ESA

Electrical Safety Compliance Analyzer

EXTECH ELECTRONICS

ESA 彩色全功能安規綜合分析儀

產品特色

- 超大型 7 吋 TFT LCD 顯示器 (解析度 800 x 480)
- 七合一安規綜合分析儀
- DualCHEK 接地與耐壓可同步測試功能
- 接觸電流提供 AC, DC, AC + DC 量測
- My Menu 我的最愛快捷鍵功能
- 內建隔離可程式交流電源 (500VA)
- 可執行熱態 (動態) 耐壓測試 (Hot Hipot)
- 採用 DSP (Digital Signal Processing) 技術

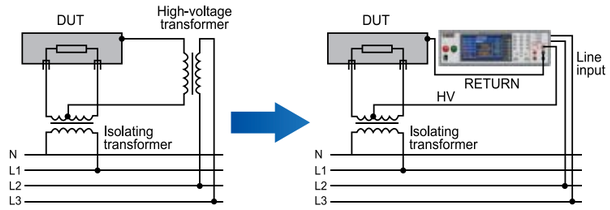
產品優勢與專利

- **七合一安規綜合分析儀 (專利：169836)**

包含交流耐壓測試 (ACW)、直流耐壓測試 (DCW)、絕緣阻抗測試 (IR)、接地阻抗測試 (GB)、接觸電流測試 (TCT) 、電氣性能測試 (RUN) 與交流電源 (AC Source)。

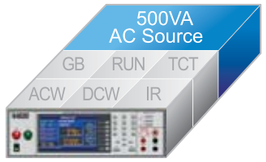
- **超大型 7 吋 TFT LCD 顯示器**

儀器彩色顯示，可以讓操作人員在觀看畫面時更加清晰，提高可讀性以及辨識度。



- **熱態 (動態) 耐壓 (Hot Hipot) 測試**

滿足 IEC60335-1 之測試要求：交流耐壓測試輸出相位可設定和 Line input 同步，可於被測物在開機時 (熱態、動態) 進行耐壓測試。



- **內建隔離可程式交流電源**

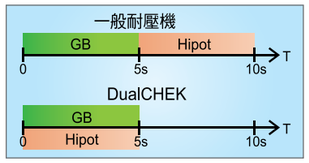
進行電氣性能與接觸電流測試時，不需外接隔離電源或交流電源供應器，可直接使用內建的隔離可程式交流電源，大幅節省空間與成本。

- **採用 DSP (Digital Signal Processing) 技術**

改善使用者在操作人機介面時的反應速度，使操作畫面更加流暢，此外，也可得到更精確的量測值。

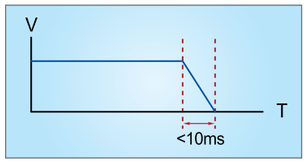
- **My Menu**

可將常用的功能及測試項，增加到 My Menu 底下做快捷鍵的使用。



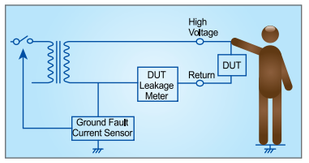
- **DualCHEK**

突破傳統單一功能測試，耐壓功能與接地阻抗功能可同時進行測試，有效縮短測試時間並增加測試效率。



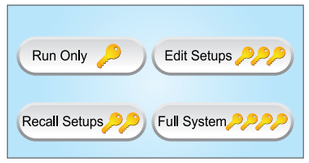
- **改良式直流高壓快速放電裝置 (專利：M279103)**

高壓測試後會儲存大量的電能，此專利可在直流高壓測試後最快 10ms 內，同時對儀器內部與被測物殘餘的電能進行快速放電，確保人員操作安全及防止高壓回灌造成其它週邊設備的損壞。



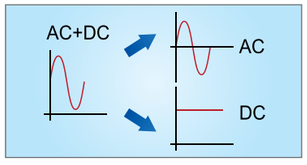
- **防高壓觸電線路 (Smart GFI) (專利：169000)**

誤觸高壓時，儀器會在 1ms 內立刻自動切斷高壓輸出以保護操作者的人身安全。



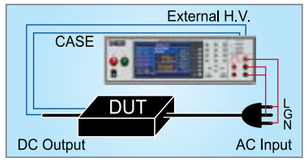
- **權限設定**

系統使用者權限分為四個等級，所有測試參數非經充分授權，否則無法修改，保障嚴謹的生產管理。



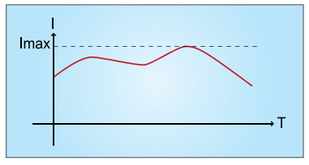
- **接觸電流提供 AC, DC, AC + DC 量測**

滿足 IEC60601 (醫療用電氣設備的安全通用要求) 的應用。



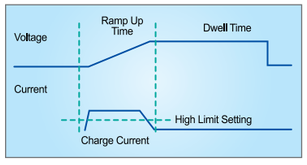
- **內建多點掃描測試功能 (External H.V.)**

另外提供一組高壓測試端，可測試 P-G (Primary to Ground)、S-G (Secondary to Ground)、P-S (Primary to Secondary) 不需另外購買多通道掃描器，以節省體積和成本。



