

## Hipot Analyzer

### MODEL 19055

#### Functions:

- Hi-Pot
  - AC 5kV/100mA
  - DC 6kV/20mA
- Insulation
  - 5kVmax
  - 1M $\Omega$ ~50G $\Omega$

#### Key Features:

- 500VA output rating
- Floating output complies with EN50191
- Corona Discharge Detection (CDD, option)
- Flashover Detection
- Discharge Level Analysis (DLA)
- Open Short Check (OSC)
- High Frequency Contact Check (HFCC)
- Ground Fault Interrupt
- Standard RS232 interface
- Option GPIB & HANDLER interface
- Key lock when fail
- Programmable voltage & test limit
- CE Mark



## HIPOT ANALYZER MODEL 19055

Chroma 19055 Series Hipot Analyzers are designed for hipot tests and analysis. The tests of AC/DC/IR can be programmed in 5kV/100mA with 500VA output rating which complies with the EN50191 requirements. (Please refer to the application notes for more detail information.)

The 19055-C has not only the AC/DC/IR tests but also a new measurement technology - Corona Discharge Detection (CDD) that can detect the following via the Discharge Level Analysis (DLA) test mode.

- Corona discharge Start Voltage (CSV)
- Flashover Start Voltage (FSV)
- BreakDown Voltage (BDV)

As to the Contact Check during Hipot test, Chroma 19055 Series is equipped with a new function of High Frequency Contact Check (HFCC) besides the Open Short Check (OSC). By conducting the Contact Check during Hipot test, it can increase the test reliability and efficiency significantly.

For convenience use, Chroma 19055 has large LCD screen for operation and judgment. In addition, the GFI human protection circuit and Floating safety output prevent the operators from electrical hazard.

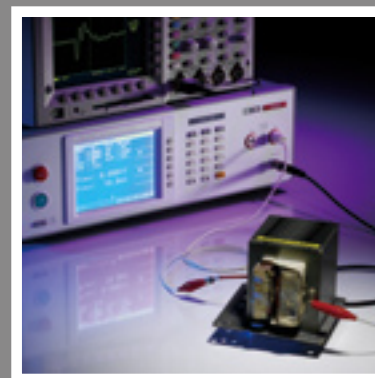
#### Applications

**Motor:** The 19055 Series Hipot Analyzers with 500VA output rating can be used to test and analyze the withstand voltage of high power and leakage current for the products like motor stators and rotors with high parasitic capacitance. Corona detection can be used for turn-to-turn or turn-to-ground test to avoid winding insulation failure from corona discharge.

**Transformer:** When using a power transformer under the normal voltage, a primary side corona discharge could cause the adjacent components to be damaged if occurred. Thus, the function of Corona Discharge Detection (CDD) of 19055-C can be used to detect if there is any corona discharge occurred to improve the product quality.

**High Voltage Capacitor, Photocoupler & Insulation Material:** If any gaps, voids or impurities appeared when doing molding in the manufacturing process, the insulation capability may be affected. The Corona Discharge Detection (CDD) equipped by 19055-C is able to detect if there is any corona discharge occurred to enhance the product quality.

With these functions the R&D engineers are able to analyze the products for the components with poor insulation and solve the problem.

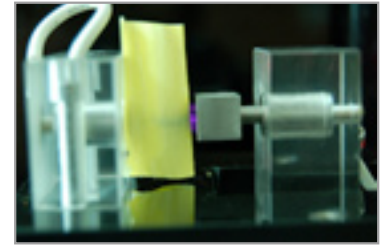


**Chroma**



**DIELECTRIC WITHSTAND TEST – BREAKDOWN / FLASHOVER / CORONA DISCHARGE DETECTION**

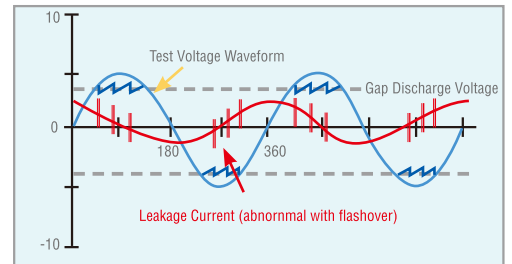
What does dielectric withstand fail mean? Most of the regulations write : “During the test, no flashover or breakdown shall occur.” However, insulation failure and discharge have been more important in materials and components. Because there is high relation between discharge and insulation ability, discharge is not only a safety issue but also a key point of electrical quality. Discharge has three types by material characteristic: Corona discharge, Glow discharge and Arc discharge.



