Calibration Chart

Brüel & Kjær Type 4231 Serial No. 3004068

Sound Pressure Level: 94.00 or 114.00 dB ±0.20 dB
(re 20 µPa at reference conditions)

Frequency: 1000 Hz ±0.1%

Distortion: < 1%

Reference Conditions:

Temperature:	23°C
Pressure:	101.325 kPa
Humidity:	50% RH
Load:	0.25 cm^3 (½" Brüel & Kjær Mic.)

Date: 16/07/12 Signed: [signature]

Sound Calibrator Type 4231

Brüel & Kjær

Levels for Brüel & Kjær ½" Microphones:

Equivalent Free Field:	93.85 dB or 113.85 dB
Equivalent Diffuse Field:	94.00 dB or 114.00 dB
Pressure Field:	94.00 dB or 114.00 dB

Frequency: 1000 Hz

Conforms to:
ANSI S1.40–1984 and IEC 60942 (2003) Class 1 & LS

Ambient Conditions:

Temperature:	−10° to 50°C, Class LS +16° to 30°C
Pressure:	65 kPa to 108 kPa
Humidity:	25% to 90% RH

For further information refer to the User Manual

BC0210–12

MANUFACTURER'S CERTIFICATE OF CONFORMANCE

We certify that Brüel & Kjær **-2238--001-** Serial No. **2800932** has been tested and passed all production tests, confirming compliance with the manufacturer's published specification at the date of the test.

The final test has been performed using calibrated equipment, traceable to National or International Standards or by ratio measurements.

Brüel & Kjær is certified under ISO 9001:2008 assuring that all test data is retained on file and is available for inspection upon request.

Nærum 23-aug-2012

Torben Bjørn
Vice President, Operations

Please note that this document is not a calibration certificate.
For information on our calibration services please contact your nearest Brüel & Kjær office.

BA 0238 - 18

HEADQUARTERS: Brüel & Kjær Sound & Vibration Measurement A/S · DK-2850 Nærum · Denmark
Telephone: +45 7741 2000 · Fax: +45 4580 1405 · www.bksv.com · info@bksv.com
Local representatives and service organisations worldwide

Brüel & Kjær

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We certify that Brüel & Kjær **-2238--001-** Serial No. **2808432** has been tested and passed all production tests, confirming compliance with the manufacturer's published specification at the date of the test.

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Brüel & Kjær

ENVIROTECH SERVICES CO.

High-Volume TSP Sampler
5-Point Calibration Record

Location : AMS5(Ma Wan Chung Village)
Calibrated by : K.F.Ho
Date : 15/10/2012

Sampler
Model : TE-5170
Serial Number : S/N3640

Calibration Orfice and Standard Calibration Relationship
Serial Number : 1378
Service Date : 22 Feb 2012
Slope (m) : 1.99405
Intercept (b) : -0.00397
Correlation Coefficient(r) : 0.99984

Standard Condition
Pstd (hpa) : 1013
Tstd (K) : 298.18

Calibration Condition
Pa (hpa) : 1015
Ta(K) : 299

Resistance Plate		dH [green liquid] (inch water)	Z	X=Qstd (cubic meter/min)	IC	Y
1	18 holes	10.4	3.223	1.618	55	54.9
2	13 holes	8.3	2.879	1.446	50	49.9
3	10 holes	6.5	2.548	1.280	45	44.9
4	7 holes	4.1	2.023	1.017	37	36.9
5	5 holes	2.5	1.580	0.794	29	28.9

Sampler Calibration Relationship

Slope(m):31.351 Intercept(b): 4.579 Correlation Coefficient(r): 0.9992

Checked by: Magnum Fan Date: 16/10/2012

EQUIPMENT CALIBRATION RECORD

Type :	Laser Dust Monitor
Manufacturer / Brand :	SIBATA
Model No.:	LD-3B
Equipment No.:	LD-3B-002
Sensitivity Adjustment Scale Setting :	622 CPM

Operator:

Standard Equipment

Equipment :	MFC High Volume Air Sampler
Venue :	Wah Ming House, Wah Fu Estate
Model No.:	TE-5170 Total Suspended Particulated
Serial No.:	2100

