

CERTIFICATE #: 180601-065609-d2544d

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CLIENT: TUV Rheinland of North America, Inc., 12 Commerce Road, Newtown, CT, 06470, USA
MANUFACTURER: Narda
EQUIPMENT TYPE: Field Probe
MODEL NUMBER: 2300/90.10; ELT-400
SERIAL NUMBER: L-0002; K-0045
ASSET NUMBER: 003175

Instrumentation Environment: **TEMP:** 21°C **RH:** 49%
Calibration Environment: **TEMP:** 21°C **RH:** 49% **BAR. PRES.:** 30.10 in

DATE OF CALIBRATION: 06/04/2018
CALIBRATION DUE DATE: 06/04/2019
CALIBRATION CYCLE NOTES: 1 year from calibration date. The applied calibration cycle has been requested by the customer. The relevant documentation has been received and is on file.
CALIBRATION LOCATION: 1346 Yellowwood Road, Kimballton, IA 51543
CALIBRATION BY: Dave Grabill

EQUIPMENT STATUS

Received in tolerance:	☒	Returned in tolerance:	☒
Received with limited cal.:	☐	Returned with limited cal.:	☐
Received out of tolerance:	☐	Returned out of tolerance:	☐

CALIBRATION STANDARD(S)	CALIBRATION METHOD(S)	CALIBRATION PROCEDURE(S)
IEEE Std. 1309-2013	Substitution	624593

NOTES: Data below 5Hz is not accredited, please see page 3 of certificate.



Keysight-LC Service Center Manager
Brandt Langer

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CALIBRATION EQUIPMENT USED:

<u>Manufacturer</u>	<u>Equipment Type</u>	<u>Model Number</u>	<u>Serial Number</u>	<u>Trace #</u>	<u>Cal Due Date</u>
Agilent Technologies, Inc.	PSA Spectrum Analyzer	E4445A	MY42510104	180301-080808-3c56e6	03/07/2019
AR	Amp	350AH1	0424825	NA	NA
Hewlett-Packard	Function/Arbitrary Waveform Generator	33120A	US34009685	171106-144151-f20296	11/15/2018
Holaday	ELF Magnetic Field Meter	HI-3624	108095	170914-072858-3d0102	09/14/2018
Holaday	ELF Magnetic Field Meter	HI-3627	00023777	180330-095742-069a90	NA
Schwarzbeck Mess-Elektronik	Helmholtz Coil	HHS 5204-12	005	NA	NA
Schwarzbeck Mess-Elektronik	Loop	FESP 5133-7/41	5133741-054	171010-074558-bbc8be	10/10/2018

CALIBRATION DATA FILE(S) THAT ARE PART OF THIS CERTIFICATE:

Magmeter01.txt

** All data/documentation is available online at: <http://certxpress.service.keysight.com/certxpress/login.aspx>***IN TOLERANCE/OUT OF TOLERANCE EXPLANATION:**

The criterion to determine the "In Tolerance/Out of Tolerance" status is based on one of the following conditions:

1. If the manufacturer has a specified tolerance for the item being calibrated, then the calibration values are compared to this tolerance, and the values must fall within the manufacturer's tolerance. The tolerance may be obtained from the manufacturer's web site, data sheets, equipment manuals, etc.
2. In case the manufacturer does not provide any tolerances, the calibration results are compared to typical values provided by the manufacturer or to historical in-house data with a +/- 3 dB tolerance.
3. Where results are compared to published specifications in a standard, the calibration results are compared to this tolerance, and the values must fall within the standard's tolerance.
4. In the situation that this laboratory's measurement uncertainty is larger than the manufacturer's specified tolerance, the comparison criterion will be based on historical in-house data as defined above. This judgement will only be made using accredited calibration methods.

CALIBRATION TRACEABILITY:

This laboratory is accredited to ISO/IEC 17025:2005 and NCSL/ANSI Z540-1-1994. All measurement instrumentation is traceable to a recognized National Metrology Institute, which is a signatory to the International Committee for Weights & Measures, Mutual Recognition Arrangement. Supporting documentation related to traceability is on file and is available for examination upon request.

INTERPRETATION TO THE GUIDANCE AND USE OF CALIBRATION DATA:

The calibration values supplied with this certificate apply to measurements made under the physical (geometric) arrangements with respect to the applicable calibration standard. Use of this item under other conditions will result in additional sources of error of which is the responsibility of the user.

CALIBRATION UNCERTAINTY:

- ☐ Actual uncertainty (Expanded) _____
- ☒ Uncertainties that apply to this calibration are shown below. CMC represents our typical uncertainty for the calibration documented in this certificate since, to the best of our knowledge, the conditions under which the CMC for this facility and calibration item was determined applied to this calibration as well. The repeatability contribution to CMC is based on a type A evaluation of at least 10 data sets or more.

<u>Parameter/Equipment:</u>	<u>Range:</u>	<u>CMC** (+/-):</u>
Magnetic Field Strength Meters - (15 to 19) mG	(5 to 20) Hz	0.73 dB
Magnetic Field Strength Meters - (150 to 190) mG	20 Hz to 2 kHz	1.1 dB
Magnetic Field Strength Meters - (60 to 700) mG	(2 to 500) kHz	1.1 dB

**** Calibration and Measurement Capability (CMC)** is the smallest uncertainty of measurement that a laboratory can achieve within its scope of accreditation when performing more or less routine calibrations of nearly ideal measurement standards or nearly ideal measuring equipment. Calibration and Measurement Capabilities represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k = 2$. The actual measurement uncertainty of a specific calibration performed by the laboratory may be greater than the CMC due to the behavior of the customer's device and to influences from the circumstances of the specific calibration. In the statement of CMC, M is the uncertainty contribution of the mismatch error caused by the impedance mismatch between the calibration system of the laboratory and the device under calibration.

For further detailed explanations, a complete copy of the scope of our A2LA accreditation is available upon request.