

T e s t R e p o r t

Report No : U10013

Client: : Vaisala Limited
Elm House
351 Bristol Road
Birmingham
West Midlands
B5 7SW

Description : Highway Camera and Sensors

Manufacturer : Vaisala Ltd

Type/Model : Vaisala Control Unit - RWS200
Road Sensor - DRS511
Road Sensor - DSC211
Road Sensor - DST111
Wind Sensor (WMT700)
Cameras - Mobotix M15
Router - WR21
IR Lamps - VAR14

Test Specification : Measurement of power consumption in accordance with the
'Unmetered Supplies Operational Information Document' –
Version 17.0 (15/03/2017).

Date Testing Started : 21/02/2018

Conclusion : Refer to body of report

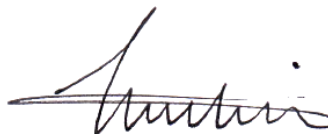
Date of Issue : 07/03/2018

Date of Expiry : 06/03/2023

Tested by: M. ALI
Position: Head of Department -
Photometry



Approved by: T. MALIK
Position: Operations Manager



INTRODUCTION

The products identified in Table 1 were tested at the premises of Vaisala Limited for measurement of power consumption in accordance with the “Unmetered Supplies Operational Information” document – Version 17.0 (15/03/2017).

PRODUCT DETAILS

Table 1. Test Sample Details

Product Description	Highway Camera and Sensors
Model No.	Vaisala Control Unit - RWS200 Road Sensor - DRS511 Road Sensor - DSC211 Road Sensor - DST111 Wind Sensor (WMT700) Cameras - Mobotix M15 Router - WR21 IR Lamps - VAR14
Number of Samples	Five
Condition on Receipt	Good
Nominal Dimensions	600mm × 495mm × 210mm
Product Supply Requirement	90-264V AC, 45-65Hz
Sampling Method: Test samples selected and supplied by client, no sampling method specified by client.	

There is a heater incorporated into the product which operates when the external temperature reaches -2°C, the product was measured at a nominal ambient temperature of 21°C without the heater on.

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RESULTS

Table 2. Wattage and VA results for RWS200, DRS511, 2 x Mobotix M15 and WR21

Operating Mode	Vaisala Control Unit (RWS200) with Road Sensor (DRS511), 2 Cameras (Mobotix M15) and Router (WR21) operating				
Watts					
Voltage	Sample Number				
	1	2	3	4	5
210	41.13	38.21	40.57	38.92	35.77
220	40.77	37.21	40.12	38.88	35.36
230	40.73	37.57	39.89	38.88	35.96
240	40.82	36.96	39.63	38.44	36.08
250	40.47	37.01	39.63	38.59	36.03
VA					
Voltage	Sample Number				
	1	2	3	4	5
210	76.70	70.06	76.36	74.65	71.94
220	80.13	77.00	79.75	78.54	75.25
230	83.78	81.00	83.24	82.00	79.71
240	87.46	84.37	86.54	85.38	83.80
250	93.01	92.28	92.47	91.90	91.30
Power Factor					
Voltage	Sample Number				
	1	2	3	4	5
210	0.54	0.55	0.53	0.52	0.50
220	0.51	0.48	0.50	0.50	0.47
230	0.49	0.46	0.48	0.47	0.45
240	0.47	0.44	0.46	0.45	0.43
250	0.44	0.40	0.43	0.42	0.39
Ambient Temperature During Test (°C)			22.1		
PF Leading/Lagging			Leading		

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Table 3. Wattage and VA results for RWS200, DRS511, 2 × Mobotix M15, WR21 and 2 × VAR14

