more the scanned waveforms.”
- The lower the setting level in numeric, the smaller the scanned waveforms, which it makes them accurately compare.

By increasing the displayed range of waveforms, it increase the displayed time range of waveforms. So these waveforms are displayed for a long time and accordingly several waveforms are displayed on a screen.

By reducing the displayed range(or time) of waveforms, the front part of of the scanning waveforms are only displayed so that only 1~2 waveforms can be displayed on a screen.

It is only effective to evaluate the waveforms scanned within the 80% of the entire screen which is started from the left on LCD screen.

The 80% portion of the entire screen (from the left of screen) shall be analyzed as the effective data for good/bad evaluation.

The recommendable number of waveforms is 3~4, because the measured data, due to narrow or width waveform, is inaccurate for good/bad evaluation.

- If the waveform is excessively wide (setting to 07), It makes not only an empty space in the left of waveform but also the phase shift due to bad influences, such as stray capacitance of product under test, capacitance unbalance caused by being connected with additional equipments.

⑨ **Start button**

If pushed, the test result shall be displayed within 0.5 second.

⑩ **Data Hold switch**

If It is selected to < Lock> mode, all presetting data on the front panel (Model, Voltage, Width, Pulse, Judge) will be locked before < Normal > mode.

⑪ Pulse Frequency Selection switch ( 01 to 20 )

This switch is used to preset the number of impulse applicable to the product under test, which can be adjusted from 01 to 20 of impulse.

By the way, the waveform of master sample for good/bad evaluations is only determined by the final impulse among the applied impulses.

Other impulses are used to check the previous quality before final evaluation.

## ⑫ Output Connector

This is outlet which generates a high voltage of impulse for testing.

The impulse voltage is applied to product through two cables connected to this output connector.

- Red cable ("+" part) ; high voltage flowing
- Earth cable ("- " part); grounding

**⑬ Connector for remote start**

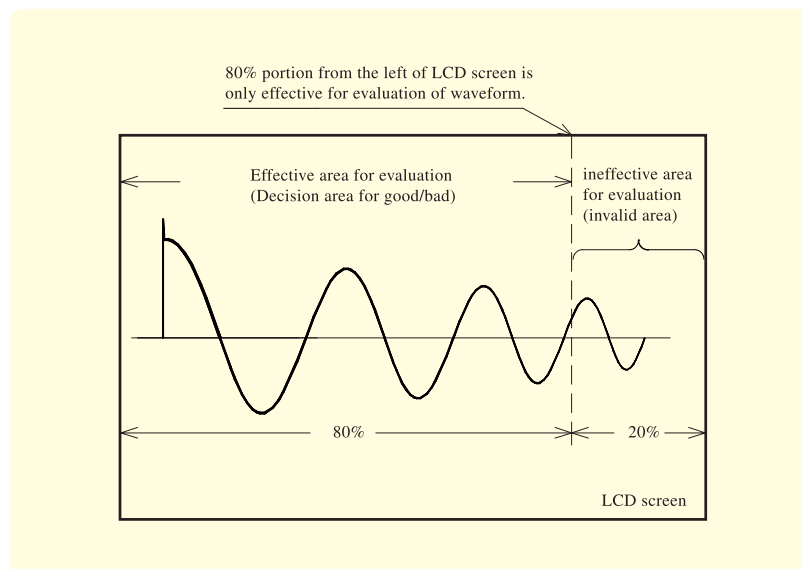
This connector is used for the outside using of start button

**⑭ Test ON Lamp**

This lamp shows the test procedure is on working.

\* Above operation method may be changeable by manufacturing reason.

(Fig.) Example of recommendable display of waveforms



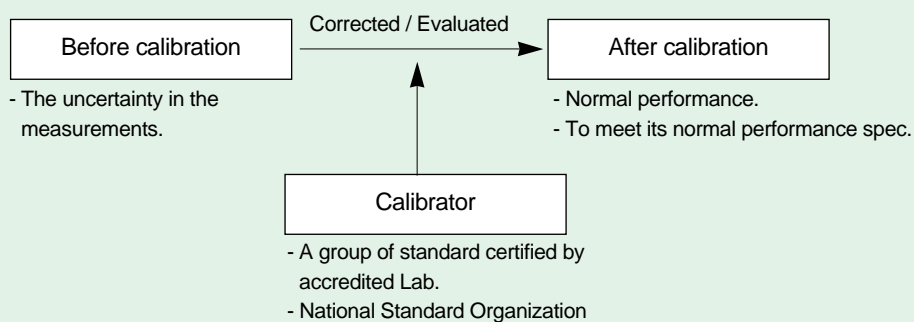
## • Calibration Service

KAST runs its own Calibration Lab., certified from National Institute of Tech. & Quality throughout ISO 17025 and ISO 9002.

