

### **Certificate of Calibration - Wind Monitoring Station**

Description: Yau Lai Estate, Bik Lai House

Manufacturer: <u>Davis Instruments</u>

Model No.: <u>Davis7440</u>

Serial No.: MC01010A44

Equipment No.: <u>SA-03-04</u>

Date of Calibration <u>20-Aug-2021</u>

Next Due Date <u>20-Feb-2022</u>

#### 1. Performance check of Wind Speed

Wind Sp	peed, m/s	Difference D (m/s)
Wind Speed Reading (V1) Anemometer Value (V2)		D = V1 - V2
0.0	0.0	0.0
1.5	1.5	0.0
2.8	2.7	0.1
4.0	4.1	-0.1

#### 2. Performance check of Wind Direction

Wind Di	rection (°)	Difference D (°)
Wind Direction Reading (W1)	Marine Compass Value (W2)	D = W1 - W2
0	0	0.0
90	90	0.0
180	180	0.0
270	270	0.0

#### **Test Specification:**

- 1. Performance Wind Speed Test The wind meter was on-site calibrated against the anemometer
- 2. Performance Wind Direction Test The wind meter was on-site calibrated against the marine compass at four direction

Calibrated by: Approved by: Approved by: Henry Leung



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Wind Sp	peed, m/s	Difference D (m/s)		
Wind Speed Reading (V1) Anemometer Value (V2)		D = V1 - V2		
0.0 0.0		0.0		
1.5	1.6	-0.1		
2.5	2.5	0.0		
3.5	3.4	0.1		

#### 2. Performance check of Wind Direction

Wind Di	rection (°)	Difference D (°)
Wind Direction Reading (W1)	Marine Compass Value (W2)	D = W1 - W2
0	0	0.0
90	90	0.0
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270	270	0.0

#### **Test Specification:**

- 1. Performance Wind Speed Test The wind meter was on-site calibrated against the anemometer
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Calibrated by:	<u> </u>	Approved by:	-leng chang
	Wong Shing Kwai	_	Henry Leung



RECALIBRATION **DUE DATE:** 

January 11, 2022

**Calibration Certification Information** 

January 11, 2021 Cal. Date:

Rootsmeter S/N: 438320

°K

Operator: Jim Tisch Ta: 297 Pa: 750.1

mm Hg

Calibration Model #: TE-5025A

Calibrator S/N: 3864

Run	Vol. Init (m3)	Vol. Final (m3)	ΔVol. (m3)	ΔTime (min)	ΔP (mm Hg)	ΔH (in H2O)
1	1	2	1	1.4470	3.2	2.00
2	3	4	1	1.0210	6.4	4.00
3	5	6	1	0.9140	8.0	5.00
4	, 7	8	1	0.8670	8.8	5.50
5	9	10	1	0.7140	12.9	8.00

Data Tabulation							
Vstd	Qstd	$\sqrt{\Delta H \left(\frac{Pa}{Pstd}\right) \left(\frac{Tstd}{Ta}\right)}$		Qa	√∆H(Ta/Pa)		
(m3)	(x-axis)	(y-axis)	Va	(x-axis)	(y-axis)		
0.9860	0.6814	1.4073	0.9957	0.6881	0.8899		
0.9818	0.9616	1.9902	0.9915	0.9711	1.2585		
0.9797	1.0719	2.2251	0.9893	1.0824	1.4071		
0.9786	1.1288	2.3337	0.9883	1.1399	1.4757		
0.9732	1.3630	2.8146	0.9828	1.3765	1.7798		
	m=	2.06566		m=	1.29348		
QSTD	b=	0.00315	QA	b=	0.00199		
٦	r=	0.99996		r=	0.99996		

Calculations							
Vstd=	ΔVol((Pa-ΔP)/Pstd)(Tstd/Ta)	Va=	ΔVol((Pa-ΔP)/Pa)				
Qstd=	Vstd/ΔTime	Qa= Va/ΔTime					
	For subsequent flow rate calculations:						
Qstd=	$1/m\left(\left(\sqrt{\Delta H\left(\frac{Pa}{Pstd}\right)\left(\frac{Tstd}{Ta}\right)}\right)-b\right)$	Qa=	$1/m\left(\left(\sqrt{\Delta H\left(Ta/Pa\right)}\right)-b\right)$				

