



### Rig Mass Flow Rate Calculations

Please Enter Parameters in highlighted boxes below

Engine Data File		
<b>Ambient Conditions</b>		
Air Temperature	5	[C]
Atmospheric Pressure	975	[mBar]
Air Humidity	95	[%]
<b>Viper Engine Parameters</b>		
Engine Air Intake Mass Flow	18.7	[Kg/s]
Butane Flow Rate	1732	[Ltr/h]
Engine Speed	12150	[RPM]
ETC	650	[C]
<b>Gas Delivery System Data File</b>		
<b>Gas Delivery System</b>		
Mixed Gas (Fuel) Mass Flow rate	0.024	[Kg/s]
Oxygen Mass Flow rate	0.148	[Kg/s]

Please do not change anything in this box

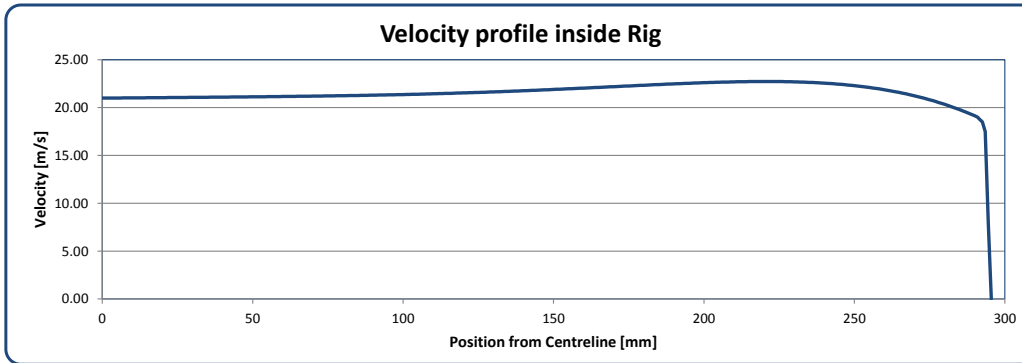
Test Date and Time = 21.04.2015 15:38:55.1

Calculated Parameters		
Air density	1.217898	[Kg/m <sup>3</sup> ]
Liquid Butane density	584	[Kg/m <sup>3</sup> ]
Butane mass Flow rate	0.280969	[Kg/s]
Air Fuel Ratio	79.23263	[ ]
<b>Calculated Exhaust gas properties (Reaction Engines)</b>		
Exhaust products density	0.389	[Kg/m <sup>3</sup> ]
<b>Pitot Traverse Results</b>		
Rig Gas flow rate - Integrated	2.293286	[Kg/s]
Total Rig Mass flow	2.465286	[Kg/s]
<b>Rig Gas Temperature as read from TC 11</b>		
Gas Temperature	507	[C]

Bruce Ewan to fill in

Note

Manual for viper 201 gives figures for fuel flow rate to be as follows at maximum power					
Fuel Flow	2035	lb/hr	to	2920	lb/hr
	925	Kg/hr		1327.273	Kg/hr
	1156.25	ltr/hr		1659.091	ltr/hr



**Data Acquisition Parameters**

Sampling Rate	1000	[Hz]
No of samples recorded	100	Samples
Averaged samples sampling	10	[Hz]
Pitot Traverse speed	7	[mm/s]
Distance Travelled every 0.1	0.7	[mm]