KAST's products are all calibrated before delivery, and we also have offered the calibration service to many domestic companies.

It means that all test products from KAST can be confidential with their quality and responsibility.

## • What is calibration?



This series of inter-comparisons establishes traceability, which is the goal of the calibration process to assure that all measurements can be traced to national standards.



▲ Photo explanation

KAST's Calibration Lab., and KAST is one of National Calibration Institutes.

## • Company profile

- 1987. 11 Established  
· · · (Abbreviated )
- 2000. 5 Patent for Surge Tester' s part
- 2001. 3 Registered as Venture company
- 2001. 4 Joined consortium with technical university.
- 2002. 1 ISO 9002, ISO 17025
- 2002. 11 Award for high accuracy testing Equip.' s part
- 2002. 12 Award for Development of high accuracy Equip.
- 2002. 1 Certified as National calibration institute
- 2003. 9 Registered as INNO BIZ company.

## • Supply Record

### Domestic Sale

LG Electronics Inc  
LG Industrial Systems Co.Ltd  
LG Cable Co.Ltd  
LG · OTIS  
LG IC Ltd  
LG MRO  
LG C&D Ltd  
Wilo-LG  
ROLTEC  
DONGZIN MOTORMATE Co.

SAMSUNG Electronics  
SAMSUNG ELECTRO-MECHANICS  
SAMSUNG Emerson Electric Co  
Daewoo Electronics  
Useong Electro-Mechanics  
SAEHAN  
CUCKOO TECHNOLOGIES Co.  
KODENSHI AUK  
NAMYEONG ELECTRONIC Co.  
O-YANG Kongjoki Co.

HYUNDAI HEAVY INDUSTRIES  
HYUNDAI ELEVATOR  
HANWHA  
HYOSUNG Co.  
KOREA CORE Co.Ltd  
SPM Co.Ltd  
DEASUNG ENGINEERING Co.  
DAE YOUNG Co  
Micro Galaxy  
SANSHINE ELECTRONICS

KM-TECH Co.  
KEYANG ELECTRIC MACHINERY  
New Motor Technology  
KOREA MOTOR CO Ltd  
SAMWOO M.& ELECTRICAL CO  
SAMHWA POLYMERS Co.Ltd  
SUNGDO HI-TECH CO.  
KIA PRECISION WORKS CO  
DNF Electronics Co. Ltd  
THERMO METRICS KOREA

KOREA SHIROYAMA Co.Ltd  
HAN KUK MAGNET Co.  
WOOSHIN ENG' & MECHA. Co.  
Dong Young Industry Co.  
A-PRO Co.Ltd  
TSE Co. Ltd  
UNION METALS Co.  
PureTec Co., Ltd  
SAMBU  
Gugje Precision Co

Keyrin Telecom Co.  
C&L KOREA INC.  
HYOLIM TECH Co. Ltd  
POONG SUNG ELECTRIC Co.  
REMY KOREA Ltd  
DONGHO ELECTRONICS Co.  
S K  
Tong Yang MAGIC  
Kyung Won Century Industry  
Korean Magneto co

UNIT KOREA CO Ltd  
SEW ON E&T Co.  
ONOFF SYSTEM  
MAPO ELEC. Co.  
Power Pack Engineering Co.  
DAESUNG ( Carburetor...)  
ACS Co.  
Kyung-In Electronics  
SAFETY COMPLIANCE Co.  
Kr tech co. kr

KOREA I.G MOTOR Co.Ltd  
Woory Industry Co.  
Dong-a Electric  
Kiturami Precision Co  
DENSO  
KUMHO Electric Co.  
DURING  
OHSUNG ELECTRIC MACHINERY  
INZI CONTROLS  
Dong-a Electric

Hanil Electric co  
WINIX  
SIN YUNG INDUSTRY Co.  
KWANG-SUNG MULTI MACHINE Co.  
Bujeon Electronic Co.  
Micro Telephone Co  
DOOYOUNG ELECTRONICS  
DC Chemical Co  
MAJESTIC AUTO LIMITED  
Valeo Mando ELECT. SYSTEMS Korea

### Overseas sale

China  
Japan  
USA  
Vietnam

Philippine  
Malaysia  
Thailand  
Taiwan

HongKong  
Mexico  
India  
Indonesia

KAST, Bright company, kind people are very grateful for sharing our past, present and future with you through win-win biz.

KAST runs its own Calibration Lab., certified from National Institute of Tech. & Quality throughout ISO 17025 and ISO 9002.

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