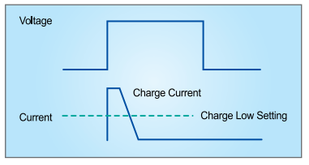
- **Imax 功能**

可記錄測試過程中最高的漏電流值，以符合品管及驗證單位嚴格的測試要求。



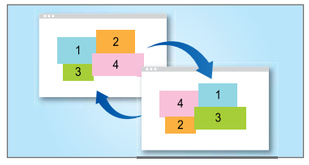
- **緩昇上限 (Ramp High) 設定 (專利：100859)**

可允許充電電流在電壓上升過程中，即使超過上限設定也不致誤判。如此，可大幅縮短緩昇時間以節省總測試時間。



- **充電下限 (Charge Low) 設定 (專利：106128)**

利用判斷充電電流之大小來偵測迴路連接是否正常，以確保測試之精確度及有效性。



- **彈性調整視窗資訊**

依使用者喜好，可定義每個顯示視窗的位置，方便紀錄與觀察。

- **MD 具有外接 BNC 端子**

可外接電壓錶或示波器，方便驗證單位對 MD 進行校驗。

- **MDV 功能**

可量測 MD 兩端的電壓，不需外掛電壓錶，符合 IEC60990 (接觸電流和保護導體電流的量測方法) 測試要求。

- **通訊介面**

提供 USB & RS232、GPIB、Ethernet 與 Multi-function Interface (USB-A & Bar code & RS232 / RS485) 等介面使用。

- **自動偵測輸入電壓**

儀器會自動偵測輸入電壓為 115V 或 230V，不需手動切換輸入電源開關，防止人為誤操作而造成儀器損毀。

- **10000 組記憶組**

提供多達 10000 組 Memory 或 Step 組合應用，方便客戶針對不同產品做設定。

- **多國語言**

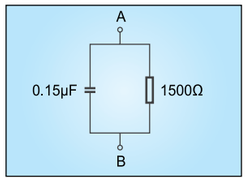
可依照國家語系的不同來做選擇，提供英文、繁體中文、簡體中文。

接觸電流測試及電氣性能測試

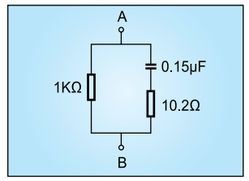
• 內建多組人體模擬阻抗 (MD)

在設定畫面中可顯示 MD線路圖，不需額外拿標準或線路圖來核對，另有一組 MD 可擴充使用。

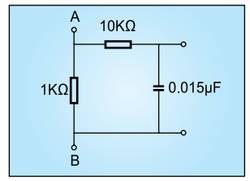
UL544NP



UL544P



IEC60601



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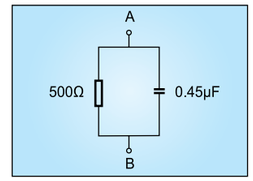
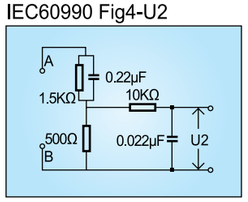
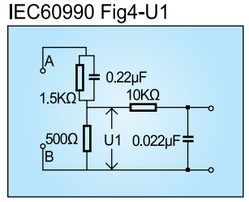


