



Calibration, Repair and Supply of Test & Measurement Equipment

Page 1 of 2

Date of Printing: 2011-05-16

ISO 9001:2008
TRACEABLE CALIBRATION CERTIFICATE
Certificate # : 110512TL114729

WORK ORDER #:	23944	CAL DATE:	2011-05-12
PURCHASE ORDER #:	TBA	DUE DATE:	2012-05-12
PROCEDURE #:	M03722A - C00544C	ISSUE DATE:	2011-05-16
IN STATE:	Operational, Tolerances Not Applicable		
OUT STATE:	Operational, Tolerances Not Applicable		
COMPANY:	ERLPhase Power Technologies Ltd		
ADDRESS:	74 Scurfield Blvd, Winnipeg, Manitoba, R3Y 1G4		
DESCRIPTION:	Data Logger/Recorder, Voltage, Current, Phase, 36 Channel		
MANUFACTURER:	ERLPhase Power Technologies Ltd		
MODEL:	Tesla 4000		
MANUFACTURER SN:	TESLA 4000-110126-03		
EQUIPMENT ID:			

This document certifies that the instrument listed above was calibrated using standards that are traceable to NRC and/or NIST standards, and/or have been derived by ratio type self-calibrating techniques. The instrument was calibrated in the lab at Pulse Engineering Ltd. under the following environmental conditions: Temperature = 23.0+/-2.5°C, Humidity = 30-55% range.

This document certifies that all required test data is included in the accompanying test data report.

This certificate and test data report shall not be reproduced except in full without written approval from Pulse Engineering Ltd.

Certified by: *Trent Laycock*
Trent Laycock QA Technologist

When the data report shows tolerances, Pulse Engineering Ltd. is testing to see if the instrument is in compliance with manufacturing or customer specifications. Our procedures assure that the uncertainties in the measurement systems used at the various test points are at least four times less than the tolerance limits of the equipment being calibrated. For this condition, equipment can be considered to be in-tolerance if the results are within the specifications of the equipment being calibrated.

When the data report shows an uncertainty it is our "Best Uncertainty". This is the smallest uncertainty of measurement that Pulse Engineering Ltd. can achieve within its measuring systems when performing more or less routine calibrations of nearly ideal measurement standards of nearly ideal measuring equipment. Best uncertainties represent expanded uncertainties expressed at approximately the 95 % level of confidence, usually using a coverage factor of $k=2$ assuming a normal distribution. The best uncertainty of a specific calibration performed by the laboratory may be greater than the best uncertainty due to the behavior of the customer's device and to influences from the circumstances of the specific calibration.

There is a Cal Due date on the certificate. This is not a requirement but a service to the majority of our customers and is based on the cycle time specified by them. When we do not have a specified cycle time our report defaults to a 12 month recall cycle.

There is no implied warranty that the instrument will maintain its specified tolerances during the calibration interval due to possible drift, environment, or other factors beyond our control.

ISO 9001:2008
TRACEABLE CALIBRATION CERTIFICATE
Certificate # :110512TL114729

STANDARDS USED IN CALIBRATION

Asset	Cal Due Date	Make/Model Description
002012	2011-08-18	Guildline - 1682 - Resistance Standard, 0.1 Ohm
013001	2012-01-10	Fluke - 5700A - Meter Calibrator
013136	2011-06-10	Agilent / Hewlett Packard - 34401A - Digital Multimeter, 6 1/2 Digit (1200000 count).
013169	2011-06-16	Hewlett Packard - 3325A - Function Generator, 60 MHz
013157	2011-09-20	Fluke - 5220A - Transconductance Amplifier, 20A, ac/dc
013188	2011-08-16	Agilent / Hewlett Packard - 34401A - Digital Multimeter, 6 1/2 Digit (1200000 count).
013199	2012-03-11	Hewlett Packard - 3325B - Function Generator, 60 MHz

AS RECEIVED TEST DATA REPORT

Certificate # :	110512TL114729	Cal. Date :	2011-05-12	(yyyy-mm-dd)	Form # :	M03722A
Desc. :	Data Logger/Recorder, Voltage, Current, Phase, 36 Channel					
Man. :	ERLPhase Power Technologies Ltd					
Model # :	Tesla 4000					
Serial # :	TESLA 4000-110126-03					
I.D.# :	N/A					

