UL 儀器校驗規範摘要

此中文摘要僅供參考. 一切要求仍以所附之英文原件為準

UL 儀器校驗要求:設備使用於生產 UL/UL-C/CUL 標誌產品時,其後續生產檢驗服務需 符合本文件之要求.此文件適用於所有 UL 認證產品.此文件並視為後續檢驗服務程序書 (Follow-Up Services Procedure) 之一部份.

定義: UL 僅針對檢驗, 量測和測試時使用之設備 (簡稱: IMTE – Inspection, Measuring and Test Equipment) 做最低要求. 此要求同時適用於貴公司提供 UL 檢驗人員於貴廠檢驗時所使用之設備及其廠內校驗用之標準件.

儀校要求之重要性:

此要求為一主要因素來確認產品檢驗,量測和測試時符合 UL 要求的有效性和準確性.設備用於上述動作時必需先經適當校驗,以提供依據確認其結果是有效的和準確的.同樣的, 校驗標準必須能追溯至國家標準.建議使用已經 **ISO/IEC 17025** 認證.之校驗實驗室.

設備校驗要求:

所有在 UL 後續檢驗服務程序書 包括任何標準附錄頁 (Standardized Appendix Pages)、 特別附錄頁 (Special Appendix Pages)、後續檢驗說明書 (Follow-Up Inspection Instructions)、標準書 (Standards) 中所提及之 IMTE 或 UL 檢驗員於檢驗時使用或製造 商(工廠)用來確認符合 UL 規範之設備皆必須校驗 (含五十倍目鏡,吊重用砝碼/物件, PWB 壓合的溫度表及壓力錶等).製造商必須提供適當之工具且誤差值符合 UL 要求給 檢驗員進行檢驗.

當此工具僅需較低的準確度,如計時器,捲尺,鐵尺,量角器,圓規等時廠商有下列選擇來 符合 UL 要求:

選擇一:最低限度,工廠需保有一來自工具製造商敘述適當準確度之文件用來証明工具本體上所敘述之精 準度.除此之外,如捲尺和其他類似之較低準確度工具須進行使用前檢查(In-Service Checks) – 目視檢查 是否有磨損,破損或其它類型的損壞.工廠必須制定此種檢查之檢驗項目,頻率和方法及如何處理不合格品.

選擇二: 和其他 IMTE 設備一樣定期送校.

儀錶如果為生產設備的一部分,且未在 UL 後續檢驗服務程序書中被提及則不須校驗.但如果 UL 後續檢驗服務程序書有敘述的部分就必須校驗,例如用於監測 PWB 的壓合溫度及壓合壓力的儀錶即需校驗.

校驗頻率:

以 UL 後續檢驗服務程序書所要求的為遵守依據,但所有 IMTE 一年至少校驗一次.新購置之 IMTE 亦須校驗過才可使用.

內校用量測標準件之規定:

用以作 IMTE 內校使用的量測標準件,如法碼和塊規必須至少每三年或因誤用導致精準 度不確定時由合格實驗室校驗一次.其他量測標準件,如電壓計,多功能電錶用來校驗其 它錶頭則須至少每一年或因誤用導致精準度不確定時由合格實驗室校驗一次.標準件包 括相關軟體皆須依製造廠規定之方式保存以避免損壞.

校驗標示:

每一個校驗過之儀器皆須使用標籤或其他方式標示出下次校驗日期.且每一儀器皆有其特有明確的製造廠名,型號,序號,校驗編號,財產編號等.

校驗證明/記錄:

UL 建議使用 ISO/IEC 17025 認證過之實驗室(請實驗室提供 ISO/IEC 17025 認證証明書 以資證明或校驗報告上有 ISO/IEC 17025 認証標章). 使用此類認證過之實驗室可加速 UL 檢驗員審核校驗記錄. 檢驗員將於拜訪時確認此類認證過之實驗室提供的校驗證明 至少包含下列資訊:

!校驗儀器有明確的製造廠名,型號,序號,校驗編號等.