Corona Discharge

**Corona Discharge:** A type of localized discharge resulting from transient ionization in an insulation system when the voltage stress exceeds a critical value. The ionization is usually localized over a portion of the distance between the electrodes of the system and with lighting and temperature rising. A long term of corona discharge and temperature rising may cause Qualitative Change of material, insulation deterioration, and finally insulation failure (a real corona discharge as the figure shows.) Corona discharge is a high frequency phenomenon which is able to detect by high level meter.

**Glow Discharge and Arc Discharge:** This is the electrical discharge generated by high electric field inside or on the surface of insulation material that makes the DUT lost its insulation and form a transient or discontinuous discharge. It causes the conductive path to be carbonated or the product to be damaged. Test for leakage current only is unable to screen out the defects. It is necessary to test the voltage or current for its change ration to screen out the defects. Thus Flashover detection is one of the most indispensable test items.



Flashover Waveform

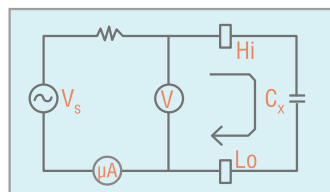
Chroma 19055 Series Hipot Analyzers provide discharge level analysis including Corona discharge detection (19055-C only), ARC/Flashover detection and breakdown detection for research and quality assurance.

**CONTACT CHECK – HIGH FREQUENCY CONTACT CHECK (HFCC, PATENT PENDING) & OPEN SHORT CHECK (OSC, PATENT:254135)**

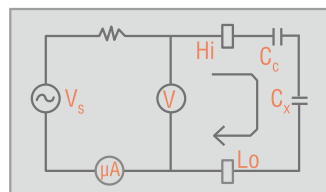
When open occurred during test procedure, FAIL product will be judged as GOOD product. When short occurred during test procedure, screening earlier can reduce the damage on equipment to save the test cost. Generally speaking, the DUT has capacitive load (Cx) from tens to thousands pF under normal status. It forms a micro capacitance on open circuit interface once the connection is interrupted (as Cc). In general, the capacitance is lower than 10pF thus the total capacitance is far lower than the status of normal product. The capacitance is far higher than normal status when DUT short or close to short. Therefore, users judge the short problem by using high/low limit value of capacitance change.

HFCC (High Frequency Contact Check) is a new measurement technology for contact check. HFCC is able to perform with Hipot test by high frequency around 1MHz for higher efficiency on production line.

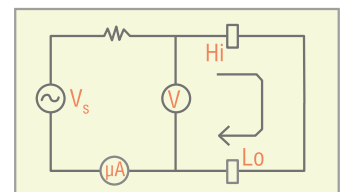
OSC (Open / Short Check) is a mode for checking open & short on test circuit. OSC avoids equipment damage and tests fail from circuit open and DUT short before starting the hipot test.



Normal Condition



If Circuit opened :  $C_m = C_c * C_x / (C_c + C_x) \ll C_x$

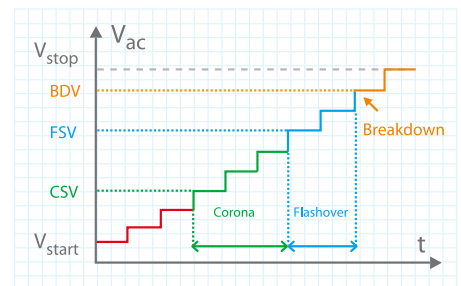


If circuit shorted :  $C_m \gg C_x$

**DISCHARGE LEVEL ANALYSIS (DLA)**

Dielectric withstanding voltage of component depends on material and manufacturing processes. For improving insulation ability, discharge level should be defined including Corona discharge, Flashover and Breakdown. Chroma 19055 has Discharge Level Analysis mode (DLA) for definition by programming voltage, time, counts and limits.

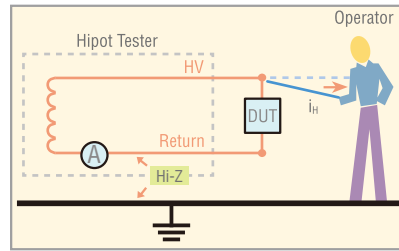
Discharge Level Analysis (DLA) has three levels of judgment to setup Corona limit, ARC limit for flashover and high limit for breakdown. DLA mode will show the withstanding voltage depending on the different level limit, which means Corona discharge Start Voltage (CSV), Flashover Start Voltage (FSV), and Breakdown Voltage( BDV). R&D and QC personnel are able to improve the insulation by discharge data collection and analysis.