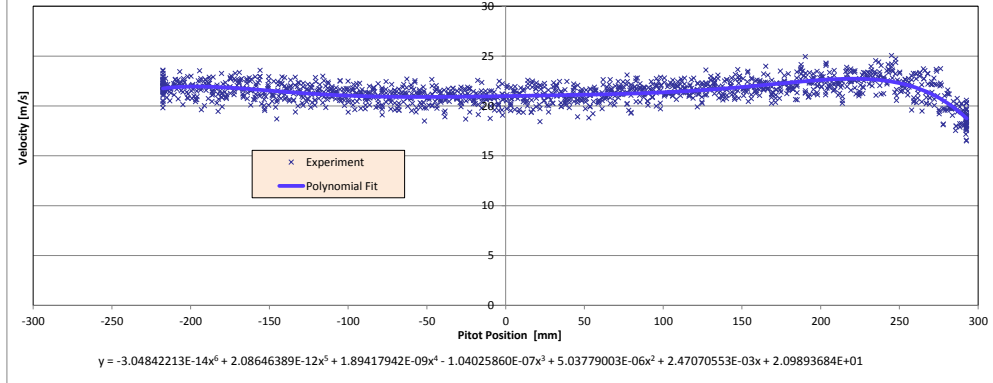
Averaged Pitot dp 0.895406324 Average Vel 21.4250627 [m/s]

**Raw Data from CSV File**

Date and time [dd:mm:yyyy hh:mm:ss.ms]	Pitot Position from rig centre [mm]	TC11 - Pitot [deg C]	Pitot dP [mBar]	O2 %
21.04.2015 15:38:55.1	-217.51	502	1.0209	16.44
21.04.2015 15:38:55.2	-217.58	502	0.9868	16.36
21.04.2015 15:38:55.3	-217.53	502	0.7955	16.23
21.04.2015 15:38:55.4	-217.52	502	1.0243	16.51
21.04.2015 15:38:55.5	-217.57	501.9	0.9328	16.31
21.04.2015 15:38:55.6	-217.56	501.9	0.764	16.34
21.04.2015 15:38:55.7	-217.52	502	0.9338	16.22
21.04.2015 15:38:55.8	-217.53	502	0.9196	16.44
21.04.2015 15:38:55.9	-217.53	501.9	0.9887	16.45
21.04.2015 15:38:56.0	-217.54	501.9	0.9607	16.42
21.04.2015 15:38:56.1	-217.55	502	0.8698	16.19
21.04.2015 15:38:56.2	-217.56	502.2	1.0757	16.41
21.04.2015 15:38:56.3	-217.55	502.1	1.052	16.46
21.04.2015 15:38:56.4	-217.57	502.2	1.0826	16.36
21.04.2015 15:38:56.5	-217.49	502.4	0.9285	16.28
21.04.2015 15:38:56.6	-215.79	502.4	0.9534	16.38
21.04.2015 15:38:56.7	-215.91	502.4	1.0074	16.42
21.04.2015 15:38:56.8	-215.93	502.6	0.9592	16.31
21.04.2015 15:38:56.9	-215.61	502.8	0.8901	16.27
21.04.2015 15:38:57.0	-213.19	502.9	0.8182	16.34
21.04.2015 15:38:57.1	-213.41	502.8	0.9197	16.37
21.04.2015 15:38:57.2	-213.36	502.9	0.8938	16.26
21.04.2015 15:38:57.3	-210.7	503	0.962	16.36
21.04.2015 15:38:57.4	-210.4	503	0.8667	16.37
21.04.2015 15:38:57.5	-210.42	502.9	0.9349	16.26
21.04.2015 15:38:57.6	-210.41	503	0.9481	16.23
21.04.2015 15:38:57.7	-207.87	503	0.9297	16.32
21.04.2015 15:38:57.8	-207.87	502.9	0.8335	16.41
21.04.2015 15:38:57.9	-207.88	502.9	0.9956	16.19
21.04.2015 15:38:58.0	-206.92	502.9	1.0684	16.1
21.04.2015 15:38:58.1	-204.66	502.9	0.9544	16.22
21.04.2015 15:38:58.2	-204.93	502.9	0.7882	16.35
21.04.2015 15:38:58.3	-204.94	502.9	0.8915	16.22
21.04.2015 15:38:58.4	-203.85	503	0.9741	16.31
21.04.2015 15:38:58.5	-202.18	503.1	0.8434	16.33
21.04.2015 15:38:58.6	-202.38	503.1	0.8897	16.45
21.04.2015 15:38:58.7	-201.95	503.2	0.9391	16.26
21.04.2015 15:38:58.8	-199.22	503.3	0.8379	16.42
21.04.2015 15:38:58.9	-199.45	503.4	0.8992	16.35
21.04.2015 15:38:59.0	-199.43	503.3	0.9413	16.42
21.04.2015 15:38:59.1	-197.92	503.3	0.8569	16.27
21.04.2015 15:38:59.2	-196.8	503.4	0.8293	16.23
21.04.2015 15:38:59.3	-196.9	503.3	0.8129	16.42
21.04.2015 15:38:59.4	-196.89	503.2	0.9412	16.34
21.04.2015 15:38:59.5	-195.15	503.2	0.9867	16.45
21.04.2015 15:38:59.6	-194.27	503.3	1.0762	16.28
21.04.2015 15:38:59.7	-194.3	503.3	0.9381	16.41
21.04.2015 15:38:59.8	-193.17	503.2	0.7485	16.33
21.04.2015 15:38:59.9	-191.23	503.3	0.7807	16.32
21.04.2015 15:39:00.0	-191.41	503.4	0.9374	16.27
21.04.2015 15:39:00.1	-191.39	503.4	0.9423	16.41
21.04.2015 15:39:00.2	-190.22	503.3	0.9042	16.37
21.04.2015 15:39:00.3	-188.72	503.4	0.9639	16.2
21.04.2015 15:39:00.4	-188.81	503.4	0.9679	16.32
21.04.2015 15:39:00.5	-188.8	503.5	0.8359	16.37
21.04.2015 15:39:00.6	-186.48	503.5	0.8139	16.42
21.04.2015 15:39:00.7	-186.25	503.6	0.9003	16.27
21.04.2015 15:39:00.8	-186.26	503.7	0.8882	16.38
21.04.2015 15:39:00.9	-186.31	503.6	0.866	16.36