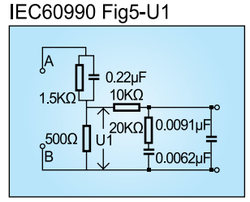
IEC60990 Fig4-U2



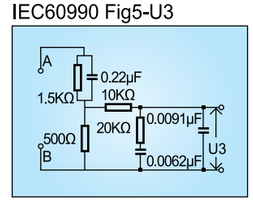
IEC60990 Fig4-U1



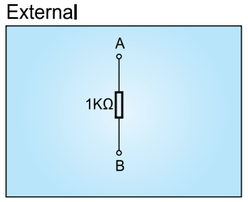
IEC60990 Fig5-U1



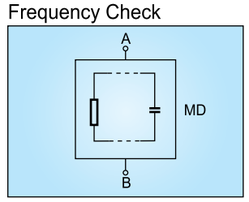
IEC60990 Fig5-U3



External

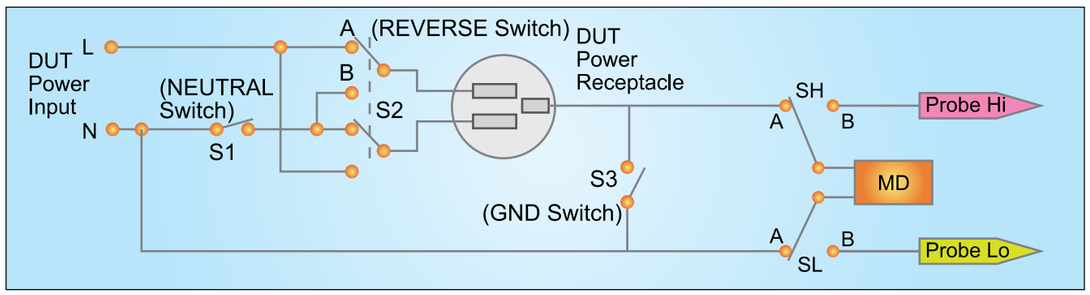


Frequency Check



• 八種電源迴路狀態模擬

模擬電源各種狀態，將參數設定好後，一鍵完成所有測試。



• 模擬電源狀態對應表

狀態			說明
S1	S2	S3	
C	A	C	Normal
C	B	C	Reverse
C	A	O	Ground Open
C	B	O	Reverse & Ground Open
O	A	C	Neutral Open
O	A	O	Neutral Open & Ground Open
O	B	O	Neutral Open & Reverse & Ground Open
O	B	C	Neutral Open & Reverse

C : Close O : Open A, B 表示模擬圖內對應開關之切換位置

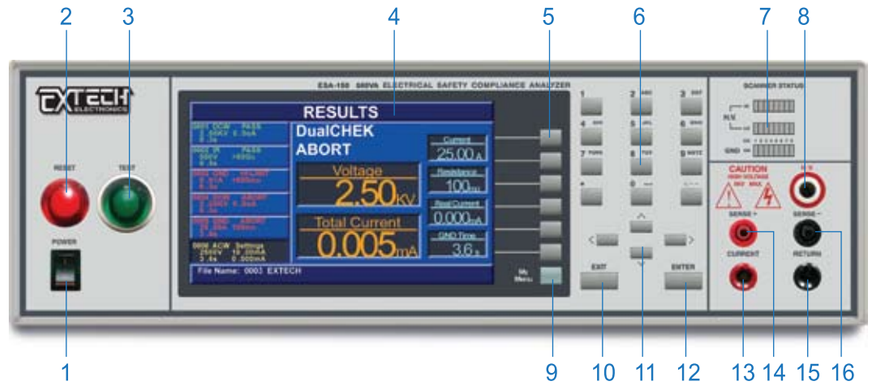
• 接觸電流量測方式

狀態		說明
SH	SL	
A	A	對地洩漏電流：人體碰觸到機體之地 (機殼) 時，流經人體至大地的洩漏電流。
B	A	對表面洩漏電流：人體碰觸到機體的任一點 (如測試棒、螺絲等) 時，流經人體至大地的洩漏電流。
B	B	表面間洩漏電流：人體同時碰觸到機體表面之任何兩點時，由其中一點流經人體至另一點的洩漏電流。

A, B 表示模擬圖內對應開關之切換位置

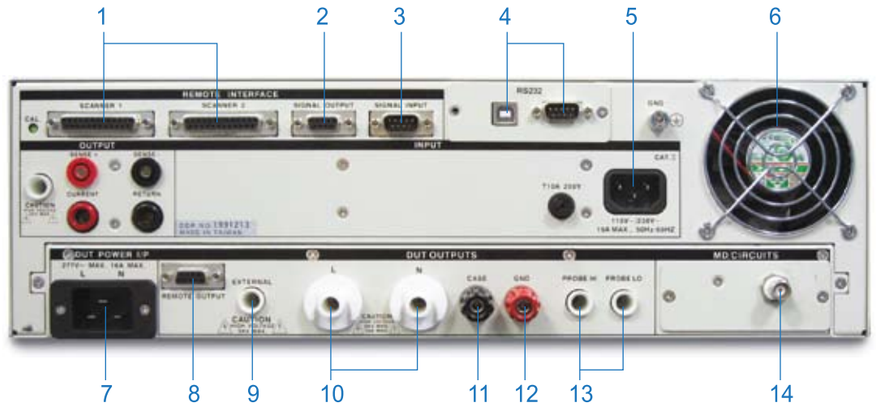
ESA 面板介紹

• 正面 / Front



1. 電源開關
2. RESET 開關
3. TEST 開關
4. TFT LCD
5. 功能選擇鍵
6. 數字 & 字母鍵
7. SCANNER STATUS 指示燈
8. 高壓端子
9. My Menu 鍵
10. EXIT 鍵
11. 方向鍵
12. ENTER 鍵
13. CURRENT 端子
14. SENSE +
15. RETURN 端子
16. SENSE -

• 背面 / Rear



1. 外接矩陣式掃描器介面
2. 遙控訊號輸出端子排
3. 遙控訊號輸入端子排
4. Interface 裝置
5. 輸入電源插座
6. 風扇
7. 被測物電源輸入端
8. REMOTE OUTPUT
9. 外部高壓輸出端
10. 輸出至被測物 L / N 端子
11. CASE 端子
12. GND 端子
13. PROBE HI / LO 端子
14. MD 輸出訊號
(外接示波器/ 電壓表)