Last Calibration Date 21/10/2011

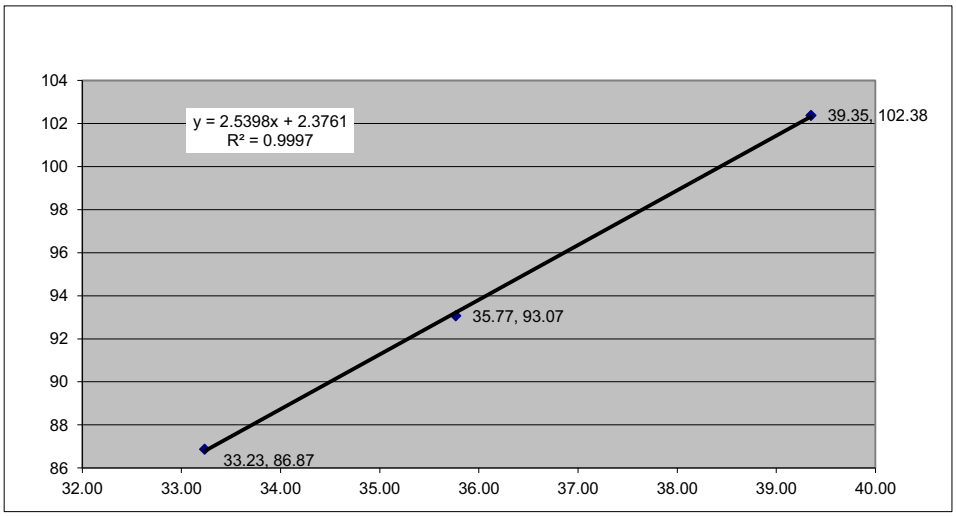
Calibration Result

Sensitivity Adjustment Scale Setting (Before Calibration) :	622 CPM
Sensitivity Adjustment Scale Setting (After Calibration) :	622 CPM

Hour	Date (dd-mmm-yy)	Time		Ambient Condition		Concentration (obtained by High Volume Sampler) (ug/m3) Y-axis	Total Count for 60mins (obtained by Laser Dust Monitor)	Count per Minute X-axis
				Temp (C)	R.H. (%)			
1	15-Oct-12	13:12	14:12	26.3	74%	86.87	1994	33.23
2	15-Oct-12	14:16	15:16	26.3	74%	93.07	2146	35.77
3	15-Oct-12	15:33	16:33	26.3	74%	102.38	2361	39.35

Be Linear Regression of Y or X
Slope (K-factor): 2.5398
Correlation coefficient : 0.9997

Remark:



Recorded by: Ruby Law Signature: Date: 21/10/2012

Checked by: Keith Chau Signature: Date: 21/10/2012

FT Laboratories Ltd.

Management System Document Control Cover Sheet

Document Name	Ref. No.	Revision No.
Performance Check of Sonde	**CHM158**	**0**

	Prepared By	Reviewed By	Approved By
Name	Fragrance Ho	Rowena R. De Jesus	W.C. Yue
Position	Senior Chemist	Senior Chemist	Director & General Manager
Signature			
Date	24/10/12	24/10/2012	24/10/2012

For Comment		For Use	

Issued To	
Name: Fragrance Ho	Signature:
Position: Sr. Chemist.	Date: 24 Oct. 2012

Please return a photocopy of signed cover sheet to QSE Dept. as evidence of receipt.

Document Control Stamp (Valid only if in red)

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REVISION STATUS

Revision No.	Effective Date	Description / Summary of Revision
0	**10 Oct 2012**	**Initial issue**

Contents

1. Introduction

1.1 This procedure is based on instrument manual, BS1427:1993 and APHA, Standard Methods for the Examination of Water & Wastewater, 19th edition

1.2 The environmental condition during the performance check should be under temperature 20 ± 5°C and humidity 45 - 80%.

2. Performance Check Interval

2.1 Parameters include temperature, pH, conductivity, turbidity and dissolved oxygen should all be checked every 3 months.

3. Temperature Check

3.1 Equipment

3.1.1 Reference thermometer, traceable to national standard

3.1.2 Liquid bath

3.1.3 Timer

3.2 Procedures

3.2.1 Prepare a liquid (distilled water) bath and equilibrium the temperature to 10, 20 and 30°C.

3.2.2 Set up the instrument to parallel with reference thermometer.

3.2.3 Compare and record the temperature with reference thermometer for the temperature 10, 20 and 30°C and the record sheet.

3.2.4 The temperature deviation should be within ± 0.15°C

4. pH Value Check

4.1 Reagent

4.1.1 Primary pH buffer solution and commercial buffer solution, traceable to national standard

4.2 Procedures

4.2.1 Use a certain amount of pH 7 buffer standard in a clean, dry or pre-rinsed calibration cup, carefully immerse the probe end of the sonde into the solution.