Calculated Velocity [m/s]
22.910354
22.5244797
20.2236849
22.9484725
21.8995134
19.8192345
21.9112489
21.744012
22.5461537
22.2246071
21.1470552
23.5172091
23.2566987
23.5925133
21.8489792
22.1400079
22.7583709
22.20725
21.3924043
20.5102019
21.7451942
21.4368205
22.239639
21.1093371
21.9241506
22.0783834
21.8630935
20.7010798
22.6246902
23.4372761
22.1516159
20.1306785
21.4092213
22.3790666
20.8236567
21.387597
21.9733421
20.7556478
21.5014796
21.9990652
20.9896535
20.6488576
20.4436651
21.9978966
22.5233384
23.5226741
21.9616398
19.6171584
20.0346743
21.9534445
22.0107476
21.5611762
22.2615904
22.3077332
20.730862
20.4562358
21.5146271
21.3695601
21.1008108

**Raw Data Plot with Polynomial fit on Calculated Velocity**



21.04.2015 15:39:01.0	-183.28	503.7	0.8008	16.23
21.04.2015 15:39:01.1	-183.37	503.7	0.9147	16.16
21.04.2015 15:39:01.2	-183.32	503.7	0.9338	16.42
21.04.2015 15:39:01.3	-181.15	503.7	0.9014	16.37
21.04.2015 15:39:01.4	-180.37	503.7	1.0522	16.32
21.04.2015 15:39:01.5	-180.43	503.8	0.8496	16.24
21.04.2015 15:39:01.6	-180.4	503.7	0.8743	16.4
21.04.2015 15:39:01.7	-178.29	503.7	0.8919	16.29
21.04.2015 15:39:01.8	-177.88	503.7	0.8502	16.28
21.04.2015 15:39:01.9	-177.86	503.7	0.9704	16.23
21.04.2015 15:39:02.0	-177.29	503.6	0.8376	16.23
21.04.2015 15:39:02.1	-174.7	503.5	0.8793	16.36
21.04.2015 15:39:02.2	-174.95	503.5	1.0139	16.24
21.04.2015 15:39:02.3	-174.91	503.6	0.9355	16.34
21.04.2015 15:39:02.4	-174.25	503.5	1.0298	16.34
21.04.2015 15:39:02.5	-172.21	503.4	0.894	16.41
21.04.2015 15:39:02.6	-172.43	503.5	0.8681	16.25
21.04.2015 15:39:02.7	-172.31	503.5	0.9142	16.4
21.04.2015 15:39:02.8	-169.27	503.4	0.9679	16.37
21.04.2015 15:39:02.9	-169.46	503.4	0.9195	16.34
21.04.2015 15:39:03.0	-169.46	503.4	0.9918	16.3
21.04.2015 15:39:03.1	-168.37	503.5	0.9969	16.38
21.04.2015 15:39:03.2	-166.72	503.5	0.9037	16.41
21.04.2015 15:39:03.3	-166.94	503.5	0.8743	16.32
21.04.2015 15:39:03.4	-166.91	503.5	0.9263	16.29
21.04.2015 15:39:03.5	-164.61	503.4	0.9211	16.4
21.04.2015 15:39:03.6	-164.3	503.3	0.9653	16.41
21.04.2015 15:39:03.7	-164.37	503.3	1.0031	16.25