ESA 規格

MODEL	ESA-140		ESA-150
AC WITHSTAND VOLTAGE			
Output Rating	5KVAC / 50mA		5KVAC / 100mA
	Range	Resolution	Accuracy
Output Voltage, Vac	0 - 5000	1	± (2% of setting + 5V)
Output Frequency	50Hz / 60Hz ± 0.1%, User selectable		
Output Waveform	Sine wave, Crest Factor = 1.3 - 1.5		
Output Regulation	± (1% of output + 5V), From no load to full load and low line to high line (combined regulation)		
SETTINGS			
HI and LO-Limit (Total) current, mA	0.000 - 9.999	0.001	± (2% of setting + 2 counts)
	10.00 - 50.00 (for ESA-140)	0.01	
	10.00 - 100.00 (for ESA-150)		
HI and LO-Limit (Real) current, mA	0.000 - 9.999	0.001	± (3% of setting + 50μA)
	10.00 - 50.00 (for ESA-140)	0.01	
	10.00 - 99.99 (for ESA-150)		
Ramp Up Timer, second	0.1 - 999.9	0.1	± (0.1% of setting + 0.05s)
Ramp Down Timer, second	0.0 - 999.9		
Dwell Timer, second	0, 0.4 - 999.9 (0 = continuous)		
Ground Continuity	Current : DC 0.1A ± 0.01A, fixed Max. Ground Resistance : 1.0Ω ± 0.1Ω		
Current Offset	0.000 - 50.00mA (Total current + current offset ≤ 50mA) for ESA-140 0.000 - 99.99mA (Total current + current offset ≤ 100mA) for ESA-150		
Arc Detection	The range is from 1 - 9 (9 is the most sensitive)		
DC WITHSTAND VOLTAGE			
Output Voltage, Vdc	0 - 5000	1	± (2% of setting + 5V)
DC Output Ripple	< 4% (5KV / 20mA at Resistive Load)		
SETTINGS			
HI and LO-Limit current, μA	0.0 - 999.9	0.1	± (2% of setting + 2 counts)
	1000 - 20000	1	
Ramp Up Timer, second	0.4 - 999.9	0.1	± (0.1% of setting + 0.05s)
Ramp Down Timer, second	0.0, 1.0 - 999.9		
Dwell Timer, second	0, 0.3 - 999.9 (0 = continuous)		
Ramp-HI current	> 20mApeak maximum, ON / OFF User selectable		
Charge LO current	0.0 - 350.0μA, auto / manual set		
Discharge Time	0.05μF / 10ms		
Maximum Capacitive Load DC Mode	1μF < 1KV, 0.08μF < 4KV		
	0.75μF < 2KV, 0.04μF < 5KV		
	0.5μF < 3KV		
Ground Continuity	Current : DC 0.1A ± 0.01A, fixed Max. Ground Resistance : 1.0Ω ± 0.1Ω		
Arc Detection	The range is from 1 - 9 (9 is the most sensitive)		
INSULATION RESISTANCE			
Output Voltage, Vdc	30 - 1000	1	± (2 % of setting + 2 counts)
Charging Current	Maximum > 20mApeak		
SETTINGS			
HI and LO-Limit Resistance, MΩ	0.05 - 99.99 (HI-Limit : 0 = OFF)	0.01	0.05 - 999.9, ± (2% of setting + 2 counts)
	100.0 - 999.9	0.1	1000 - 9999, ± (5% of setting + 2 counts)
	1000 - 50000	1	10000 - 50000, ± (15% of setting + 2 counts)
Ramp Up Timer, second	0.1 - 999.9	0.1	± (0.1% of setting + 0.05s)
Ramp Down Timer, second	0.0 , 1.0 - 999.9		
Dwell Timer, second	0, 0.5 - 999.9 (0 = continuous)		
Delay Timer, second	0.5 - 999.9		
Charge LO current, μA	0.000 - 3.500, auto / manual set		
GROUND BOND			
Output AC Current, A	1.00 - 40.00	0.01	± (2% of setting + 2 counts)
Output Voltage, Vac	3.00 - 8.00	0.01	± (2% of setting + 3 counts)
Output Frequency, Hz	50Hz / 60Hz ± 0.1%, User selectable		
Output Regulation	± (1% of output + 0.02A), Within maximum load limits, and over input voltage range		
Maximum Loading	1.00 - 10.00A / 0 - 600mΩ, 10.01 - 30.00A / 0 - 200mΩ, 30.01 - 40.00A / 0 - 150mΩ		
SETTINGS			
Lead Resistance Offset, mΩ	0 - 200	1	± (2% of setting + 2 counts)
HI and LO-Limit Resistance, mΩ	0 - 150 (30.01 - 40.00A)	1	6.00 - 40A, ± (2% of setting + 2 counts)
	0 - 200 (10.01 - 30.00A)		
	0 - 600 (6.00 - 10.00A)		
	0 - 600 (1.00 - 5.99A)		1.00 - 5.99A, ± (3% of setting + 3 counts)
Dwell Timer, second	0, 0.5 - 999.9 (0 = continuous)	0.1	± (0.1% of setting + 0.05s)
CONTINUITY TEST			
Output Current	0.1A for 0 - 10.00Ω, 0.01A for 10.1 - 100.0Ω, 0.001A for 101 - 1000Ω, 0.0001A for 1001 - 10000, 0.1A is max.		
SETTINGS			
Max and Min-Limit Resistance, Ω	0.00 - 10.00	0.01	± (1% of setting + 3 counts)
	10.1 - 100.0	0.1	
	101 - 1000	1	
	1001 - 10000	1	± (1% of setting + 10 counts)
Dwell Timer, second	0.0, 0.3 - 999.9 (0 = continuous)	0.1	± (0.1% of setting + 0.05s)
Resistance Offset, Ω	0.00 - 10.00	0.01	± (1% of reading + 3 counts)
MEASUREMENT			
	Range	Resolution	Accuracy
Voltage, KV (AC / DC)	0.00 - 5.00	0.01	± (1.5% of reading +1 count)
Voltage, Vdc (IR only)	0 - 1000	1	± (1.5% of reading + 2 counts)
AC Current (Total), mA	0.000 - 3.500	0.001	± (2% of reading + 2 counts)
	3.00 - 100.00	0.01	
AC Current (Real), mA	0.000 - 9.999	0.001	± (3% of reading + 50μA) all ranges PF > 0.1 ; V > 250Vac
	10.00 - 99.99	0.01	