!校驗日期以確認 IMTE 仍在有效期内.

- !有效的認證人簽證此校驗證明.
- !審核校驗數據,以確認 IMTE 適合使用.

!UL建議在校驗報告上註明量測值的不確定度 (Measurement Uncertainty)

校驗記錄由非 ISO/IEC 17025 認證過之實驗室提供或內校記錄則必須包含下列資訊 (請參考第 4-7 頁的校正證書樣樣本或英文版第 06-07 頁):

- 1. 文件名稱,如校正證書,校正報告.
- 2. 校驗文件提供者名稱和地址.
- 3. 實際校驗地址,如不同於校驗文件提供者.
- 4. 有明確的製造廠名,型號,序號等.
- 5. 有獨立的文件編號 Report No.
- 6. 敘述校驗儀器的狀況,如收件時的狀態: 誤差內, 誤差外, 損壞等(臺灣地區校驗實驗室應皆有 ISO /IEC17025 認證, 可無此項描述).
- 7. 校驗日期.
- 8. 校驗值不符合校驗標準時須明確標示出,如誤差值超出標準.
- 9. IMTE 具多功能量測時,校驗記錄須指出並證明此儀器適用校正內的多種量測值,如多功能電表可量測電壓,電流,電阻而 6"游標卡尺具可量測內徑,外徑和深度的特質.
- 10. 校驗者的職稱,姓名和簽名. 電子簽名亦可接受.
- 11. 校驗值可追溯至國家或國際標準.

校驗值和結果無適當證明不可被修改/替換.如有使用代工值執行校驗工作,報告上須明確標示.

內校記錄可以較簡化的方式表達,但仍須包含上述所有內容.

超出校驗誤差許可情事

當 IMTE(任何調整之前)被發現已不在所需校驗誤差之內,如 OEM 的精密度規範,則貴公司需進行分析以確認此情況是否不利於檢驗結果.同樣的,當設備被判定無法正確運作時亦需需進行同樣的分析.並需檢討此狀況有無影響前次量測/測試結果.

有問題的設備不可繼續使用,必需隔離或有顯著的標示,並:

!評估和記錄此設備對前次檢驗或測試的影響

!評估是否需要對受影響的產品採取適當的改善措施. 貴公司必須採取行動修正產品務須使其符合 UL 要求.

記錄:

校驗證明及其記錄至少須保存一年. 校驗頻率較低者,則需保留直至下次校驗.

校驗內容需符合本文件的規定.

儀校不良分析記錄亦須保存.保存期限由貴公司定義並記錄之.UL建議保存針對精準度要求較低儀器所作 In-service check 的記錄.

注意:

!UL 並未對任何廠商或產品背書保證.

! 如您須要進一步的資訊, 請聯絡當地檢驗人員.

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OCL hereby certifies that equipment noted herein has been calibration in the above listed stands. The standards used to perform this calibration are direct/indirect traceable to NML/ROC or national standards, The carbonau on services from OCL are capable of performing services in compliance with the requirements of ISO - 17025. This carbonau on services that calibrate on the items calibrated. Reproduced calibration certificate in partial is not effective.	送校儀器之校正項目有效,部份複製	段或分離使用無效。 9		
capable of performing services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in compliance with the requirements of ISO - 17025. This calibration services in calibration s	OCL hereby certifies that equipment r	noted herein has been calibrat	h the above listed stand,	he standards used to
the items calibrated. Reproduced calibration certificate in partial is not effective.	capable of performing services in comp	bliance with the requirements of	SO - 17025 . This conibilation certifi	ficate is valid only to
	the items calibrated. Reproduced calibrated	ation certificate in partial is not e	ffective. L 校.	手 、