	Standard Conditions				
Tstd:	298.15 °K				
Pstd:	760 mm Hg				
	Key				
ΔH: calibrator manometer reading (in H2O)					
ΔP: rootsmeter manometer reading (mm Hg)					
Ta: actual absolute temperature (°K)					
Pa: actual barometric pressure (mm Hg)					
b: intercept					
m: slope					

#### RECALIBRATION

US EPA recommends annual recalibration per 1998 40 Code of Federal Regulations Part 50 to 51, Appendix B to Part 50, Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere, 9.2.17, page 30

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# **High-Volume TSP Sampler**

# 5-POINT CALIBRATION DATA SHEET



File No. MA20003/44/0008

Project No.	KTD1 - Centre	of Excellence in	Paediatrics (Childs	ren's Hospital)		_	
Date:	2-A	ug-21	Next Due Date: 2-Oct-21		Operator:	SK	
Equipment No.:	A-0	01-44	Model No.:	TE-5170		Serial No.	1316
			Ambient C	ondition			
Temperatu	re, Ta (K)	302.7	Pressure, Pa			750	
		Or	ifice Transfer Star	ndard Inform	ation		
Serial	l No.	3864	Slope, mc	0.05846	Intercept		-0.00313
Last Calibra	The state of the s	11-Jan-21	4		$c = [\Delta H \times (Pa/760)]$		
Next Calibr	ation Date:	11-Jan-22		$Qstd = \{ [\Delta H \ x]$	(Pa/760) x (298/	Γa)] <sup>1/2</sup> -bc} / m	c
			G 19 41 67	TOD C I			
		0	Calibration of	18P Sampler		IIVe	
Calibration Point	ΔH (orifice), in. of water		Orfice [ΔH x (Pa/760) x (298/Ta)] <sup>1/2</sup>		ΔW (HVS), in. of water		60) x (298/Ta)] <sup>1/2</sup>
1	13.8		3.66		9.2		2.99
2	11.2		3.30	56.48	7.0		2.61
3	8.3		2.84		5.4	,	2.29
4	6.2		2.45		3.4		1.82
5	3.2		1.76	30.21	1.8		1.32
Slope , mw = Correlation	coefficient* =	_	.9964	Intercept, bw :	-0.270	94	
			Set Point Ca	alculation			
		Curve, take Qstd he "Y" value acc		(Pa/760) v (20	08/Ta)1 <sup>1/2</sup>		
Therefore, Se	et Point; W = ( n		<sup>2</sup> x (760 / Pa) x (	`	3.90		
Remarks:							
Conducted by:	Wong Sl	ning Kwai	Signature:	<i>\</i>	X	Date:	2-Aug-21
Checked by:	Henry	Leung	Signature:	\-lem	, Xon	Date:	2-Aug-21