MODEL	ESA-140			ESA-150
DC Current, μA	0.0 - 350.0		0.1	± (2% of reading + 2 counts)
DC Current, mA	0.300 - 3.500		0.001	
	3.00 - 20.00		0.01	
AC Current, A (GB)	0.00 - 40.00		0.01	± (3% of reading + 3 counts)
Resistance, MΩ (IR)	30 - 499V	500 - 1000V		30 - 499V 0.05 - 999.9, ± (7% of reading + 2 counts) 500 - 1000V 0.05 - 999.9, ± (2% of reading + 2 counts) 1000 - 9999, ± (5% of reading + 2 counts) 10000 - 50000, ± (15% of reading + 2 counts)
	0.050 - 1.999	0.050 - 9.999	0.001	
	2.00 - 19.99	10.00 - 99.99	0.01	
	20.0 - 199.9	100.0 - 999.9	0.1	
	200 - 50000	1000 - 50000	1	
Resistance, mΩ (GB)	0 - 600		1	1.00 - 2.99A, ± (3% of reading + 3 counts) 3.00 - 40.00A, ± (2% of reading + 2 counts)
Resistance, Ω (Continuity)	0.00 - 10.00		0.01	± (1% of reading + 3 counts)
	10.1 - 100.0		0.1	
	101 - 1000		1	
	1001 - 10000		1	± (1% of reading + 10 counts)
GENERAL				
Input Voltage AC	115 / 230Vac ± 15% auto range, 50 / 60Hz ± 5%, 5A / 250Vac Slow-Blow for ESA-140, 10A / 250Vac Slow-Blow for ESA-150			
PLC Remote Control	Input : Test, Reset, Interlock, Recall File 1 through 3, Recall File 1 through 7 (Option) Output : Pass, Fail, Test-in-Process			
Memory	It has 10000 steps and allow the user to create different memories and steps			
TFT LCD	800 x 480 resolution digital TFT LCD and 9 ranges contrast setting			
DualCHEK	5kVac / 25mA and 25Aac / 150mΩ for ESA-140 ; 5kVac / 50mA and 30Aac / 150mΩ for ESA-150			
Safety	Built-in Smart GFI circuit, GFI trip current 5.0mA max., HV shut down speed : <1ms (on 50 / 60Hz and test under 1000V)			
Hot Hipot Test	To detect the line input voltage to produce a simultaneous sine wave of line power at hipot output			
My Menu	The menu can be customized and created the most favorite used functions by the user			
Interface	Standard USB & RS232 PC Control Card, optional Ethernet, GPIB (IEEE-488.2), Multi-function Interface card (USB-A / RS-485 / RS-232 / BAR Code PS / 2 type)			
Multinational Language	The operating screen can select different language including English / Traditional Chinese / Simplified Chinese			
Alarm Volume Setting	Range : 0 - 9 ; 0 = OFF, 1 is softest volume, 9 is loudest volume			
Calibration	Adjustments can be made through the front panel			
Environment	0 - 40°C, 20 - 80% RH			
Dimensions / Net Weight	430mm (W) × 133mm (H) × 500 mm (D) / 30Kg			
OPTION				
MATRIX SCANNER (for Opt.736)				
High Voltage Rating	5KVAC / 5KVDC			
High Current Rating	40A			
Number of HV Channel	8			
Number of HA Channel	8			
Point to Point Continuity	To use the scanner to reach point to point continuity test and this function will be a standard feature when built-in scanner is added			
RUN TEST (for Opt.767, Opt.768 and Opt.769)				
DUT POWER				
AC Voltage	0 - 277.0V, Single phase unblance			
Current	16A maximum continuous			
Power Rating	4500W maximum			
Short Circuit Protection	23Arms or Inrush Current 68Apeak, Response time RMS < 3s; Peak < 10us			
SETTINGS				
HI and LO-Limit AC Voltage, V	30.0 - 277.0		0.1	± (1.5% of setting + 0.2V)
HI and LO-Limit AC Current, A	0.00 - 16.00		0.01	± (2% of setting + 2 counts)
HI and LO-Limit AC Power, W	0 - 4500		1	± (5% of setting + 3 counts)
HI and LO-Limit Power Factor	0.000 - 1.000		0.001	± (8% of setting + 2 counts)
HI and LO-Limit Leakage Current	0.00 - 10.00 HI-Limit : 0 = OFF		0.01	± (2% of setting + 2 counts)
Delay Time, second	0.2 - 999.9		0.1	± (0.1% + 0.05s)
Dwell Time, second	0, 0.1 - 999.9 (0 = continuous)			
MEASUREMENT				
	Range		Resolution	Accuracy
Voltage, Vac	0.0 - 277.0		0.1	± (1.5% of reading + 2 counts) at 30 - 277V
Current, Aac	0.00 - 16.00		0.01	± (2% of reading + 2 counts)
Power, Watts	0 - 4500		1	± (5% of reading + 3 counts)
Power, Factor	0.000 - 1.000		0.001	± (8% of reading + 2 counts)
Leakage Current, mA	0.00 - 10.00		0.01	± (2% of reading + 2 counts)
MD	Leakage current measuring resistor = 2kΩ ± 1%			
TOUCH CURRENT TEST (for Opt.768 and Opt.769)				
DUT				
DUT Input Power Rating	0 - 277V, AC@ 16Aac max.			
Current	16A maximum continuous			
Short Circuit Protection	23Arms or Inrush Current 68Apeak, Response time RMS < 3s; Peak < 10us			
SETTINGS				
Leakage HI and LO-Limit (RMS), μA	Range	0.0 - 999.9μA (0 = OFF)	Resolution	0.1μA
		1000 -10000uA		1μA
Leakage HI and LO-Limit (peak), μA	Range	0.0 - 999.9μA (0 = OFF)	Resolution	0.1μA
		1000 -10000uA		1μA
Dwell Time, second	0, 0.7 - 999.9 (0 = continous)		0.1	± (0.1% + 0.05s)
Delay Time, second	0.5 - 999.9			
Measuring Device	A. UL544 Non Patient, UL484, IEC60598, UL1363,UL923, UL471, UL867, UL697			
	B. UL544 Patient Care			
	C. UL2601-1, IEC60601-1, EN60601-1			
	D. UL1563			
	E. IEC60990 Fig4 U2, IEC 60950-1, IEC60335-1, IEC60598-1, UL484, IEC60065, IEC61010, IEC60065			
	F. IEC60990 Fig5 U3, IEC60598-1			
	G. Basic measuring element 1k ohm of frequency check			
MD A - G components	Resistance accuracy : ± 1%, Capacitance accuracy : ± 5%			
MD Voltage Limit	Maximum 30Vpeak or 30Vdc			