	校 ^{Calibration} 校正 CALIBRATION (校正實驗室 Calibration Laboratory " 校正證書 CALIBRATION CERTIFICATE					
校止實驗至 台北縣: 電話:(02)8512-	二段 88 巷 20 號 傅頁:(02) 8512-	Page Report No.	: 2 of 4 . OCL-2310706M04S2				
	校正結里(Cal	ibration Data)					
		······································	$\sqrt{8}$				
	標準値 Standard	量測値 Reading	誤差率(%) Error				
1. DCV CHECK	0.501 (kV)	0.50 (kV)	-0.02				
	1.002	1.00	-0.03				
	2.004	2.00	-0.07				
	3.007	3.00	-0.12				
	4.011	4.00	-0.18				
	5.016	5.00	-0.27				
	6.021	6.00	-0.35				
2. ACV CHECK(@	60 Hz)	2444 					
2. 1101 0110011(@	0.502 (kV)	0.50 (kV)	-0.04				
	1.003	1.00	-0.06				
1. A.	2.004	2.00	-0.08				
	3.007	3.00	-0.14				
	4.009	4.00	-0.18				
	5.017	5.00	-0.34				
3. DC CUT-OFF C	URRENT CHECK						
	0.097 (mA)	99.7 (µA)	0.03				
	0.195	198.5	0.04				
	0.495	498	0.03				
	1.987	1988	0.01				
	4.975	4950	-0.25				
	9.971	9940	-0.31				
4. AC CUT-OFF C	URRENT CHECK(@ 60 Hz)						
	0.095 (mA)	0.099 (mA)	0.04				
	0.190	0.194	-0.02				
	0.989	0.993	0.04				
	1.985	1.992	0.07				
	4.943	4.95	0.07				
	9.85	9.89	0.40				

	t Calibratio	交正實驗室 m Laboratory	
	校正	諮 書	
\sim	AL IRR ATION	CERTIFICATI	7
し. 校正實驗室		CERTII IÇATI	
台北縣 二段	88巷20號	Page	. 3 OF 4
電話:(02)8512- 傳	真:(02)8512	Report No.	: OCL-2310706M0482
	校正結果(Ca	libration Data)	
檔位	標準値	量測値	誤差率(%)
Range	Standard	Reading	Error
5. INSULATION TEST D	CV CHECK	500 (TD*	0.10
	1003	1000	-0.10
		1000	-0.50
6. INSULATION RESIST.	ANCE CHECK(@ 2-W)	and a second	
500 (V)	2 (MΩ) -	1.98 (ΜΩ)	-0.01
	5	4.98	-0.01
	10	9.97	-0.01
	20	19.97	-0.01
	2U	49.7	-0.03
	200	100	-0.13
	500	498	-0.20
	1000	996	-0.40
1000 (V)	2 (MΩ)	1.978 (MΩ)	-0.01
	-5	4.95	-0.01
	10	10.96	0.10
	20	19.95	-0.01
	50	49.94	-0.01
to a second s	100	98.9	-0.11
	200	197.8	-0.22
	1000	490.7	-0.34
그는 것을 가 말을	1000	771.7	-0.02
7. GROUNDING CHECK	(@ 2-W ; OFF SER=5 m!	3)	
10 (A) 10	15.51 (m22)	16 (m ¹ 2)	0.64
10	105 88	50 107	1.05
25 (A)	15.31	16	0.65
25	55.17	56	0.78
25	105.88	106	0.11
8. GROUNDING AC CUI	RENT CHECK (@ 60 Hz		
	10.05 (A)	10 (A)	-0.17
	25.02	25	-0.07
	30.06	30	-0.20
		-	





MARK INTEGRITY PROGRAM

UL Calibration Requirements: Equipment Used for UL/C-UL/ULC Mark Follow-Up Services

UL defines minimum requirements for calibration of inspection, measuring and test equipment (IMTE) required as part of its Follow-Up Services Procedures. These requirements also include IMTE supplied by customers and used by UL field representatives during inspection activities at the inspection location. Standards used to calibrate such inspection, measuring and testing equipment are also covered by these requirements.