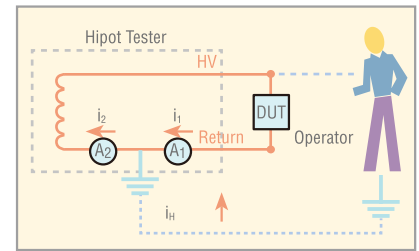
## OPERATOR PROTECTION – FLOATING OUTPUT / GROUND FAULT INTERRUPT (GFI)

In order for the operator to use the test equipment safely, Chroma has developed a Floating circuit that complies with EN50191 Equipment Safety Standard with brand new technology. When in Floating output state, no matter which Hipot test terminal the operator touches the earth leakage current is lower than 3.5mA and the operator won't be injured by the electricity.

GFI (Ground Fault Interrupt) is another human protection circuit developed by Chroma. As the figure shows  $i_1$  and  $i_2$  are derived from the A1 and A2 of current meter, and when the operator is having an electric shock, the current meter detected different values respectively. The difference is  $i_2 - i_1 = i_H$ . When the  $i_H$  is too high, the GFI is determined as no good and it will cut off the output signals to protect the user's safety.



Floating output

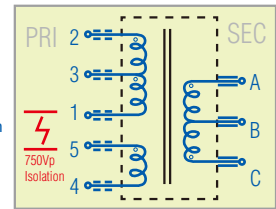
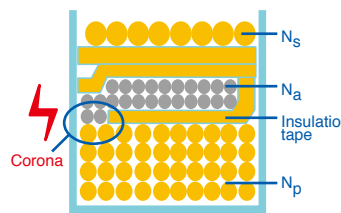


GFI

## APPLICATIONS

### CORONA DISCHARGE DETECTION (CDD)

**Transformer:** The internal winding of electronic products often endures unstable voltage for a long period when using under normal voltage condition. After a period of time the insulation would be affected if the primary side components are in corona discharge state for a long time. For instance, most of the power transformers reserve an auxiliary coil for other circuits to use in the primary side design as the figure shows. When it is used under  $V_p=750V$  for a long time and if the manufacturing process was bad such as bad insulating tape or bad tubing it would cause corona discharge to occur continuously. The insulation capability of primary winding would be affected and burned out at last due to the enamelled carbonization.



Primary winding fail cause insulation failure

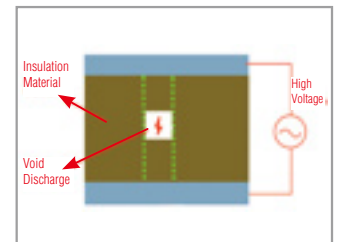
**Motor:** As the rotating electrical products such as industrial motors or electric vehicle motors are often used for long hours and under the environment with large variation in temperature and humidity, the features of high durability and reliability are most required. Temperature is also one of the key factors to influence the insulation. If corona discharge occurs in turn-to-turn and turn-to-ground, it would cause the insulation to deteriorate due to the temperature rise for a long time and material qualitative change. Adding corona discharge test in hipot test raises the quality requirements for insulation and is able to detect the products with poor insulation early to reduce the defect rate caused by long-term usage.



Corona discharge in motor

### DISCHARGE LEVEL ANALYSIS FOR CAPACITOR / PHOTOCOUPLER / INSULATION MATERIAL

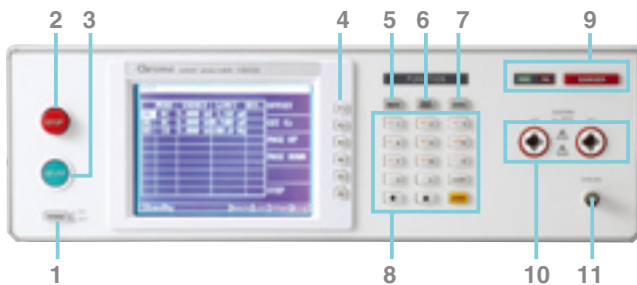
Discharge analysis is often used to verify the high voltage capacitors, safety capacitors, photocouplers and insulation materials. When there are gaps or voids caused by the manufacturing process in the insulation medium, different electric field will be formed and corona will be created once the hipot test is conducted. The medium would change when such situation continues for a long time and quality issue would appear due to bad insulation.



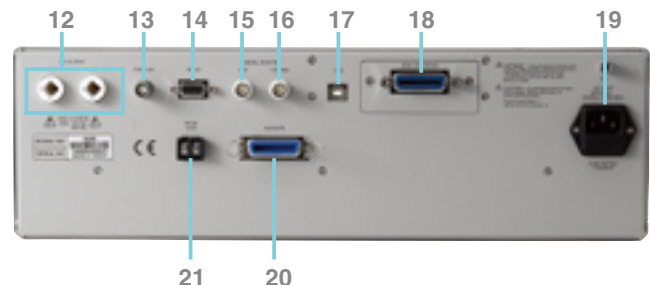
Void discharge

Chroma 19055 Series Hipot Analyzers have the functions of Corona Discharge Detection (CDD) to detect the corona discharge and Discharge Level Analysis to specify the CSV, FSV and BDV. They are capable of providing useful data to verify the product insulation and increase the reliability of manufacturing.