4.2.2 Allow at least 1 minute for temperature equilibration before proceeding.

4.2.3 From the Calibration Menu, select **ISE1 pH** to access the pH calibration choices

and then press **3-3-Point**. Press **Enter** and input the value of the buffer at the prompt.

4.2.4 After entering the correct pH value of the buffer, press **Enter** and the current values of all enabled sensors will appear on the screen and change with time as they stabilize in the solution.

4.2.5 Observe the readings under pH and when they show no significant change for approximately 30 seconds, press **Enter**. The display will indicate that the calibration is accepted.

4.2.6 Use a certain amount of an additional pH buffer standard into a clean, dry or pre-rinsed calibration cup, carefully immerse the probe end of the sonde into the solution.

4.2.7 Allow at least 1 minute for temperature equilibration before proceeding.

4.2.8 Press **Enter** and input the correct value of the second buffer for the calibration temperature at the prompt.

4.2.9 Press **Enter** and the current values of all enabled sensors will appear on the screen and will change with time as they stabilize in the solution.

4.2.10 Observe the readings under pH and when they show no significant change for approximately 30 seconds, press **Enter**.

4.2.11 Use a certain amount of a third pH buffer standard into a clean, dry or pre-rinsed calibration cup, carefully immerse the probe end of the sonde into the solution.

4.2.12 Allow at least 1 minute for temperature equilibration before proceeding.

4.2.13 Press **Enter** and input the correct value of the third buffer for the calibration temperature at the prompt.

4.2.14 Observe the readings under pH and when they show no significant change for approximately 30 seconds, press **Enter**.

4.2.15 After the third calibration point is complete, press **Enter** again, as instructed on the screen, to return to the Calibrate Menu.

4.2.16 Rinse the sonde in water and dry.

(Noted: the mV of the 1st pH buffer calibration should be within ± 30mV; and the mV between 2 buffer calibration should be within 168-180mV.)

4.2.17 Immerse a verified pH buffer solution to cross check the calibration curve. Record on the record sheet.

4.2.18 pH value difference should be within ± 0.10 pH-unit.

5. Conductivity Check

5.1 Reagent

5.1.1 Primary chemical – potassium chloride, 58.67ms/cm at 25°C, traceable to national standard

5.1.2 Primary chemical - potassium chloride, 0.20mol/L (24.80ms/cm at 25°C) should be used for performance check, traceable to national standard

5.2 Procedures

5.2.1 Place a certain amount of 58.67mS/cm conductivity standard solution into a clean, dry or pre-rinsed calibration cup.

5.2.2 Before proceeding, ensure that the sensor is as dry as possible. Ideally, rinse the conductivity sensor with a small amount of standard that can be discarded. Be certain that to avoid cross-contamination of standard solutions with other solutions. Make certain that there are no salt deposits around the oxygen and pH/ORP probes, particularly if you are employing standards of low conductivity.

5.2.3 Carefully immerse the probe end of the sonde into the solution.

5.2.4 Gently rotate and/or move the sonde up and down to remove any bubbles from the conductivity cell.

5.2.5 The probe must be completely immersed past its vent hole and insure that the vent hole is covered by solution.

5.2.6 Allow at least one minute for temperature equilibration before proceeding.

5.2.7 From the Calibrate Menu, select **Conductivity** to access the Conductivity calibration procedure and then **1-SpCond** to access the specific conductance calibration procedure.

5.2.8 Enter the calibration value of the standard used (mS/cm at 25°C) and press **Enter**.

5.2.9 The current values of all enabled sensors will appear on the screen and will change with time as they stabilize.

5.2.10 Observe the readings under Specific Conductance or Conductivity and when they show no significant change for approximately 30 seconds, press **Enter**. The screen will indicate that the calibration has been accepted and prompt you to press **Enter** again to return the Calibrate Menu.

5.2.11 Rinse the sonde with distilled water and dry the sonde.

5.2.12 Immerse a standard conductivity solution (24.80 ms/cm at 25°C) for counter check. Record on the record sheet.

5.2.13 The conductivity difference should be within ± 0.5% of reading + 0.001 ms/cm.

6. Turbidity Check

6.1 Reagents

6.1.1 Turbidity standard solution with 0, 10 and 126 NTU.

6.2 Procedures

6.2.1 Before proceeding with the calibration of the sonde has been cleaned and is free of debris. Solid particles from this source, particularly those carried over from past deployments, will contaminate the standards during calibration protocol and cause either calibration errors and/or inaccurate field data.

