



YOKOGAWA

European Standards Laboratory
Yokogawa Europe B.V.
Amersfoort, The Netherlands



CALIBRATION-CERTIFICATE

Certificate number 57269P10185
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Applicant	Yokogawa Europe Euroweg 2 3825 HD Amersfoort Select Country	
Instrument	Power Meter WT3000	
	Manufacturer	Yokogawa
	Type	760304-04-MV-F/G6/B5/DT/FQ/DA/V1/C7/E0/C5
	Serial number	27E116813
	Inventory number	DEMO_1_23
	ID numbers used standards	CSE820 CSE976 CSE981 CSE965
	Procedure	CALWT3000_30A Version: 1 of 16-05-2014
Calibration method	The Powermeter was compared to the Yokogawa Power Calibration System via a phantom technique. During the calibration the distortion of the applied voltage and current were below 0.1 %. Before calibration the device was powered on for at least 12 hours.	
Environmental conditions	Temperature	(23.3 ± 1) °C
	Relative Humidity	(45 ± 4) %rh
Date of Calibration	03-sep-15	
Result	The results of the calibration are shown on the next pages. The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k such that the coverage probability corresponds to approximately 95%. The standard uncertainty of measurement has been determined in accordance with the EA4/02. The long term stability of the calibrated object is not included in the reported expanded uncertainty measurement.	
Traceability	The measurements have been executed using standards for which the traceability to (inter)national standards has been demonstrated towards the RvA.	
Date	03-sep-15	
Name	N. el Morabit	
Function	Calibration Engineer	

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E L E M E N T 1

Voltage Calibration DC

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
15V	15.0000	15.0040	0.0005	V DC	0.026
15V	-15.0000	-14.9952	0.0007	V DC	-0.032
100V	100.0000	100.0261	0.0015	V DC	0.026
100V	-100.0000	-99.9683	0.0025	V DC	-0.032
150V	150.0000	150.023	0.003	V DC	0.016
150V	-150.0000	-149.9382	0.0021	V DC	-0.041
1000V	1.000000	1.000194	0.000014	kV DC	0.019
1000V	-1.000000	-0.99961	0.00003	kV DC	-0.039

Voltage Calibration AC at 10 Hz

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
100V	100.000	99.999	0.010	V AC	-0.001

Voltage Calibration RMS at 60 Hz

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
15V	15.0000	15.0001	0.0006	V AC	0.001
30V	30.0000	29.9987	0.0006	V AC	-0.004
60V	60.0000	60.0036	0.0011	V AC	0.006
100V	100.000	99.999	0.004	V AC	-0.001
150V	150.000	149.983	0.003	V AC	-0.011
300V	300.000	299.961	0.015	V AC	-0.013
600V	600.000	599.976	0.017	V AC	-0.004
1000V	1.00000	0.99992	0.00009	kV AC	-0.008

Voltage Calibration RMS at 1 kHz

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
15V	15.0000	15.0003	0.0010	V AC	0.002
30V	30.0000	30.0000	0.0025	V AC	0.000
60V	60.000	60.005	0.005	V AC	0.009
100V	100.000	100.004	0.008	V AC	0.004
150V	150.000	149.983	0.012	V AC	-0.011
300V	300.00	299.96	0.03	V AC	-0.015
600V	600.00	599.98	0.06	V AC	-0.004
1000V	1.00000	0.99992	0.00010	kV AC	-0.008

Voltage Calibration RMS at 10 kHz

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
100V	100.000	100.032	0.023	V AC	0.032
150V	150.00	150.25	0.04	V AC	0.168

Voltage Calibration RMS at 50 kHz

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
100V	100.00	100.19	0.07	V AC	0.191
150V	100.00	100.57	0.07	V AC	0.569

Voltage Calibration RMS at 100 kHz

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
15V	15.000	15.044	0.014	V AC	0.295
150V	100	108	12	V AC	8.004

Voltage Calibration Linearity at 60 Hz

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
100V	1.0000	0.9769	0.0014	V AC	-2.306
100V	10.0000	9.9801	0.0012	V AC	-0.199
100V	50.0000	49.9888	0.0017	V AC	-0.022
100V	110.0000	110.0013	0.0027	V AC	0.001

Current Calibration DC

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
5A	5.0000	5.0000	0.0009	A DC	0.000
5A	-5.0000	-4.9997	0.0012	A DC	-0.006
20A	20.000	20.002	0.008	A DC	0.012
20A	-20.000	-20.003	0.010	A DC	0.017

Current Calibration AC at 10 Hz

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
5A	5.0000	4.9989	0.0021	A AC	-0.022