AC VOLTAGE MEASUREMENT CALIBRATION AT 60 Hz:

TESLA Recorder testing In the non Phasor Measurement Unit (PMU) Mode

Module model number	Nominal Voltage rating	Frequency (Hz)	Actual Applied (Units)	Test Result (UUT Reading)	Units	Test Result (UUT Error)
401006	69	60	14.0000	13.988	V rms	-0.012
401006	69	60	69.0000	69.000	V rms	0.000
401006	69	60	84.0000	84.004	V rms	0.004

AC CURRENT MEASUREMENT CALIBRATION AT 60 Hz:

TESLA Recorder testing In the non Phasor Measurement Unit (PMU) Mode

Module model number	Nominal Current rating	Frequency (Hz)	Actual Applied (Units)	Test Result (UUT Reading)	Units	Test Result (UUT Error)
401014	5	60	1.0005	1.005	A rms	0.004
401014	5	60	5.0045	5.005	A rms	0.000
401014	5	60	6.0017	6.004	A rms	0.002
401013	5	60	1.0004	1.000	A rms	0.000
401013	5	60	5.0046	5.005	A rms	0.000
401013	5	60	6.0018	6.004	A rms	0.002
401020	1	60	0.2000	0.199	A rms	-0.001
401020	1	60	1.0005	1.000	A rms	0.000
401020	1	60	1.1999	1.199	A rms	-0.001
401020	1	60	3.0019	3.004	A rms	0.002
401017	1	60	0.2000	0.200	A rms	0.000
401017	1	60	1.0005	0.999	A rms	-0.001
401017	1	60	1.1999	1.197	A rms	-0.003
401017	1	60	3.0019	2.999	A rms	-0.003

AS RECEIVED TEST DATA REPORT

Certificate # :	110512TL114729	Cal. Date :	2011-05-12	(yyyy-mm-dd)	Form # :	M03722A
Desc. :	Data Logger/Recorder, Voltage, Current, Phase, 36 Channel					
Man. :	ERLPhase Power Technologies Ltd					
Model # :	Tesla 4000					
Serial # :	TESLA 4000-110126-03					
I.D.# :	N/A					

AC VOLTAGE MEASUREMENT CALIBRATION AT 50 Hz:

TESLA Recorder testing in the non Phasor Measurement Unit (PMU) Mode

Module model number	Nominal Voltage rating	Frequency (Hz)	Actual Applied (Units)	Test Result (UUT Reading)	Units	Test Result (UUT Error)
401006	69	50	14.0000	13.987	V ac	-0.013
401006	69	50	69.0000	69.000	V ac	0.000
401006	69	50	84.0000	84.005	V ac	0.005

AC CURRENT MEASUREMENT CALIBRATION AT 50 Hz:

TESLA Recorder testing in the non Phasor Measurement Unit (PMU) Mode

Module model number	Nominal Current rating	Frequency (Hz)	Actual Applied (Units)	Test Result (UUT Reading)	Units	Test Result (UUT Error)
401014	5	50	1.0000	1.003	A rms	0.003
401014	5	50	5.0045	5.000	A rms	-0.005
401014	5	50	6.0027	5.998	A rms	-0.005
401013	5	50	1.0000	0.999	A rms	-0.001
401013	5	50	5.0045	5.000	A rms	-0.005
401013	5	50	6.0027	5.997	A rms	-0.006
401020	1	50	0.2000	0.199	A rms	-0.001
401020	1	50	1.0004	1.000	A rms	0.000
401020	1	50	1.1997	1.198	A rms	-0.002
401020	1	50	3.0003	3.002	A rms	0.002
401017	1	50	0.2000	0.200	A rms	0.000
401017	1	50	1.0004	1.000	A rms	0.000
401017	1	50	1.1997	1.199	A rms	-0.001
401017	1	50	3.0003	3.001	A rms	0.001

Notes:

Phase angle measurement error: typically ± 0.1 degrees.

UUT Error = (UUT Reading - Actual Applied).

UUT was tested as per Customer's specifications.

UUT = Unit Under Test.

Serial Numbers of modules used:

1A AC Current Module, model 401020

TMC110203-056

5A AC Current Module, model 401014

TMC110223-247

69V AC Voltage Module, model 401006

TMP110316-047

1 amp split core transformer, model 401017

Undefined

5 amp split core transformer model 401013

Undefined

This is the end of the report.