## PANEL DESCRIPTION



1. Power Switch
2. STOP Key
3. START Key
4. Function Keys
5. MENU Key
6. MAIN INDEX Key
7. LOCAL Key
8. Data Entry Keys/Program Keys
9. Indicator
10. HV1 / HV2
11. RTN/LOW



12. HV1 / HV2 (rear)
13. RTN/LOW (rear)
14. RS232 Interface
15. ARC Signal Monitor
16. Corona Signal Monitor
17. USB Interface
18. GPIB Interface (option)
19. Power Inlet
20. Handler Interface
21. Interlock

## SPECIFICATIONS

<b>Model</b>	<b>19055</b>	
<b>Mode</b>	ACV / DCV / IR	
<b>Withstanding Voltage Test</b>		
Output Voltage	AC : 0.05 ~ 5KV, DC : 0.05 ~ 6KV	
Load Regulation	1% of setting + 0.5% full range	
Voltage Accuracy	1% of setting + 0.5% full range	
Voltage Resolution	2V	
Cutoff Current	AC:100mA;DC:20mA	
Current Accuracy	1% of setting + 0.5% full range	
Current Resolution	AC : 1 $\mu$ A, DC : 0.1 $\mu$ A	
Output Frequency	50Hz / 60Hz	
Test/Ramp/Fall/Dwell Time	0.3 ~ 999 sec., continue / 0.1 ~ 999 sec., off / 0.1 ~ 999 sec., off / 0.1 ~ 999 sec., off	
Waveform	Sine wave	
<b>Insulation Resistance Test</b>		
Output Voltage	DC : 0.05 ~ 5kV	
Voltage Resolution	2V	
Voltage Accuracy	1% of setting + 0.5% full range	
IR Range	1M $\Omega$ ~ 50G $\Omega$	
Resistance Resolution	0.1M $\Omega$	
Resistance Accuracy	>1kV	1M $\Omega$ ~ 1G $\Omega$ : $\pm$ 3% of reading + 0.1% of full range, 1G $\Omega$ ~ 10G $\Omega$ : $\pm$ 7% of reading + 2% of full range, 10G $\Omega$ ~ 50G $\Omega$ : $\pm$ 10% of reading + 1% of full range,
	$\cong$ 500V	0.1M $\Omega$ ~ 1G $\Omega$ : $\pm$ 3% of reading + 0.1% of full range, 1G $\Omega$ ~ 10G $\Omega$ : $\pm$ 7% of reading + 2% of full range,
	$\cong$ 1kV	1G $\Omega$ ~ 10G $\Omega$ : $\pm$ 7% of reading + 2% of full range, 10G $\Omega$ ~ 50G $\Omega$ : $\pm$ 10% of reading + 1% of full range,
	<500V	0.1M $\Omega$ ~ 1G $\Omega$ : $\pm$ 3% of reading + (0.2*500/Vs)% full range
<b>Flashover Detection</b>		
setting Mode	Programmable setting	
Detection Current	AC: 20mA;DC: 10mA	
<b>Contact Check Function</b>		
HFCC	High frequency contact check	
OSC (open/short check)	600Hz, 0.1s	
<b>Electrical Hazard Protection Function</b>		
Floating output design	Leakage current <3 mA	
Fast Output Cut-off	0.4ms after NG happen	
Ground Fault Interrupt	0.5mA $\pm$ 0.25mA AC, ON/OFF	
Panel Operation Lock	Present password	
Interlock	YES	
GO/NG Judgment Window		
Indication, Alarm	GO : Short sound, Green LED; NG : Long sound, Red LED	
Data Hold	Least tests data memories	
Memory Storage	100 sets, max. 50 steps per set	
<b>Interface</b>	RS232, Handler interface (Standard), GPIB interface (Optional)	
<b>General</b>		
Operation Environment	Temperature: 0 $^{\circ}$ C ~ 45 $^{\circ}$ C, Humidity: 15% to 95% R.H@ $\leq$ 40 $^{\circ}$ C	
Power Consumption	500VA	
Power Requirements	90~132Vac or 198~264Vac, 47~66Hz	
Weight	Approx. 20kg	

All specifications are subject to change without notice. Please visit our website for the most up to date specifications.

## ORDERING INFORMATION

- 19055** : Hipot Analyzer AC/DC/IR
- 19055-C** : Hipot Analyzer AC/DC/IR (with Corona discharge detection)
- A190356** : GPIB Interface
- A190702** : 40kV HV Test Probe
- A190708** : ARC (Flashover) Verification Fixture
- A190344** : HV Gun (SP02)

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