This document applies to all customers of UL's product certification services for the U.S. and Canadian markets, i.e., UL/C-UL/ULC Mark certifications. Calibration is a requirement of UL certification as noted in the United States and Canadian testing and certification service terms and conditions located at www.ul.com/contracts.

Why this requirement is important

A key element in determining compliance with UL requirements is the validity and accuracy of inspection, measurement and test results. Equipment used to perform these activities must be calibrated to provide the necessary level of confidence in the results of the inspections, measurements and tests being conducted. Calibration of IMTE – as well as the standards for calibration – must be traceable to national standards and SI units of measure, whenever possible, e.g., the National Institute of Standards and Technology in the United States. It is recommended that providers of calibration services be accredited under ISO/IEC 17025. See page 3 of this document for calibration certificate requirements for calibrations performed by a nonaccredited laboratory or performed in-house by the manufacturer.

REQUIREMENTS

Equipment requiring calibration

All IMTE required as part of a UL Follow-Up Services Procedure including any Appendices, Follow-Up Inspection Instructions or Standard Appendix Pages or equipment that is used by UL field representatives while conducting inspection activities at the factory or used by the manufacturer to verify compliance with UL requirements must be calibrated and traceable to SI units.

Customers are responsible for selecting inspection, measuring and test equipment that is suitable for the measurements to be taken. Customers must ensure that the IMTE selected for each measurement meets measurement tolerances specified in UL Follow-Up Services Procedures or related documentation, i.e., customers must select and use the right tool for the job.

When inspection, measuring and test equipment with low precision capability, such as tape measures, steel rules, protractors, radius gauges, etc., are used as the final means of verifying compliance with UL requirements, customers have the following options:



Option 1

At a minimum, customers will have an appropriate accuracy statement from the manufacturer of a measuring device to certify or attest to a device's stated precision and accuracy capabilities. This information is important in demonstrating that equipment accuracy is capable of meeting required measurement tolerances. In addition, tape measures and similar low-precision inspection, measuring and test equipment shall undergo in-service checks as described in the "In-Service Checks" section of this document.

Option 2

Customers may choose to include tape measures and similar lowprecision IMTE in their calibration system. This equipment will be calibrated or validated at regularly defined intervals, according to requirements defined in this document.

Equipment not requiring calibration

Manufacturing equipment instrumentation and gauges that are an integral part of equipment used in manufacturing products are not generally subject to calibration requirements, unless specifically identified in the Follow-Up Services Procedure. Typically, these are gauges and instruments used to monitor process characteristics, e.g., speed, pressure, etc., and are not used to evaluate final product characteristics.

Weights do not need to be calibrated if verified with a calibrated scale. Unless specified in UL Follow-Up Services Procedures or related documents, timing devices such as timers, stopwatches and clocks do not require calibration.

In-service checks of inspection, measuring and test equipment

During an in-service check, IMTE is validated prior to use to ensure it is capable of achieving the required measurement accuracy. Customers must specify the criteria and methods used to conduct these in-service checks, as well as the process for handling nonconformances. IMTE used to verify compliance with UL requirements shall be checked daily by a customer to ensure it is functioning properly. If this equipment is not used daily, then a functional verification should be performed prior to use.

Frequency of calibration

All IMTE described in a UL Follow-Up Services Procedure as well as Appendices, Follow-Up Inspection Instructions or Standard Appendix Pages or used by UL field representatives in activities at a manufacturing location must be calibrated at least annually for their intended function and use. If a UL Follow-Up Services Procedure specifies more frequent calibration frequency, then that frequency is to be followed.

Measurement standards

Measurement standards used in the calibration of IMTE must be calibrated and traceable to national standards and SI units whenever possible and are to be used for calibration purposes only.