MODEL	ESA-140			ESA-150
Probe setting	G-L, PH-PL, PH-L (Use HV relay and HV terminal connector)			
Internal Leakage	1. Internal Leakage current = 65uA 2. 277V applied to PH max leakage current = 70uA			
External MD	User can add one extra MD for his application			
Current Measurement	The leakage current is fitting range by leakage current Hi-limit setting value			
Frequency Range	DC, 15Hz ≤ F ≤ 1MHz			
Leakage Current Range (RMS)				
Auto Range	Range 1 - Range 6	0.0uA - 10.00mA	Resolution	0.1uA / 1uA / 0.01mA
Fixed Range > 6% of Range	Range 1 - Range 6	0.0uA - 10.00mA	Resolution	0.1uA / 1uA / 0.01mA
Fixed Range < 6% of Range	Range 2 - Range 6	0.0uA - 600uA	Resolution	0.1uA / 1uA / 0.01mA
Accuracy for Auto Range				

Range	Mode	Frequency	Basic Accuracy
Range 1 - 5*1	AC + DC	DC	± (2% of reading + 3 counts)
		15Hz < f < 100kHz	± (2% of reading + 3 counts)
		100kHz < f < 1MHz	± (5% of reading) > 10.0uA
	AC only*2	15Hz < f < 30Hz	± (3% of reading + 5 counts)
		30Hz < f < 100kHz	± (2% of reading + 3 counts)
		100kHz < f < 1MHz	± (5% of reading) > 10.0uA
	DC only*3	DC	± (2% of reading + 3 counts) > 10.0uA
Range 6*1	AC + DC	DC	± (5% of reading) > 10.0uA
		15Hz < f < 100kHz	
	AC only*2	15Hz < f < 30Hz	
		30Hz < f < 100kHz	
	DC only*3	DC	