6.2.2 One standard must be 0 NTU and this standard must be calibrated first.

6.2.3 To begin the calibration, place the correct amount of 0 NTU standard (distilled water) into calibration cup provided with the sonde.

6.2.4 Immerse the sonde into water. Input the value 0 NTU at the prompt, and press **Enter**.

6.2.5 The screen will display real-time readings that will allow you to determine when the readings have stabilized.

6.2.6 Activate the wiper 1-2 times by pressing **3-Clean Optics** as shown on the screen, to remove any bubbles.

6.2.7 After stabilization is complete, press **Enter** to "confirm" the first calibration and then, as instructed, press **Enter** to continue.

6.2.8 Dry the sonde carefully and then place the sonde in the second turbidity standard 10 NTU using the same container as for the 0 NTU standard.

6.2.9 Input the correct turbidity value in NTU, press **Enter**, and view the stabilization of the values on the screen in real-time.

6.2.10 As above, activate the wiper with the **3-Clean Optics** key to remove bubbles.

6.2.11 After stabilization is complete, press **Enter** to "confirm" the second calibration and then, as instructed, press **Enter** to continue.

6.2.12 Dry the sonde carefully and then place the sonde in the third turbidity standard 126 NTU using the same container as for the 0 NTU standard.

6.2.13 Input the correct turbidity value in NTU, press **Enter**, and view the stabilization of the values on the screen in real-time.

6.2.14 As above, activate the wiper with the **3-Clean Optics** key to remove bubbles.

6.2.15 After the readings have stabilized, press **Enter** to confirm the calibration and then press **Enter** to return to the Calibration Menu.

6.2.16 Immerse the mid-point check of turbidity standard solution, 10.0NTU, then record

the reading on the record sheet.

6.2.17 The turbidity difference should be within ± 2% of reading or 0.3 NTU (whichever is greater).

7. Dissolved Oxygen Check

7.1 Preparation of water samples for Winkler Titration

7.1.1 Air-saturated distilled water

7.1.2 Half air-saturated distilled water

7.1.3 Zero-oxygen distilled water

7.2 Reagents for Winkler Titration

7.2.1 Manganous sulfate solution

7.2.2 Alkali-iodide-azide reagent

7.2.3 Concentrated sulphric acid

7.2.4 Diluted sulphuric acid, 6N

7.2.5 Starch solution

7.2.6 Standard potassium bi-iodate solution, approx. 0.0021M

7.2.7 Standard sodium thiosulfate solution, 0.025N

7.3 Titration Procedures

7.3.1 Place 300ml of distilled water (cl. 7.1) in the BOD bottle.

7.3.2 Add 1 ml $MnSO_4$ solution to the water sampler, and add 1 ml alkali-iodide-azide reagent thereafter.

7.3.3 Stopper carefully to exclude air bubbles. Rinse any overflow of alkali with running water and mix by inverting bottle a few minutes.

7.3.4 When the precipitate has settled sufficiently (to approximate half the bottle volume) by leaving a clear supernatant above the manganese hydroxide floc, add 2ml concentrated H_2SO_4

7.3.5 Restopper the bottle carefully. Rinse any overflow of acid with running water and mix the content by inverting several times until it is completely dissolved. If the precipitate does not dissolve completely, a little more acid should be added.

7.3.6 Measure 100ml of the solution with glass pipette and add it into 250ml Erlenmeyer flask.

7.3.7 Titrate with 0.025N $Na_2S_2O_3$ solution to a pale straw color. Add a few drops of the starch indicator and continue titration to blue color disappearance completely.

Ignore any reappearance of blue color. The titration should be carried out as quickly as possible. Otherwise the dissolved oxygen content may be changed.

7.3.8 Calculate the dissolved oxygen content by:

DO, mg/L

= [(vol. of std $Na_2S_2O_3$ used, ml) x (normality of $Na_2S_2O_3$, N) x 8 x 1000] / 100ml

7.4 Procedures

7.4.1 Place the sensor into a calibration cup containing about 1/8 inch of water which is vented by loosening the threads.

7.4.2 Wait approximately 10 minutes before proceeding to allow the temperature and oxygen pressure to equilibrate.

7.4.3 Select **ODOsat%** and then **1-Point** to access the DO calibration procedure.

7.4.4 Calibration of Optical dissolved oxygen sensor in the DO% procedure also results in calibration of the DO mg/L mode and vice versa.