# **High-Volume TSP Sampler**

# 5-POINT CALIBRATION DATA SHEET



File No. MA20003/04/0007

Project No.	KER 1 - Future	Residential Dev	elopment at Kerry	Godown			
Date:	2-Aı	ıg-21	Next Due Date:	2-0	Oct-21	Operator:	SK
Equipment No.:	A-0	1-04	•	TE 5170		Serial No.	10595
			Ambient C	ondition			
Temperatu	re, Ta (K)	302.7	Pressure, Pa			750	
•	, , , , ,		,	· · · · · · · · · · · · · · · · · · ·			
		Ori	fice Transfer Sta	ndard Informa	ation		
Serial	l No.	3864	Slope, mc	0.05846	Intercept		-0.00313
Last Calibra	ation Date:	11-Jan-21			$c = [\Delta H \times (Pa/760)]$		
Next Calibr	ation Date:	11-Jan-22	(	$Qstd = \{ [\Delta H \ x] $	(Pa/760) x (298/7	$[\Gamma a]^{1/2}$ -bc} / m	nc
			C 121 42 67	TCD C			
	l	0	Calibration of '	1 SP Sampier		HVS	
Calibration Point	ΔH (orifice), in. of water		(0) x (298/Ta)] <sup>1/2</sup>	Qstd (CFM) X - axis	ΔW (HVS), in. of water	[ΔW x (Pa/7	60) x (298/Ta)] <sup>1/2</sup> /-axis
1	13.7		3.65	62.46	9.0		2.96
2	11.4	i	3.33	56.98	7.0		2.61
3	8.6	1	2.89	49.50	5.4		2.29
4	5.2		2.25		3.2		1.76
5	3.0		1.71	29.26	2.1	1.43	
Slope , mw = Correlation	coefficient < 0.99	0	.9970	Intercept, bw =	0.048	3	
			Set Point Ca	alaulation			
From the TSP Fi	ield Calibration (	Curve, take Ostd		aicuiation			
	ssion Equation, th						
Č	1		-		4.0		
		mw x Q	$\mathbf{pstd} + \mathbf{bw} = [\Delta \mathbf{W} \ \mathbf{x}]$	(Pa/760) x (29	98/Ta)] <sup>1/2</sup>		
Therefore, Se	et Point; W = ( m	w x Qstd + bw)	<sup>2</sup> x ( 760 / Pa ) x ( ′	Ta / 298 ) =	4.16		
Remarks:							
Conducted by:	Wong Sh	ing Kwai	Signature:	<u> </u>	<u></u>	Date:	2-Aug-21
				1 0			
Checked by:	Henry	Leung	Signature:	1-Pa	2 Xon	Date:	2-Aug-21

# **High-Volume TSP Sampler** 5-POINT CALIBRATION DATA SHEET



File No. MA20003/41/0007

Project No.	No. KTD 2D - Next to the SOR Office of Trunk Road T2 in Kai Tak Area						
Date:	26-J	[ul-21	Next Due Date:	26-	Sep-21	Operator:	SK
Equipment No.:	A-0	)1-41	Model No.:	TE	5170	Serial No.	5280
			Ambient C	ondition			
Temperatu	re, Ta (K)	302	Pressure, Pa			751	
			ifice Transfer Star			,	0.00212
Serial		3864	Slope, mc	0.05846	Intercept $c = [\Delta H \times (Pa/760)]$		-0.00313
Last Calibra Next Calibra		11-Jan-21 11-Jan-22			$(Pa/760) \times (298/7)$		
rext Cariora	ation Date.			<del>25τα ( ΔΠ x</del>	(14/100) 1 (200)	tu)j bej / me	
			Calibration of	TSP Sampler			
Calibration		Oı	fice			HVS	
Point	$\Delta H$ (orifice), in. of water	[ΔH x (Pa/76	(60) x (298/Ta)] <sup>1/2</sup>	Qstd (CFM) X - axis	ΔW (HVS), in. of water		0) x (298/Ta)] <sup>1/2</sup> axis
1	13.7		3.65	62.57	8.8	2	.93
2	11.5		3.35	57.33	7.0		.61
3	8.2		2.83	48.42 40.73	5.5		.32
5	5.8 2.9		2.38		4.1 2.3		.50
	0.0412 coefficient* =	_	.9978	Intercept, bw =	0.313	1	
*II Correlation C	oefficient < 0.9	90, check and re	canorate.				
E d TODE	11017	G + 1 - 0 + 1	Set Point Ca	alculation			
		Curve, take Qstd he "Y" value acc					
rrom the Regres	sion Equation, t	ne Y value acc	ording to				
		mw x Q	$\mathbf{pstd} + \mathbf{bw} = [\Delta \mathbf{W} \ \mathbf{x}]$	(Pa/760) x (29	98/Ta)] <sup>1/2</sup>		
Therefore, Se	et Point; W = ( n	nw x Qstd + bw)	<sup>2</sup> x ( 760 / Pa ) x ( 7	Га / 298 ) =	4.45		
Remarks:							
Conducted by:	Wong Sl	ning Kwai	Signature:	\\	<u></u>	Date:	26-Jul-21
Checked by:	d by: Henry Leung Signature: Lemy M97 Date: 26-Jul-21						26-Jul-21