21.04.2015 15:39:03.8	-162.79	503.3	1.0125	16.24
21.04.2015 15:39:03.9	-161.63	503.3	0.9025	16.34
21.04.2015 15:39:04.0	-161.81	503.2	0.7848	16.45
21.04.2015 15:39:04.1	-161.75	503.3	0.8998	16.24
21.04.2015 15:39:04.2	-160.02	503.4	0.8277	16.22
21.04.2015 15:39:04.3	-159.17	503.4	0.8296	16.49
21.04.2015 15:39:04.4	-159.18	503.3	0.8486	16.44
21.04.2015 15:39:04.5	-158.99	503.4	1.0227	16.34
21.04.2015 15:39:04.6	-156.14	503.4	0.856	16.3
21.04.2015 15:39:04.7	-156.3	503.5	0.9923	16.4
21.04.2015 15:39:04.8	-156.25	503.3	0.8761	16.35
21.04.2015 15:39:04.9	-154.94	503.3	0.7946	16.33
21.04.2015 15:39:05.0	-153.22	503.4	0.8642	16.24
21.04.2015 15:39:05.1	-153.33	503.4	0.782	16.35
21.04.2015 15:39:05.2	-153.33	503.3	0.885	16.38
21.04.2015 15:39:05.3	-151	503.4	0.9165	16.32
21.04.2015 15:39:05.4	-150.79	503.5	0.9174	16.29
21.04.2015 15:39:05.5	-150.78	503.4	0.9359	16.31
21.04.2015 15:39:05.6	-150.85	503.4	0.954	16.39
21.04.2015 15:39:05.7	-148.19	503.4	0.8625	16.27
21.04.2015 15:39:05.8	-148.26	503.4	0.8146	16.38
21.04.2015 15:39:05.9	-148.21	503.4	0.871	16.23
21.04.2015 15:39:06.0	-146.06	503.4	0.768	16.44
21.04.2015 15:39:06.1	-145.27	503.5	0.6805	16.34
21.04.2015 15:39:06.2	-145.3	503.6	0.8117	16.41
21.04.2015 15:39:06.3	-145	503.6	0.8255	16.32
21.04.2015 15:39:06.4	-142.62	503.6	0.8381	16.38
21.04.2015 15:39:06.5	-142.79	503.7	0.9732	16.31
21.04.2015 15:39:06.6	-142.72	503.7	0.8917	16.41
21.04.2015 15:39:06.7	-142.26	503.6	0.8842	16.46
21.04.2015 15:39:06.8	-140.02	503.6	0.8696	16.35
21.04.2015 15:39:06.9	-140.2	503.8	0.9424	16.22
21.04.2015 15:39:07.0	-140.2	503.7	0.832	16.27
21.04.2015 15:39:07.1	-137.31	503.6	0.8168	16.43
21.04.2015 15:39:07.2	-137.27	503.7	0.8303	16.3
21.04.2015 15:39:07.3	-137.32	503.8	0.9034	16.34
21.04.2015 15:39:07.4	-137.19	503.7	0.8957	16.32
21.04.2015 15:39:07.5	-134.55	503.6	0.8259	16.42
21.04.2015 15:39:07.6	-134.73	503.5	0.8194	16.34
21.04.2015 15:39:07.7	-134.75	503.7	0.8771	16.24
21.04.2015 15:39:07.8	-133.47	503.5	0.732	16.32
21.04.2015 15:39:07.9	-131.6	503.4	0.8717	16.31
21.04.2015 15:39:08.0	-131.84	503.3	0.7783	16.34