Current Calibration AC at 60 Hz

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
500mA	500.000	499.972	0.012	mA AC	-0.006
1A	1.000000	0.999989	0.000030	A AC	-0.001
2A	2.00000	1.99989	0.00009	A AC	-0.006
5A	5.00000	4.99940	0.00023	A AC	-0.012
10A	10.0000	9.9992	0.0005	A AC	-0.008
20A	20.000	20.002	0.004	A AC	0.008
30A	20.000	20.001	0.004	A AC	0.005

Current Calibration AC at 1 kHz

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
500mA	500.00	499.96	0.19	mA AC	-0.007
1A	1.0000	1.0000	0.0004	A AC	0.001
5A	5.0000	4.9989	0.0021	A AC	-0.022
10A	10.000	9.998	0.009	A AC	-0.019
20A	18.00	18.04	0.07	A AC	0.239
30A	18.00	18.04	0.07	A AC	0.239

Current Calibration AC at 10 kHz

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
500mA	0.5000	0.5007	0.0018	A AC	0.138
1A	1.0000	0.9999	0.0009	A AC	-0.007

Current Calibration AC at 50 kHz

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
500mA	0.5000	0.5000	0.0011	A AC	-0.008
1A	1.000	1.000	0.003	A AC	-0.040

Current Calibration AC at 100 kHz

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
500mA	0.5000	0.4993	0.0004	A AC	-0.135
1A	1.0000	0.9989	0.0007	A AC	-0.107

Current Calibration Linearity AC at 60 Hz

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
5A	0.050000	0.049893	0.000015	A AC	-0.215
5A	0.500000	0.499892	0.000018	A AC	-0.022
5A	2.500000	2.49973	0.00009	A AC	-0.011
5A	5.500000	5.49930	0.00025	A AC	-0.013

External Current Calibration DC. For current 1V/A is used.

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
50mV	50.00	49.93	0.15	mA DC	-0.143
200mV	200.00	200.00	0.03	mA DC	0.002
1V	1.000000	0.999898	0.000023	A DC	-0.010
2V	2.000000	1.999937	0.000019	A DC	-0.003
5V	5.000000	4.99973	0.00009	A DC	-0.005

External Current Calibration 10 Hz. For current 1V/A is used.

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
50mV	50.00	50.00	0.03	mA AC	-0.004
200mV	200.00	200.00	0.05	mA AC	0.001
1V	1.000000	0.99994	0.000023	A AC	-0.006
2V	2.000000	1.99999	0.00003	A AC	-0.003
5V	5.000000	4.9998	0.00007	A AC	-0.004

External Current Calibration 60 Hz. For current 1V/A is used.

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
50mV	50.000	49.997	0.017	mA AC	-0.007
100mV	100.000	99.997	0.027	mA AC	-0.003
200mV	200.00	200.00	0.12	mA AC	0.000
1V	1.000000	0.99993	0.00008	A AC	-0.007
10V	10.00000	9.9997	0.0007	A AC	-0.003

External Current Calibration 1 kHz. For current 1V/A is used.

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
50mV	50.000	49.998	0.007	mA AC	-0.003
100mV	100.00	100.00	0.03	mA AC	-0.003
200mV	200.00	200.01	0.07	mA AC	0.005
1V	1.000000	1.00001	0.00011	A AC	0.001
10V	10.00000	10.0003	0.0007	A AC	0.003

External Current Calibration 10 kHz. For current 1V/A is used.

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
1V	1.00000	1.00046	0.00008	A AC	0.046

External Current Calibration 50 kHz. For current 1V/A is used.

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
1V	1.00000	1.00113	0.00025	A AC	0.113

External Current Calibration 100 kHz. For current 1V/A is used.

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
1V	1.0000	1.0012	0.0012	A AC	0.123

Power Calibration DC

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
15V 5A	75.000	75.019	0.009	W	0.025
15V 5A	-75.000	-74.982	0.013	W	-0.024
100V 5A	500.00	500.14	0.14	W	0.027
100V 5A	-500.00	-499.83	0.10	W	-0.034
150V 5A	750.00	750.12	0.16	W	0.016
150V 5A	-750.00	-749.73	0.11	W	-0.036
1000V 5A	5.0000	5.0011	0.0011	kW	0.022
1000V 5A	-5.0000	-4.9980	0.0012	kW	-0.041

Power Calibration 60Hz PF=1

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
100V 500mA	50.0000	49.9976	0.0028	W	-0.005
100V 1A	100.000	99.996	0.008	W	-0.004
100V 2A	200.000	199.989	0.011	W	-0.006
100V 10A	1000.00	999.91	0.05	W	-0.009
100V 20A	2.00000	1.99997	0.00009	kW	-0.002
100V 30A	2.00000	1.99997	0.00009	kW	-0.001
15V 5A	75.000	74.993	0.015	W	-0.009
30V 5A	150.000	149.975	0.009	W	-0.016
60V 5A	300.000	299.977	0.020	W	-0.008
100V 5A	500.00	499.93	0.05	W	-0.014
150V 5A	0.75000	0.74981	0.00006	kW	-0.025
300V 5A	1.5000	1.4996	0.0003	kW	-0.026
600V 5A	3.0000	2.9995	0.0003	kW	-0.015
1000V 5A	5.0000	4.9990	0.0004	kW	-0.021