# **High-Volume TSP Sampler** 5-POINT CALIBRATION DATA SHEET



File No. MA20003/55/0009

Project No.	CKL 2 - Flat 103 Cha Kwo Ling Village							
Date:	6-Jul-21		Next Due Date:	6-Sep-21 TE 5170		Operator:	SK	
Equipment No.:	A-01-55		Model No.:			Serial No	1956	
			Ambient C	Condition				
Temperatur	re, Ta (K)	302.4	302.4 Pressure, Pa		(mmHg)		754.7	
Orifice Transfer Standard Information								
Serial No.		3864 Slope, mc		0.05846 Intercept				
Last Calibration Date:		11-Jan-21	1	mc x Qstd + bc = $[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$ Qstd = $\{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$				
Next Calibration Date: 11-Jan-22  Qstd = $\{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} -bc\} / mc$								
		•	Calibration of	TSP Sampler				
G 17:		Or	fice	HVS				
Calibration Point	ΔH (orifice), in. of water	$\Delta H \text{ (orifice)}, \qquad [\Delta H \times (P_2/760) \times (298/T_2)]^{1/2}$		Qstd (CFM) X - axis	ΔW (HVS), in. of water	$[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ <b>Y-axis</b>		
1	13.5	3.63		62.23	9.6	3.07		
2	11.3	3.33		56.94	7.5	2.71		
3	8.3	2.85		48.80	5.9	2.40		
4	5.2		2.26		3.5	1.85		
5 3.0			1.71		1.9	1.36		
By Linear Regr	ession of Y on X	<u> </u>						
Slope, $mw =$	0.0506	_	I		Intercept, bw =			
	coefficient* =	0.9982		-				
*If Correlation Coefficient < 0.990, check and recalibrate.								
Set Point Calculation								
From the TSP Field Calibration Curve, take Qstd = 43 CFM								
From the Regress	sion Equation, th	e "Y" value acco	ording to					
		mw x (	$\mathbf{Qstd} + \mathbf{bw} = [\Delta \mathbf{W} \ \mathbf{x}]$	x (Pa/760) x (29	98/Ta)] <sup>1/2</sup>			
Therefore, Set Point; $W = (mw \times Qstd + bw)^2 \times (760 / Pa) \times (Ta / 298) =$ 4.36								
Remarks:								
				10				
Conducted by:	Wong Sh	ing Kwai	Signature:			Date:	6-Jul-21	
Checked by: Henry Leung			Signature:			Date:	6-Jul-21	

# **High-Volume TSP Sampler** 5-POINT CALIBRATION DATA SHEET



File No. MA20003/18/0009 Project No. CKL 1 - Flat 121 Cha Kwo Ling Village Date: 6-Jul-21 Next Due Date: 6-Sep-21 Operator: SK Model No.: \_\_\_\_\_ TE 5170 \_\_\_\_ Serial No. \_\_\_\_ 0723 Equipment No.: A-01-18 **Ambient Condition** 302.4 Pressure, Pa (mmHg) 754.7 Temperature, Ta (K) **Orifice Transfer Standard Information** 0.05846 Intercept, bc Serial No. 3864 Slope, mc -0.00313 mc x Qstd + bc =  $[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$ 11-Jan-21 Last Calibration Date: Qstd =  $\{ [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} -bc \} / mc$ Next Calibration Date: 11-Jan-22 **Calibration of TSP Sampler** Orfice HVS Calibration  $\Delta W$  (HVS), in.  $\left[ \Delta W \times (Pa/760) \times (298/Ta) \right]^{1/2} Y$ - $\Delta H$  (orifice), Ostd (CFM) Point  $[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$ in. of water X - axis of water axis 13.2 3.59 61.53 10.6 3.22 11.2 3.31 56.68 8.0 2.80 8.3 2.85 48.80 6.1 2.44 3 4 6.2 2.46 42.19 3.9 1.95 1.9 5 3.4 1.82 31.26 1.36 By Linear Regression of Y on X Slope, mw = 0.0603Intercept, bw = -0.5439 Correlation coefficient\* = 0.9968 \*If Correlation Coefficient < 0.990, check and recalibrate. **Set Point Calculation** From the TSP Field Calibration Curve, take Qstd = 43 CFM From the Regression Equation, the "Y" value according to mw x Qstd + bw =  $[\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$ Therefore, Set Point; W =  $(mw \times Qstd + bw)^2 \times (760 / Pa) \times (Ta / 298) =$ Remarks: Signature: Date: 6-Jul-21

Signature: Date: 6-Jul-21 Conducted by: Wong Shing Kwai Checked by: Henry Leung