Accuracy for Fixed Range

Range	Mode	Frequency	Basic Accuracy (> 6% of Range)	Additional Error(< 6% of Range)
Range 1 - 5*1	AC+ DC	DC	± (2% of reading + 3 counts)	add (2% of reading + 0.2% of range)
		15Hz < f < 100kHz	± (2% of reading + 3 counts)	add (2% of reading + 0.2% of range)
		100kHz < f < 1MHz	± (5% of reading) > 10.0uA	add (2% of reading + 0.5% of range)
	AC only*2	15Hz < f < 30Hz	± (3% of reading + 5 counts)	add (2% of reading + 0.2% of range)
		30Hz < f < 100kHz	± (2% of reading + 3 counts)	add (2 % of reading + 0.2% of range)
		100kHz < f < 1MHz	± (5% of reading) > 10.0uA	add (2% of reading + 0.5% of range)
	DC only*3	DC	± (2% of reading + 3 counts) > 10.0uA	add (2% of reading + 0.2% of range)
Range 6*1	AC + DC	DC	± (5% of reading) > 10.0uA	add (2% of reading + 0.2% of range)
		15Hz < f < 100kHz		
	AC only*2	15Hz < f < 30Hz		
		30Hz < f < 100kHz		
	DC only*3	DC		

Leakage Current Range (PEAK)				
Auto Range	Range 1 - Range 6	0.0uA - 10.00mA	Resolution	0.1uA / 1uA / 0.01mA
Fixed Range > 6% of Range	Range 1 - Range 6	0.0uA - 10.00mA	Resolution	0.1uA / 1uA / 0.01mA
Fixed Range < 6% of Range	Range 2 - Range 6	0.0uA - 600uA	Resolution	0.1uA / 1uA / 0.01mA
Accuracy for Auto Range				

Range	Mode	Frequency	Basic Accuracy
Range 1 - 5*1	AC + DC	DC	± (2% of reading + 2uA)
		15Hz < f < 1MHz	± (10% of reading + 2uA)
	AC only*2	15Hz < f < 1MHz	± (10% of reading + 2uA)
Range 6*1	AC + DC	DC	± (2% of reading + 3 counts)
		15Hz < f < 100kHz	± (10% of reading + 2 counts)
	AC only*2	15Hz < f < 100kHz	± (10% of reading + 2 counts)

Accuracy for Fixed Range

Range	Mode	Frequency	Basic Accuracy (> 6% of Range)	Additional Error (< 6% of Range)
Range 1 - 5*1	AC + DC	DC	± (2% of reading + 2uA)	add (2% of reading + 0.2% of range)
		15Hz < f < 100kHz	± (10% of reading + 2uA)	add (2% of reading + 0.2% of range)
		100kHz < f < 1MHz	± (10% of reading + 2uA)	add (2% of reading + 0.5% of range)
	AC only*2	15Hz < f < 100kHz	± (10% of reading + 2uA)	add (2% of reading + 0.2% of range)
		100kHz < f < 1MHz	± (10% of reading + 2uA)	add (2% of reading + 0.5% of range)
Range 6*1	AC + DC	DC	± (2% of reading + 3 counts)	add (2% of reading + 0.2% of range)
		15Hz < f < 100kHz	± (10% of reading + 2 counts)	
	AC only*2	15Hz < f < 100kHz	± (10% of reading + 2 counts)	

Leakage Voltage Range (RMS)				
Auto Range	Range 1 - Range 6	0.0mV - 15.00V	Resolution	0.1mV / 1mV / 0.01V
Fixed Range > 6% of Range	Range 1 - Range 6	0.0mV - 15.00V	Resolution	0.1mV / 1mV / 0.01V
Fixed Range < 6% of Range	Range 2 - Range 6	0.0mV - 900mV	Resolution	0.1mV / 1mV / 0.01V
Accuracy for Auto Range				

Range	Mode	Frequency	Basic Accuracy
Range 1 - 5*1	AC + DC	DC	± (2% of reading + 3 counts)
		15Hz < f < 100kHz	± (2% of reading + 3 counts)
		100kHz < f < 1MHz	± (5% of reading) > 10.0mV
	AC only*2	15Hz < f < 30Hz	± (3% of reading + 5 counts)
		30Hz < f < 100kHz	± (2% of reading + 3 counts)
		100kHz < f < 1MHz	± (5% of reading) > 10.0mV
	DC only*3	DC	± (2% of reading + 3 counts) > 10.0mV
Range 6*1	AC + DC	DC	± (5% of reading) > 10.0mV
		15Hz < f < 100kHz	
	AC only*2	15Hz < f < 30Hz	
		30Hz < f < 100kHz	
	DC only*3	DC	

Accuracy for Fixed Range

Range	Mode	Frequency	Basic Accuracy (> 6% of Range)	Additional Error (< 6% of Range)
Range 1 - 5*1	AC + DC	DC	± (2% of reading + 3 counts)	add (2% of reading + 0.2% of range)
		15Hz < f < 100kHz	± (2% of reading + 3 counts)	add (2% of reading + 0.2% of range)