Weights and dimensional gauge block standards must be calibrated by a competent body – preferably by an ISO/IEC 17025 accredited calibration service provider – every **three years** or whenever the measurement standard has been subject to some form of abuse that may affect the measurement standard's fitness for use. Other measurement standards, e.g., voltmeters, master gauges used to calibrate other gauges, etc., shall be calibrated by a competent body – preferably by an ISO/IEC 17025 accredited calibration service provider – either **annually** or in accordance with the equipment manufacturer's specifications, or whenever the standard has been subject to some form of abuse that may affect the fitness of a standard.

Standards, including any related software, shall be protected from damage or deterioration and must be maintained according to the original equipment manufacturer's recommendations.

Calibration identification and status

All IMTE being calibrated – as well as measurement standards used for calibrations – shall include evidence of calibration status, e.g., a label or other marking indicating the next calibration due date. If size limitations or usage environment prevents the use of a calibration label, alternate identification methods are acceptable, providing that the identification and calibration status can be readily determined. Each piece of calibrated IMTE must have a unique, unambiguous identifier such as manufacturer name and model number, serial number, identification number, asset number, etc.



Calibration acceptance criteria

Customers are responsible for determining the tolerances, i.e., the calibration acceptance criteria, required for IMTE. Customers should consider the tolerances required for measurement when selecting IMTE. Customers may accept the precision and accuracy tolerances provided by an IMTE manufacturer for use in calibration, provided the UL measurement accuracy requirements are still satisfied.

Calibration certificates: ISO/IEC 17025 accredited calibration service providers

UL recommends using calibration service providers that are accredited to ISO/IEC 17025 through authorized signatories of an international accreditation body. See page 5 for more information on accreditation endorsements. Using an accredited calibration service provider expedites review of calibration records during a UL inspection visit: the calibration information that UL field representatives are required to verify is limited due to calibrations being performed in accordance with a calibration service provider's accreditation requirements.

During UL inspection visits, UL field representatives will evaluate calibration records. Each calibration certificate from an accredited calibration service provider shall include at least the following information:

- Unambiguous identification of the calibrated item. Some examples are manufacturer name and model number, serial number, identification number, etc.
- Date(s) calibration was performed to determine that the IMTE has been calibrated within required frequency
- A valid accreditation body endorsement for the calibration performed. Please refer to page 5 for a sample list of accreditation endorsements

During UL inspection visits, UL field representatives will confirm that the inspection, measuring and testing equipment is within the defined calibration period. Additionally, UL field representatives will review calibration certificates and data to verify that inspection, measuring and test equipment has been calibrated for the measurements for which it will be used. If the above information is unavailable or cannot be verified, UL representatives will evaluate compliance with the requirements specified for non-ISO/IEC 17025 accredited calibration service providers or calibrations performed in-house.

Calibration certificates: non-ISO/IEC 17025 accredited calibration service providers or calibrations performed in-house

Certificates for calibrations performed by non-ISO/IEC 17025 accredited calibration service providers must include the following information:

- 1. Title, e.g., Calibration Certificate, Calibration Report, etc., or equivalent
- 2. Name and address of the calibration service provider
- 3. Location where the calibration was conducted, if different from the service provider address
- 4. Unambiguous identification of the specific piece of IMTE calibrated such as manufacturer name and model number, serial number, identification number, etc.
- 5. Unique identifier of the calibration record such as a serial number and the capability to match it to a specific piece of calibrated IMTE
- 6. Description of the condition of the item calibrated, i.e., the as-received condition, e.g., out of tolerance, in tolerance, damaged, etc.
- 7. Date(s) calibration was performed
- Quantitative measured value(s) of the calibration results when out of calibration conditions are identified, i.e., when stated calibration tolerances have been exceeded
- 9. For IMTE capable of measuring multiple parameters, calibration records must include an attestation or statement confirming that the equipment's as found conditions and calibration results encompass all parameters for which it is being used. Examples of this type of equipment include





digital multi-meters measuring voltage, amperage and resistance as well as 6" calipers measuring ID, OD and depth attributes