Operating Mode	Vaisala Control Unit (RWS200) with Road Sensor (DRS511), 2 Cameras (Mobotix M15), Router (WR21) and 2 IR Lamps (VAR14) operating				
Watts					
Voltage	Sample Number				
	1	2	3	4	5
210	65.74	62.70	65.49	65.15	61.06
220	65.65	62.47	64.93	64.80	60.88
230	65.68	62.79	65.15	64.32	60.91
240	65.71	62.32	64.91	64.78	60.84
250	66.06	62.29	64.36	64.85	60.79
VA					
Voltage	Sample Number				
	1	2	3	4	5
210	101.57	98.40	101.21	100.83	96.53
220	104.44	101.25	103.81	103.41	99.32
230	107.60	104.79	107.33	106.34	102.75
240	111.30	105.03	110.69	110.43	106.43
250	115.49	111.84	113.95	114.18	110.26
Power Factor					
Voltage	Sample Number				
	1	2	3	4	5
210	0.65	0.64	0.65	0.65	0.63
220	0.63	0.62	0.63	0.63	0.61
230	0.61	0.60	0.61	0.60	0.59
240	0.59	0.59	0.59	0.59	0.57
250	0.57	0.56	0.56	0.57	0.55
Ambient Temperature During Test (°C)			21.2		
PF Leading/Lagging			Leading		

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Table 4. Wattage and VA results for RWS200, DRS511, 1 × Mobotix M15 and WR21

Operating Mode	Vaisala Control Unit (RWS200) with Road Sensor (DRS511), 1 Camera (Mobotix M15) and Router (WR21) operating				
Watts					
Voltage	Sample Number				
	1	2	3	4	5
210	34.46	30.30	34.02	32.14	29.51
220	35.24	30.36	34.16	32.23	29.60
230	34.97	30.42	34.26	32.46	29.30
240	35.38	30.18	33.91	32.17	29.45
250	35.39	30.04	33.53	31.89	29.22
VA					
Voltage	Sample Number				
	1	2	3	4	5
210	70.62	67.05	70.41	68.41	66.34
220	75.06	70.93	74.34	72.30	70.36
230	78.74	75.01	78.31	76.46	74.28
240	83.28	81.39	82.40	81.25	80.35
250	91.13	89.34	90.38	89.36	88.64
Power Factor					
Voltage	Sample Number				
	1	2	3	4	5
210	0.49	0.45	0.48	0.47	0.44
220	0.47	0.43	0.46	0.45	0.42
230	0.44	0.41	0.44	0.42	0.39
240	0.42	0.37	0.41	0.40	0.37
250	0.39	0.34	0.37	0.36	0.33
Ambient Temperature During Test (°C)			21.5		
PF Leading/Lagging			Leading		

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Table 5. Wattage and VA results for RWS200, DRS511, 1 × Mobotix M15, WR21 and 1 × VAR14

Operating Mode	Vaisala Control Unit (RWS200) with Road Sensor (DRS511), 1 Camera (Mobotix M15), Router (WR21) and 1 IR Lamp (VAR14) operating				
Watts					
Voltage	Sample Number				
	1	2	3	4	5
210	44.18	42.96	43.86	45.49	42.68
220	44.01	42.28	44.02	45.47	42.37
230	44.41	42.95	43.53	45.17	42.30
240	44.09	43.33	43.89	45.13	42.48
250	44.11	42.93	43.91	45.74	42.15
VA					
Voltage	Sample Number				
	1	2	3	4	5
210	79.47	78.50	79.40	80.74	78.02
220	83.00	82.42	83.13	84.35	81.50
230	87.04	85.82	86.50	87.69	85.18
240	90.31	89.61	90.29	91.19	88.98
250	94.52	94.13	94.30	95.59	93.21
Power Factor					
Voltage	Sample Number				
	1	2	3	4	5
210	0.56	0.55	0.55	0.56	0.55
220	0.53	0.51	0.53	0.54	0.52
230	0.51	0.50	0.50	0.52	0.50
240	0.49	0.48	0.49	0.49	0.48
250	0.47	0.46	0.47	0.48	0.45
Ambient Temperature During Test (°C)			21.7		
PF Leading/Lagging			Leading		

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Table 6. Wattage and VA results for RWS200, DRS511 and WR21