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21.4595932
20.6064856
20.5252368
21.2356106
19.3997323
21.1701395
20.0038557

21.04.2015 15:39:08.1	-131.78	503.4	0.9717	16.32	22.3514807
21.04.2015 15:39:08.2	-130.4	503.3	0.8974	16.31	21.4799482
21.04.2015 15:39:08.3	-129.11	503.2	0.7998	16.41	20.2782698
21.04.2015 15:39:08.4	-129.24	503.2	0.8548	16.33	20.9639181
21.04.2015 15:39:08.5	-128.54	503.2	0.8741	16.37	21.1992627
21.04.2015 15:39:08.6	-126.07	503.2	0.9171	16.31	21.7144355
21.04.2015 15:39:08.7	-126.34	503.2	0.9102	16.26	21.6325947
21.04.2015 15:39:08.8	-126.32	503.2	0.8123	16.34	20.436119
21.04.2015 15:39:08.9	-124.53	503.2	0.8998	16.33	21.5086519
21.04.2015 15:39:09.0	-123.67	503.1	0.929	16.51	21.8548613
21.04.2015 15:39:09.1	-123.68	503.1	0.7669	16.28	19.8568139
21.04.2015 15:39:09.2	-122.78	503.1	0.8056	16.34	20.3516641
21.04.2015 15:39:09.3	-120.97	503	0.8255	16.36	20.6014949
21.04.2015 15:39:09.4	-121.17	502.9	0.7832	16.48	20.0667267
21.04.2015 15:39:09.5	-121.18	502.8	0.8216	16.24	20.5527724
21.04.2015 15:39:09.6	-119.04	502.8	0.9058	16.2	21.5802442
21.04.2015 15:39:09.7	-118.56	502.7	0.918	16.28	21.7250877
21.04.2015 15:39:09.8	-118.61	502.6	0.8733	16.26	21.1895594
21.04.2015 15:39:09.9	-118.62	502.5	0.8372	16.24	20.7469761
21.04.2015 15:39:10.0	-116.21	502.6	0.8655	16.19	21.0947185
21.04.2015 15:39:10.1	-116.07	502.6	0.8037	16.36	20.3276503
21.04.2015 15:39:10.2	-116.05	502.3	1.0278	16.33	22.9876462
21.04.2015 15:39:10.3	-114.19	502.3	0.7662	16.39	19.8477495
21.04.2015 15:39:10.4	-113.1	502.4	0.8289	16.29	20.6438772
21.04.2015 15:39:10.5	-113.1	502.3	0.8517	16.3	20.9258699
21.04.2015 15:39:10.6	-112.97	502.2	0.9232	16.23	21.7865315
21.04.2015 15:39:10.7	-110.45	502.2	0.8565	16.16	20.9847539
21.04.2015 15:39:10.8	-110.63	502.2	0.9182	16.17	21.7274541
21.04.2015 15:39:10.9	-110.51	502.2	0.9131	16.43	21.6670292
21.04.2015 15:39:11.0	-110.3	502.1	0.849	16.3	20.8926747
21.04.2015 15:39:11.1	-107.89	502.2	0.8787	16.28	21.2549707
21.04.2015 15:39:11.2	-108.01	502.3	0.8339	16.4	20.7060465
21.04.2015 15:39:11.3	-107.97	502.3	0.8874	16.32	21.3599341
21.04.2015 15:39:11.4	-105.38	502.3	0.8421	16.3	20.8076019
21.04.2015 15:39:11.5	-105.09	502.4	0.9127	16.12	21.6622829
21.04.2015 15:39:11.6	-105.08	502.4	0.8509	16.36	20.9160398