- The name(s), functions(s) and signature(s) or equivalent identification of person(s) authorizing the calibration certificate. Note: Electronic signature/authorization is acceptable
- 11. Evidence that the measurements are traceable to national or international standards and SI units. Note:
- There should be **no** alteration to the calibration data/results without evidence of appropriate authorization, e.g., names, titles, dates, nature of alteration, etc.
- When the certificate or report contains results of calibrations performed by subcontractors, these results shall be clearly identified

For calibrations performed in-house by customers, calibration results may be reported in a simplified manner. However, any information outlined in this section that is not included on the calibration certificate or report shall be *readily available* for review at the time of UL inspection.

Out of calibration conditions

When IMTE (before any adjustments are made) is found to be outside of required calibration tolerances, i.e., OEM accuracy specification, customers shall perform an analysis to determine if the out of calibration condition could have adversely affected inspection results. Similarly, this same analysis must be performed if equipment is determined to be non-operational, if it is discovered to be defective or if other conditions exist that would raise questions about the validity of previous measurements/test results.

The equipment in question must be removed from service by segregating or prominently labeling it. The customers shall:

- Evaluate and document the effects of the equipment on previous inspections or tests
- Evaluate if the condition of the equipment could have significantly affected previous inspections or test results

and take corrective action, as appropriate. Customers **must** take action to correct product that does not comply with UL requirements

Corrective actions taken by customers should include a robust root cause analysis, containment actions, and long-term corrective actions to ensure that any nonconformance is not likely to recur.

Traceability

All calibrated IMTE is to be calibrated using measurement standards traceable to a national metrological institute, e.g., National Institute of Standards and Technology in the United States or an officially recognized national metrology institute participating in Bureau International des Poids et Measures (BIPM), either directly or through a regional group.

Note: Citation of a NIST test number, certification of the calibration lab to ISO 9001, or a simple statement of traceability to NIST or other international body by the calibration service provider are **not** acceptable as evidence of traceability. The calibration certificate and related records must provide evidence that a calibration service provider utilized calibration standards that are traceable to national standards.

Measurement uncertainty

UL recommends that calibration certificates or reports include the uncertainty of measurement values associated with the calibration data. Uncertainty calculations are recommended for all calibrations. These calculations may be performed in accordance with ISO 5725-2, Guide to the Expression of Uncertainty in Measurement Accuracy of Measurement Methods and Results – Part 2, also known as GUM (trueness and precision), or in accordance with ANSI/NCSL Z540-2, General Requirements for Calibration Laboratories and Test Equipment.

RECORDS

Certificates and other records

Customers must maintain records of calibration for at least one year. For equipment calibrated less frequently, e.g., every three years, records shall be maintained at least for the current calibration cycle.

The content of the records must comply with the requirements defined in this document.



Records of analysis of out-of-calibration conditions shall also be maintained. The duration of records retention should be defined and documented by customers. UL also recommends that customers maintain records of in-service checks for low-precision equipment.

Accreditation endorsements

The following information is provided to assist customers; it is not intended to be all-inclusive.

Since calibration certificates from accredited laboratories that conduct work within their scope of accreditation can bear an endorsement of accreditation, attention to verifying a suitable endorsement with the unique identifier is necessary. This satisfies the need to substantiate that a certificate was provided by an accredited calibration laboratory.

