



## CERTIFICATE OF CALIBRATION

<b>CERTIFICATE NUMBER:</b>	10023	<b>DATE OF ISSUE:</b>	16 February 2021	<b>6772</b>
<b>CUSTOMER</b>	Torquemeters Ltd	<b>SIGNAL PROCESSOR MODEL</b>	813	
<b>CUSTOMER ADDRESS</b>	Ravensthorpe, Northampton	<b>SERIAL No.</b>	40373	
<b>SALES ORDER No.</b>	46014	<b>SUPPLY VOLTS</b>	24.0 V dc	
<b>CUSTOMER ORDER No.</b>	45/23896	<b>AMBIENT TEMPERATURE</b>	21.1 °C	
<b>PREVIOUS SALES ORDER No.</b>	43892	<b>TorqTo SOFTWARE VERSION</b>	1.2.20.1112	
		<b>ROM Master</b>	54.08	
		<b>ROM Slave</b>	44.22	

Traceability to National Standards through:  
 Waveform Generator RIGOL TQ300  
 Thermometer TQ271

Phase measurements are taken in either angle (0-360) or % (0-100) where 100% Phase = 360 degrees.

### TEST RESULTS

Injection of signal from waveform generator.

Signal Amplitude 141mV pk-pk (50mV rms)										
APPLIED PHASE	FREQUENCY (Hz)					DEVIATIONS				
Phase %	55	1000	10000	50000	100000	55	1000	10000	50000	100000
8.333	8.348	8.349	8.350	8.344	8.328	0.015 P	0.016 P	0.017 P	0.011 P	-0.005 P
25.000	25.020	25.023	25.023	25.016	25.005	0.020 P	0.023 P	0.023 P	0.016 P	0.005 P
50.000	50.013	50.012	50.015	50.017	50.017	0.013 P	0.012 P	0.015 P	0.017 P	0.017 P
75.000	75.002	75.001	75.007	75.019	75.022	0.002 P	0.001 P	0.007 P	0.019 P	0.022 P
83.333	83.334	83.334	83.341	83.351	83.353	0.001 P	0.001 P	0.008 P	0.018 P	0.020 P

P/F indicates PASS/FAIL

Expanded Uncertainty (k=2)	0.013	0.013	0.011	0.008	0.009
Tolerance +/-	0.05	0.05	0.05	0.05	0.05

# SPECIMEN

Injection of signal from waveform generator

Signal Amplitude 1414mV pk-pk (500mVrms)										
APPLIED PHASE	FREQUENCY (Hz)					DEVIATIONS				
Phase %	55	1000	10000	50000	100000	55	1000	10000	50000	100000
8.333	8.341	8.340	8.342	8.334	8.326	0.008 P	0.007 P	0.009 P	0.001 P	-0.007 P
25.000	25.014	25.014	25.016	25.007	24.994	0.014 P	0.014 P	0.016 P	0.007 P	-0.006 P
50.000	50.004	50.002	50.006	50.007	50.006	0.004 P	0.002 P	0.006 P	0.007 P	0.006 P
75.000	74.992	74.990	74.995	75.007	75.011	-0.008 P	-0.010 P	-0.005 P	0.007 P	0.011 P
83.333	83.326	83.326	83.329	83.339	83.341	-0.007 P	-0.007 P	-0.004 P	0.006 P	0.008 P

P/F indicates PASS/FAIL

Expanded Uncertainty (k=2)	0.013	0.014	0.012	0.013	0.012
Tolerance +/-	0.05	0.05	0.05	0.05	0.05

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Signal injected from two coils and then switched

	Signal Amplitude 300mV pk-pk				
	Frequency Hz				
Phase %	100	1000	10000	50000	100000
Reading	50.055	50.259	49.781	49.978	49.965
Crossed	49.972	49.763	50.229	50.042	50.084
Reading+Crossed	100.027	100.022	100.010	100.020	100.049
Deviation	0.027	0.022	0.010	0.020	0.049

Notes

**Method of calibration**

2 sine wave signals are injected from a waveform generator into the inputs A and B of the signal processor, across 5 different phases, 5 frequencies and at two different amplitudes. A direct comparison is made between the waveform generator setting and the measured phase.

Phase is measured either in degrees or as % phase, where 360 degrees= 100% phase

Signals are also provided through two coils representative of Torquetronic transducers, inductively linked to a single output of the waveform generator. They provide two inputs to the signal processor, approximately at 50% Phase (180 degrees). The coils can be crossed over and the sum of the two readings compared to 100% Phase (360 Degrees)

Following Torquemeters Ltd 4133 5

The results show an indication of the device performance at the date of calibration only and apply only to the device being calibrated.

Uncertainty

The reported uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by a coverage factor k=2, corresponding to a coverage probability of approximately 95%

Acceptance is indicated by P or F for PASS/FAIL and is determined where the conformance probability of the deviation lying within the tolerance bands, and using the stated uncertainties is greater than 95%

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End of Certificate

Remarks:

Date of calibration	15-Feb-21	Date Issued	16 February 2021
Tested by	M.Bryan	Approved Signatory	B A vM
Signature		Signature	

Torquemeters' Reference: 40373\_PHAS\_D15M2Y2021\_H13M10

Program: 14-04-38

Rev: 5

Tested at Torquemeters Ltd., Ravensthorpe, Northampton, NN6 8ET, ENGLAND