Power Calibration 1 kHz PF=1

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
100V 500mA	50.000	50.002	0.021	W	0.004
100V 1A	100.00	100.01	0.04	W	0.008
100V 2A	200.00	200.02	0.13	W	0.008
100V 10A	1000.0	999.9	0.7	W	-0.007
100V 20A	1800.0	1800.3	2.5	W	0.016
100V 30A	1800.0	1800.3	2.5	W	0.017
15V 5A	75.00	74.99	0.03	W	-0.009
30V 5A	150.00	149.99	0.07	W	-0.008
60V 5A	300.00	300.00	0.13	W	-0.001
100V 5A	500.00	499.95	0.20	W	-0.010
150V 5A	0.7500	0.7499	0.0004	kW	-0.012
300V 5A	1.5000	1.4997	0.0008	kW	-0.019
600V 5A	3.0000	2.9987	0.0019	kW	-0.042
1000V 5A	5.000	4.999	0.004	kW	-0.019

Power Calibration 10 kHz PF=1

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
100V 500mA	50.00	50.02	0.04	W	0.039
100V 1A	100.00	100.04	0.06	W	0.043
100V 2A	200.0	200.1	0.8	W	0.043

Power Calibration 50 kHz PF=1

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
100V 500mA	50.00	50.11	0.10	W	0.224
100V 1A	100.00	100.18	0.12	W	0.183
100V 2A	200.00	200.33	0.24	W	0.164

Power Calibration 100 kHz PF=1

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
100V 500mA	50.00	50.15	0.08	W	0.291
100V 1A	100.0	100.3	0.3	W	0.285
100V 2A	200.0	200.5	0.6	W	0.254

Power Calibration Linearity 60 Hz PF=1 at constant 5 A

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
100V 5A	5.000	4.988	0.008	W	-0.232
100V 5A	50.000	49.892	0.005	W	-0.217
100V 5A	250.000	249.908	0.010	W	-0.037
100V 5A	550.00	549.94	0.05	W	-0.011

Power Calibration Linearity 60 Hz PF=1 at constant 100 V

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
100V 5A	5.0000	4.9897	0.0022	W	-0.205
100V 5A	50.0000	49.9902	0.0027	W	-0.020
100V 5A	250.000	249.963	0.010	W	-0.015
100V 5A	550.00	549.93	0.05	W	-0.013

External Current Power Calibration DC. For current 1V/A is used.

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
100V 50mV	5.000	4.995	0.008	W	-0.100
100V 200mV	20.000	20.006	0.015	W	0.030
100V 1V	100.000	100.014	0.008	W	0.014
100V 2V	200.000	200.052	0.016	W	0.026
100V 5V	500.00	500.11	0.04	W	0.021

External Current Power Calibration 60 Hz. PF=1. For current 1V/A is used.

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
100V 50mV	5.000	5.000	0.006	W	-0.001
100V 200mV	20.000	20.000	0.011	W	0.001
100V 1V	100.000	99.998	0.021	W	-0.002
100V 2V	200.00	199.99	0.10	W	-0.006
100V 5V	500.00	500.00	0.12	W	0.000

External Current Power Calibration 1 kHz. PF=1. For current 1V/A is used.

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
100V 50mV	5.000	5.000	0.010	W	0.001
100V 200mV	20.000	20.001	0.012	W	0.007
100V 1V	100.000	99.996	0.016	W	-0.004
100V 2V	200.00	200.01	0.11	W	0.005
100V 5V	500.00	499.99	0.10	W	-0.002

Power Calibration 60Hz PF=0 lag

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
15V 1A	0.0000	-0.0002	0.0008	W	-
100V 1A	0.000	-0.003	0.006	W	-
150V 1A	0.000	-0.004	0.008	W	-

Power Calibration 60Hz PF=0 Lead

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
15V 1A	0.000	0.000	0.006	W	-
100V 1A	0.000	-0.001	0.009	W	-
150V 1A	0.000	0.001	0.007	W	-

Frequency Calibration

Range	Applied	Measured	±Uncertainty	Unit	Deviation %
15V	60.000	60.000	0.007	Hz	0.000
15V	1.000000	1.000000	0.000007	kHz	0.000
15V	10.000000	10.000000	0.000007	kHz	0.000
15V	50.000000	50.000000	0.000007	kHz	0.000

Comments :