7.4.5 Enter the current barometric pressure in **mm of Hg**. (Inches of Hg x 25.4 = mm Hg).

7.4.6 Press **Enter** and the current values of all enabled sensors will appear on the screen and change with time as they stabilize.

7.4.7 Observe the readings under **ODOsat%**. When they show no significant change for approximately 30 seconds, press **Enter**.

7.4.8 The screen will indicate that the calibration has been accepted and prompt you to press **Enter** again to return to the Calibrate Menu.

7.4.9 Rinse the sonde with distilled water and dry the sonde.

7.4.10 Immerse the DO sensor into the water sample (cl. 7.1) and record the reading on record sheet.

7.4.11 The dissolved oxygen deviation should be within ± 0.15 mg/L.

8. Data Recording

8.1 All analytical data should be recorded on the data sheet – H158/001.

9. Reporting Criteria

9.1 The temperature deviation should be within ± 0.15°C

9.2 pH value difference should be within ± 0.10 pH-unit.

9.3 The conductivity difference should be within ± 0.5% of reading + 0.001 ms/cm.

9.4 The turbidity difference should be within ± 2% of reading or 0.3 NTU (whichever is greater).

9.5 The dissolved oxygen deviation should be within ± 0.15 mg/L.

FT Laboratories Ltd
科達測檢試驗所有限公司

Perfomance Check of Sonde

Report No. : **CHM/190 & CHM/190-1-01**

Equipment Information

Name / Description	:	Display System	Sonde
Manufacturer	:	YSI	YSI
Equipment No.	:	CHM/190	CHM/190-1
Model No.	:	YSI 650MDS	YSI 6920V2
Serial No.	:	12J101862	12J102249

Reference standard solution	:	CRM KIO3, CRM Buffer
Major measurement equipment	:	Thermometer
Performance Method	:	Refer to BS1427:1993 and APHA, Standard Methods for the Examination of Water & Wastewater, 19th edition
Date of Performance	:	12-Oct-12 to 13-Oct-12
Date of Next Performance Check	:	12-Jan-13
Location of Performance Check	:	Chemical and Environmental Laboratory

Environmental Condition

Temperature	:	20 ± 5	°C
Relative Humidity	:	45 - 80	%

Test Results

1. Temperature Check

Temperature Set (°C)	Thermometer Corrected Reading (°C)	Sonde Reading (°C)	Deviation (°C)	Compliance (Pass / Fail)
10	10.34	10.37	0.03	Pass
20	20.69	20.71	0.02	Pass
30	30.03	30.03	0.00	Pass

Note: Temperature deviation : ± 0.15°C

2. pH Value Check

Verified pH Buffer	pH value at 20°C	Sonde Reading (pH-unit)	Difference (pH-unit)	Compliance (Pass / Fail)
6.00	5.98	5.99	0.01	Pass
9.00	9.01	9.01	0.00	Pass

Note: pH value difference : ± 0.10 pH-unit

Perfomance Check of Sonde

Report No. : **CHM/190 & CHM/190-1-01**

3. Conductivity Check

KCl (mol/L)	Standard Conductivity (mS/cm at 25°C)	Sonde Reading (mS/cm at 25°C)	Difference (%)	Compliance (Pass / Fail)
0.2000	24.80	24.84	0.16	Pass

Note:

1. Conductivity difference : ± 0.5% of reading + 0.001 mS/cm
2. According to YSI Incorporated Environmental Monitoring Systems Manual, page 5-2 & 2-76, salinity is determined automatically from the sonde conductivity and temperature readings according to algorithms found in Standard Methods for the Examination of Water and Wastewater.

4. Turbidity Check

Standard Turbidity (NTU)	Sonde Reading (NTU)	Difference (%)	Difference (NTU)	Compliance (Pass / Fail)
10.0	10.0	0.0	0.0	Pass

Note: Turbidity difference : ± 2% of reading or 0.3 NTU (whichever is greater)

5. Dissolved Oxygen (DO) Check

DO from Winkler Titration (mg/L)	Sonde Reading (mg/L)	Deviation (mg/L)	Compliance (Pass / Fail)
8.75	8.74	-0.01	Pass
4.49	4.57	0.08	Pass
0.00	0.00	0.00	Pass

Note: Dissolved oxygen deviation : ± 0.15 mg/L

< End of Report >

Checked By : Yandy Chau Date : 13/10/2012

Reviewed By : Fragrance Ho Date : 15/10/12

Certified By : W C Yue Date : 15/10/2012