Operating Mode	Vaisala Control Unit (RWS200) with Road Sensor (DRS511) and Router (WR21) operating				
Watts					
Voltage	Sample Number				
	1	2	3	4	5
210	24.62	24.00	25.77	25.74	23.31
220	24.80	23.79	25.92	25.46	23.65
230	24.51	24.06	25.69	25.69	23.34
240	24.34	23.46	25.18	25.23	23.57
250	23.59	23.79	25.83	25.62	23.93
VA					
Voltage	Sample Number				
	1	2	3	4	5
210	62.42	61.94	63.45	63.18	61.50
220	66.66	66.09	67.45	66.92	66.00
230	72.30	72.47	72.65	72.49	72.05
240	79.03	78.87	79.26	78.92	78.74
250	85.39	85.68	85.57	86.09	85.63
Power Factor					
Voltage	Sample Number				
	1	2	3	4	5
210	0.39	0.39	0.41	0.41	0.38
220	0.37	0.36	0.38	0.38	0.36
230	0.34	0.33	0.35	0.35	0.32
240	0.31	0.30	0.32	0.32	0.30
250	0.28	0.28	0.30	0.30	0.28
Ambient Temperature During Test (°C)			21.8		
PF Leading/Lagging			Leading		

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Table 7. Wattage and VA results for RWS200, DSC211, DST111, 2 × Mobotix M15 and WR21

Operating Mode	Vaisala Control Unit (RWS200) with Road Sensor DSC211, Road Sensor DST111), 2 Cameras (Mobotix M15) and Router (WR21) operating				
Watts					
Voltage	Sample Number				
	1	2	3	4	5
210	38.23	38.46	41.13	39.50	37.71
220	38.16	38.92	40.92	39.67	37.56
230	38.25	39.01	40.90	39.65	37.51
240	38.10	39.45	40.69	39.95	38.11
250	38.47	39.95	40.38	39.73	38.39
VA					
Voltage	Sample Number				
	1	2	3	4	5
210	74.02	74.23	76.79	75.11	73.52
220	77.66	78.51	80.38	78.91	77.17
230	81.53	82.21	84.08	82.64	80.97
240	85.13	86.17	87.40	86.55	85.23
250	92.13	93.09	92.56	92.17	91.92
Power Factor					
Voltage	Sample Number				
	1	2	3	4	5
210	0.52	0.52	0.54	0.53	0.51
220	0.49	0.50	0.51	0.50	0.49
230	0.47	0.47	0.49	0.48	0.46
240	0.45	0.46	0.47	0.46	0.45
250	0.42	0.43	0.44	0.43	0.42
Ambient Temperature During Test (°C)			21.6		
PF Leading/Lagging			Leading		

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Table 8. Wattage and VA results for RWS200, DSC211, DST111, 2 × Mobotix M15, WR21 and 2 × VAR14

Operating Mode	Vaisala Control Unit (RWS200) with Road Sensor DSC211, Road Sensor DST111, 2 Cameras (Mobotix M15), Router (WR21) and 2 IR Lamps (VAR14) operating				
Watts					
Voltage	Sample Number				
	1	2	3	4	5
210	63.82	62.85	65.48	65.39	62.75
220	63.65	62.90	65.61	65.31	62.23
230	63.26	62.95	65.86	65.51	62.32
240	64.18	63.12	65.33	65.32	62.48
250	63.39	63.56	65.64	65.46	62.94
VA					
Voltage	Sample Number				
	1	2	3	4	5
210	99.47	98.46	101.06	100.94	98.14
220	102.25	101.60	104.33	103.81	100.68
230	105.08	104.82	107.87	107.40	104.03
240	109.70	108.72	110.96	110.86	107.91
250	112.81	113.06	115.15	114.72	112.26
Power Factor					
Voltage	Sample Number				
	1	2	3	4	5
210	0.64	0.64	0.65	0.65	0.64
220	0.62	0.62	0.63	0.63	0.62
230	0.60	0.60	0.61	0.61	0.60
240	0.59	0.58	0.59	0.59	0.58
250	0.56	0.56	0.57	0.57	0.56
Ambient Temperature During Test (°C)			22.4		
PF Leading/Lagging			Leading		

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Table 9. Wattage and VA results for RWS200, DSC211, DST111, 1 × Mobotix M15 and WR21