MODEL	ESA-140			ESA-150
Range 1 - 5*1	AC + DC	100kHz < f < 1MHz	± (5% of reading) > 10.0mV	add (2% of reading + 0.5% of range)
	AC only*2	15Hz < f < 30Hz	± (3% of reading + 5 counts)	add (2% of reading + 0.2% of range)
		30Hz < f < 100kHz	± (2% of reading + 3 counts)	add (2% of reading + 0.2% of range)
		100kHz < f < 1MHz	± (5% of reading) > 10.0mV	add (2% of reading + 0.5% of range)
	DC only*3	DC	± (2% of reading + 3 counts) > 10.0mV	add (2% of reading + 0.2% of range)
Range 6*1	AC + DC	DC	± (5% of reading) > 10.0mV	add (2% of reading + 0.2% of range)
		15Hz < f < 100kHz		
	AC only*2	15Hz < f < 30Hz		
		30Hz < f < 100kHz		
	DC only*3	DC		

Leakage Voltage Range (Peak)				
Auto Range	Range 1 - Range 6	0.0mV - 15.00V	Resolution	0.1mV / 1mV / 0.01V
Fixed Range > 6% of Range	Range 1 - Range 6	0.0mV - 15.00V	Resolution	0.1mV / 1mV / 0.01V
Fixed Range < 6% of Range	Range 2 - Range 6	0.0mV - 900mV	Resolution	0.1mV / 1mV / 0.01V
Accuracy for Auto Range				

Range	Mode	Frequency	Basic Accuracy
Range 1 - 5*1	AC + DC	DC	± (2% of reading + 2mV)
		15Hz < f < 1MHz	± (10% of reading + 2mV)
	AC only*2	15Hz < f < 1MHz	± (10% of reading + 2mV)
Range 6*1	AC + DC	DC	± (2% of reading + 3 counts)
		15Hz < f < 100kHz	± (10% of reading + 2 counts)
	AC only*2	15Hz < f < 100kHz	± (10% of reading + 2 counts)

Accuracy for Fixed Range

Range	Mode	Frequency	Basic Accuracy (> 6% of Range)	Additional Error (< 6% of Range)
Range 1~5*1	AC + DC	DC	± (2% of reading + 2mV)	add (2% of reading + 0.2% of range)
		15Hz < f < 100kHz	± (10% of reading + 2mV)	add (2% of reading + 0.2% of range)
		100kHz < f < 1MHz	± (10% of reading + 2mV)	add (2% of reading + 0.5% of range)
	AC only*2	15Hz < f < 100kHz	± (10% of reading + 2mV)	add (2% of reading + 0.2% of range)
		100kHz < f < 1MHz	± (10% of reading + 2mV)	add (2% of reading + 0.5% of range)
Range 6*1	AC + DC	DC	± (2% of reading + 3 counts)	add (2% of reading + 0.2% of range)
		15Hz < f < 100kHz	± (10% of reading + 2 counts)	
	AC only*2	15Hz < f < 100kHz	± (10% of reading + 2 counts)	

To explain with notes for leakage
*1 If the final measured signal is > range 5, then the maximum composite signal can be measured is 28 volts peak. If the final measured signal is ≤ range 5, then the maximum composite signal can be measured is 12 volts peak
*2 AC cutoff frequency for High Pass Filter is 15Hz on AC only mode
*3 AC cutoff frequency for Low Pass Filter is 15Hz on DC only mode
Leakage Imax Range
The specification is as same as leakage current (RMS)
The specification is as same as leakage current (Peak)

Line Voltage Measurement	
Range	0.0 - 277.0Vac
Resolution	0.1V
Accuracy	± (1.5% of reading + 0.2V), 30.0 - 277.0V
GENERAL	
Continous Power Output selection (like Continuous Run) for both TCT and Run testing.	To create continnuous parameter selection for both TCT and RUN testing. When continuous = ON under RUN testing mode, the power won't shut down when connected two steps. But when the steps setting are different than line condition under the TCT mode, DUT output will momentary power off in 25ms, then it will power on
AC SOURCE (for Opt.769)	
OUTPUT	
Power	500VA Maximum
Voltage	0 - 150.0V / 0 - 277.0V
Current	4.20A / 2.10A

• Ordering Information

ESA-140 Electrical Safety Compliance Analyzer
ESA-150 500VA Electrical Safety Compliance Analyzer
Opt.731 GPIB Interface
Opt.736 8W + 8G Matrix Scanner Module
Opt.751 Multi-function Interface Card
Opt.758 Ethernet Card
OPT.763 USB & RS232 PC Control Card
OPT.767 Run Test
OPT.768 Run Test + TCT
OPT.769 Run Test + TCT + AC Source
Opt.770 Output 400 / 800Hz for ACW
Opt.771 External HV (P-G / S-G / P-S) for Opt.767, Opt.768 or Opt.769
Opt.772 AC, DC, AC + DC measurement for TCT for Opt.768 or Opt.769
Opt.773 Power Control for Opt.767, Opt.768 or Opt.769
Opt.774 Cold Resistance for Opt.767, Opt.768 or Opt.769
Opt.775 PLC 15 Memory
Opt.776 PLC 31 Memory

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華儀電子股份有限公司
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