The following are acceptable accreditor endorsements:

- International Laboratory Accreditation Cooperation MRA signatories – a full listing of ILAC MRA signatories can be found at www.ilac.org/membersbycategory.html. The category "Full Members" includes a listing of the signatories to the ILAC MRA
- Asian Pacific Laboratory Accreditation Council MRA signatories – a full listing of APLAC MRA signatories can be found at www.aplac.org/membership_by_category.html
- European Accreditation Cooperation MRA signatories a full listing of EAC MRA signatories can be found at www. european-accreditation.org/content/mla/scopes.html

Sample calibration certificate

The calibration certificate/record shown on pages 6-7 is a representative example that contains the required elements defined previously in this document. These required elements include the following:

- 1. Title, e.g., Calibration Certificate, Calibration Report, etc., or equivalent
- 2. Name and address of the calibration service provider

- 3. Location where the calibration was conducted, if different from the service provider address
- 4. Unambiguous identification of the specific piece of IMTE calibrated such as manufacturer name and model number, serial number, identification number, etc.
- Unique identifier of the calibration record such as a serial number and the capability to match it to a specific piece of calibrated IMTE
- 6. Description of the condition of the item calibrated, i.e., the "as received" condition, e.g., out of tolerance, in tolerance, damaged, etc.
- 7. Date(s) calibration was performed
- 8. Quantitative measured value(s) of the calibration results when out of calibration conditions are identified, i.e., **when** stated calibration tolerances have been exceeded
- 9. For IMTE capable of measuring multiple parameters, calibration records must include an attestation or statement confirming that the equipment's as-found conditions and calibration results encompass all parameters for which it is being used. Examples of this type of equipment include digital multi-meters measuring voltage, amperage and resistance as well as 6" calipers measuring ID, OD and depth attributes
- 10. The name(s), functions(s) and signature(s) or equivalent identification of person(s) authorizing the calibration certificate. Note: Electronic signature / authorization is acceptable
- 11. Evidence that the measurements are traceable to national or international standards and SI units

Important notes

- UL does not endorse any vendors or products referenced herein.
- For more information, please contact your local UL Field Representative.



For more information please contact your local UL field representative



This instrument has been processed and calibrated in accordance with "Calibration Service Name" Quality Assurance Manual and is traceable to the National Institute of Standards and Technology (NIST). The "Calibration Service Name" quality system is registered to ISO 9001:2000, A2LA - accredited to ISO / IEC 17025 – 2005 & ANSI /NCSL Z540-1-1994, and compliant with ISO 10012-1, 10 CFR 50 App. B, 10 CFR 21, NQA-1 and MIL-STD-45662A. This report may not be reproduced, except in full, without the written approval of "Calibration Service Name". Unless stated otherwise, the expanded measurement uncertainty of the measurement process does not exceed 15% of the tolerance allowed for the individual characteristics measured, the measurement uncertainties for this calibration are based upon 95% (2 sigma) confidence limits. No sampling plan or other process was used for this calibration. The results reported herein apply only to the calibration of the item described above and no limitations of use apply to the calibrated unit. Although the item calibrated meets the specifications and performance at the time of calibration, due to any number of factors the recommended due date of the item calibrated does not imply continuing conformance to specifications during the recommended interval.

9

Calibration Accuracy

MANUFACTURER'S SPECIFICATIONS

Conditions / Analysis

DUE CALIBRATION / CALIBRATED WITH DATA ONSITE

	Standards Used				
HD Nu	mber Model Number	Calibration Date	Due Date	Traceability Number	
(1690R	C 5700A	7/27/2008	7/27/2009	1700128656	
10021	38 3325A	10/31/2008	10/31/2009	1700144363	
(10) 5113-8	31 <u>SS-32</u>	9/4/2008	9/4/2009	1700128975	
Y					
Certifie	ed By Technician: <u>C. Clemm</u>	ons Inspected By Auditor	: <u>S. Van Zandt</u>	Page 1 of 2	