Operating Mode	Vaisala Control Unit (RWS200) with Road Sensor DSC211, Road Sensor DST111, 1 Camera (Mobotix M15) and Router (WR21) operating				
Watts					
Voltage	Sample Number				
	1	2	3	4	5
210	35.50	34.46	37.05	36.69	34.21
220	35.55	34.24	37.28	37.34	34.27
230	35.68	34.08	37.09	36.86	34.52
240	35.13	34.57	37.67	37.03	34.18
250	35.13	34.44	37.72	37.17	34.12
VA					
Voltage	Sample Number				
	1	2	3	4	5
210	71.59	70.73	72.92	72.48	70.45
220	75.26	74.25	77.09	76.68	74.25
230	79.28	77.99	80.64	80.14	78.41
240	82.89	82.87	84.87	84.22	82.41
250	91.04	91.21	91.70	91.31	90.58
Power Factor					
Voltage	Sample Number				
	1	2	3	4	5
210	0.50	0.49	0.51	0.51	0.49
220	0.47	0.46	0.48	0.49	0.46
230	0.45	0.44	0.46	0.46	0.44
240	0.42	0.42	0.44	0.44	0.41
250	0.39	0.38	0.41	0.41	0.38
Ambient Temperature During Test (°C)			20.5		
PF Leading/Lagging			Leading		

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Table 10. Wattage and VA results for RWS200, DSC211, DST111, 1 × Mobotix M15, WR21 and 1 × VAR14

Operating Mode	Vaisala Control Unit (RWS200) with Road Sensor DSC211, Road Sensor DST111, 1 Camera (Mobotix M15), Router (WR21) and 1 IR Lamp (VAR14) operating				
Watts					
Voltage	Sample Number				
	1	2	3	4	5
210	46.97	46.82	48.96	49.21	46.57
220	47.26	47.02	48.82	49.38	45.45
230	47.52	46.97	48.88	49.29	45.87
240	47.12	46.97	48.46	49.58	45.92
250	47.58	46.89	48.72	49.97	46.22
VA					
Voltage	Sample Number				
	1	2	3	4	5
210	82.11	82.08	84.29	84.30	81.68
220	86.04	85.86	87.59	88.06	84.31
230	89.99	89.37	91.31	91.54	88.43
240	93.10	93.02	94.61	95.35	92.11
250	97.21	96.76	98.38	99.26	96.22
Power Factor					
Voltage	Sample Number				
	1	2	3	4	5
210	0.57	0.57	0.58	0.58	0.57
220	0.55	0.55	0.56	0.56	0.54
230	0.53	0.53	0.54	0.54	0.52
240	0.51	0.50	0.51	0.52	0.50
250	0.49	0.48	0.50	0.50	0.48
Ambient Temperature During Test (°C)			21.7		
PF Leading/Lagging			Leading		

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Table 11. Wattage and VA results for RWS200, DSC211, DST111 and WR21

Operating Mode	Vaisala Control Unit (RWS200) with Road Sensor DSC211, Road Sensor DST111 and Router (WR21) operating				
Watts					
Voltage	Sample Number				
	1	2	3	4	5
210	28.69	27.24	30.20	30.37	28.26
220	29.63	27.18	30.38	30.96	28.05
230	29.12	27.68	30.17	30.67	27.89
240	28.98	27.22	30.13	30.46	27.94
250	28.73	27.66	30.12	30.17	27.70
VA					
Voltage	Sample Number				
	1	2	3	4	5
210	65.62	64.52	67.10	66.93	65.35
220	70.25	68.32	71.01	71.20	69.10
230	73.98	73.28	74.81	75.02	73.36
240	80.19	80.12	80.61	80.35	79.85
250	88.42	88.05	88.94	88.51	87.77
Power Factor					
Voltage	Sample Number				
	1	2	3	4	5
210	0.44	0.42	0.45	0.45	0.43
220	0.42	0.40	0.43	0.43	0.41
230	0.39	0.38	0.40	0.41	0.38
240	0.36	0.34	0.37	0.38	0.35
250	0.32	0.31	0.34	0.34	0.32
Ambient Temperature During Test (°C)			21.7		
PF Leading/Lagging			Leading		

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Table 12. Wattage and VA results for RWS200 and WMT700

Operating Mode	Vaisala Control Unit (RWS200) with Wind Sensor (WMT700) operating				
Watts					
Voltage	Sample Number				
	1	2	3	4	5
210	22.31	21.66	24.20	24.39	21.72
220	22.29	21.46	24.77	24.55	21.34
230	22.60	21.47	24.65	24.05	21.57
240	22.36	21.73	24.62	24.20	21.50
250	22.30	21.67	24.69	23.97	21.79
VA					
Voltage	Sample Number				
	1	2	3	4	5
210	60.65	60.19	62.13	62.07	60.35
220	65.30	65.25	66.56	66.41	65.09
230	71.82	71.65	72.36	71.86	71.46
240	78.15	77.97	79.01	78.32	77.73
250	84.54	84.22	86.01	85.04	84.22
Power Factor					
Voltage	Sample Number				
	1	2	3	4	5
210	0.37	0.36	0.39	0.39	0.36
220	0.34	0.33	0.37	0.37	0.33
230	0.31	0.30	0.34	0.33	0.30
240	0.29	0.28	0.31	0.31	0.28
250	0.26	0.26	0.29	0.28	0.26
Ambient Temperature During Test (°C)			21.8		
PF Leading/Lagging			Leading		

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DEVIATION(S) FROM TEST STANDARD

No reported deviations from test standard.

MEASUREMENT UNCERTAINTY

The following expanded uncertainties apply to the measurements shown in the results;

True Power (W): $\pm 0.69\%$, Apparent Power (VA): $\pm 0.61\%$

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

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ILLUSTRATION



Figure 1. Image of Control Unit (RWS200)



Figure 2. Internal Image of Control Unit (RWS200)



Figure 3. Road Sensor (DRS511)



Figure 4. Image of Router (WR21)

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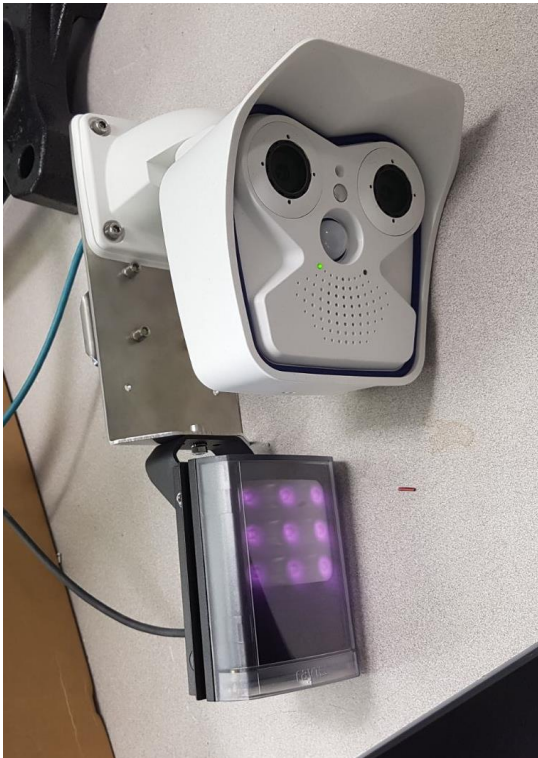


Figure 5. Image of Camera and IR Lamp (VAR14)



Figure 6. Image of Road Temperature Sensor (DST111)



Figure 7. Image of Road Condition Sensor (DSC211)

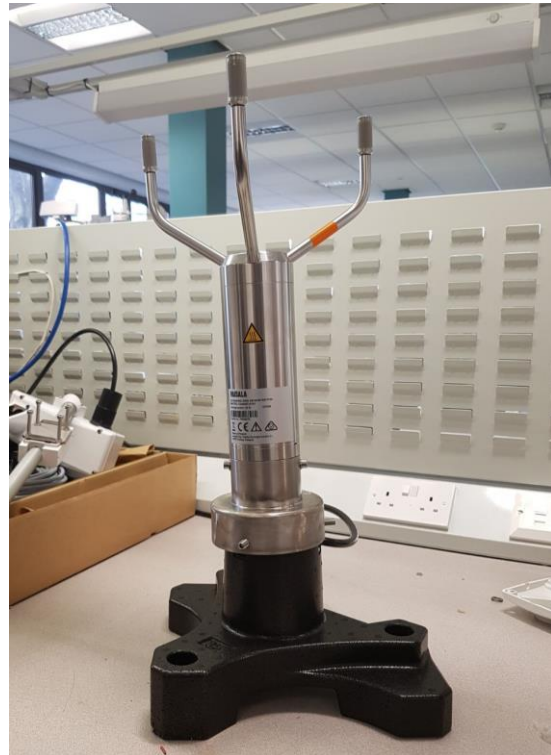


Figure 8. Image of Wind Sensor (WMT700)

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