5		(2)		'Calibratio	n Service I	Name"		5
V	Manufacturor		\langle	Cortificato N	lumbor	ABC 102		
	Madal	2062A) -	Calibration	Data (0/19/2000		- 7)
-	Deseriation	Distal Mult	matar	Calibration	Jale	2/10/2009		〜 `ノ
	Description		-meler	Serial Nume	ber a	3990313		$\overline{}$
	Procedure	SOP-CAL-L	DMM-04	-HD #		VIM0077	4	
Ī	Function / Range	Nominal Value	As Found	Result	As Left	Result	Min	Max
ļ		1	• 1	DC V	oltage	_	1	-
Ļ	200 mV	190.00	189.99	Pass	Same	Pass	189.89	190.11
		-190.00	-190.04	Pass	Same	Pass	-190.11	-189.89
	2 V	1.9000	1.9002	Pass	Same	Pass	1.8989	1.9011
ļ	20 V	19.000	19.003	Pass	Same	Pass	18.985	19.015
ļ	200 V	190.00	190.03	Pass	Same	Pass	189.85	190.15
-	1000 V	1000.0	1000.0	Pass	Same	Pass	999.1	1000.9
ŀ	100mV @ 200 Hz	100.00	100.07	AC V	Somo	Pace	00.40	100.60
ŀ		100.00	100.07	Pass	Same	Pass	99.40	100.60
ŀ		1 0000	1 0002	Pass	Same	Pass	90.00	1 01.40
ŀ	2011Z 200 Hz	1.0000	1.0002	Pass	Same	Pass	0.9890	1.0110
	200112 1 kHz	1.0000	1.0012	Pass	Same	Pass	0.9940	1.0000
)	10 kHz	1.0000	1.0002	Page	Same	Pass	0.9900	1.0070
	30 kHz	1.0000	1.0035	Pass	Same	Pass	0.9900	1.0070
ŀ	0.1 V 200 Hz	0.1000	0.10040	Page	Same	Pass	0.9000	0 1015
1	0.1 V 200 Hz	0.1000	0.1000	Pass	Same	Pass	0.0000	0.1010
1	10 V @ 200 Hz	10,000	10 125	Fail	Same	Pass	9.0000	10,060
	10 kHz	10.000	10 734	Fail	Same	Pass	9 480	10.520
	30 kHz	10.000	10 787	Fail	Same	Pass	9 460	10.540
ľ	100 V @ 200 Hz	100.00	100.26	Pass	Same	Pass	99.40	100.60
ľ	10 kHz	100.00	100.46	Pass	Same	Pass	94,80	105.20
ŀ	30 kHz	100.00	100.44	Pass	Same	Pass	94.60	105.40
F	750 V @ 400 Hz	750.0	752.60	Pass	Same	Pass	734.0	766.0
ľ	750 V @ 1000 Hz	750.0	754.5	Pass	Same	Pass	734.0	766.0
Ī		1		DC C	urrent			
[200 uA	190.00	190.05	Pass	Same	Pass	189.41	190.59
[-190.00	-190;06	Pass	Same	Pass	-190.59	-189.41
[2 mA	1.9000	1.9007	Pass	Same	Pass	1.8941	1.9059
	20 mA	19.000	19.011	Pass	Same	Pass	18.941	19.059
L	200 mA	190.00	190.49	Pass	Same	Pass	188.65	191.35
L	2000 mA	1900.0	1900.2	Pass	Same	Pass	1886.5	1913.5
		-1900.0	-1900.2	Pass	Same	Pass	-1913.5	-1886.5
-	20 m A	10,000	10.052	AC Curre	nt@1kHz	Pace	10 0/7	10 152
ŀ	20 IIIA	19.000	19.055	Resistanc	e in Ohms	F 855	10.047	19.155
ŀ	200	100.0	10.06	Pass	Same	Pass	99.86	100.14
	2 k	1.0000	0.9998	Pass	Same	Pass	0.9986	1.0012
2	20 k	10.000	9.997	Pass	Same	Pass	9.986	10.012
0	200 k	100.00	99.97	Pass	Same	Pass	99.86	100.12
~	2 M	1.000	0.9999	Pass	Same	Pass	0.9978	1.0022
	20 M	10.00	10.00	Pass	Same	Pass	9.95	10.05

For more information please contact your local UL field representative

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