21.04.2015 15:39:11.7	-104.46	502.4	0.819	16.33	20.5202264
21.04.2015 15:39:11.8	-102.33	502.4	0.7812	16.49	20.0410889
21.04.2015 15:39:11.9	-102.55	502.5	0.8864	16.33	21.3478956
21.04.2015 15:39:12.0	-102.52	502.4	0.8225	16.4	20.5640263
21.04.2015 15:39:12.1	-101.66	502.4	0.8575	16.44	20.9970006
21.04.2015 15:39:12.2	-99.74	502.4	0.8076	16.26	20.3769112
21.04.2015 15:39:12.3	-99.99	502.5	0.7306	16.33	19.3811718
21.04.2015 15:39:12.4	-99.71	502.5	0.8285	16.32	20.6388956
21.04.2015 15:39:12.5	-96.87	502.4	0.7847	16.31	20.0859336
21.04.2015 15:39:12.6	-97.09	502.4	0.8157	16.13	20.4788436
21.04.2015 15:39:12.7	-97.05	502.4	0.8678	16.35	21.1227287
21.04.2015 15:39:12.8	-95.73	502.4	0.7504	16.37	19.6420408
21.04.2015 15:39:12.9	-94.32	502.2	0.8132	16.45	20.4474372
21.04.2015 15:39:13.0	-94.48	502.2	0.8608	16.36	21.0373642
21.04.2015 15:39:13.1	-94.49	502.3	0.8782	16.29	21.2489225
21.04.2015 15:39:13.2	-92.97	502.2	0.8382	16.38	20.7593631
21.04.2015 15:39:13.3	-91.83	502.1	0.8709	16.38	21.1604229
21.04.2015 15:39:13.4	-91.96	502.1	0.7595	16.4	19.7607801
21.04.2015 15:39:13.5	-91.12	502.1	0.9106	16.27	21.6373475
21.04.2015 15:39:13.6	-88.69	502.1	0.8214	16.41	20.5502707
21.04.2015 15:39:13.7	-88.99	502	0.8369	16.27	20.7432586
21.04.2015 15:39:13.8	-89.02	502	0.8446	16.39	20.8384655
21.04.2015 15:39:13.9	-87.04	502	0.8274	16.28	20.6251899
21.04.2015 15:39:14.0	-86.39	502	0.7858	16.28	20.100007
21.04.2015 15:39:14.1	-86.47	502	0.8436	16.21	20.8261256
21.04.2015 15:39:14.2	-86.14	502.1	0.8422	16.23	20.8088374
21.04.2015 15:39:14.3	-83.69	502.2	0.9278	16.37	21.8407416
21.04.2015 15:39:14.4	-83.9	502.2	0.9181	16.46	21.7262709
21.04.2015 15:39:14.5	-83.86	502.2	0.8447	16.28	20.8396991
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21.04.2015 15:39:14.7	-80.85	502.4	0.7734	16.29	19.9407864
21.04.2015 15:39:14.8	-80.97	502.4	0.828	16.39	20.6326668
21.04.2015 15:39:14.9	-80.95	502.4	0.8005	16.2	20.2871418
21.04.2015 15:39:15.0	-78.41	502.5	0.752	16.19	19.66297
21.04.2015 15:39:15.1	-78.42	502.6	0.7874	16.25	20.1204599

21.04.2015 15:39:15.2	-78.33	502.5	0.7107	16.37	19.1153984
21.04.2015 15:39:15.3	-78.28	502.6	0.8801	16.19	21.2718963
21.04.2015 15:39:15.4	-75.71	502.7	0.8527	16.25	20.9381511
21.04.2015 15:39:15.5	-75.84	502.8	0.98	16.31	22.4467379
21.04.2015 15:39:15.6	-75.82	502.6	0.8816	16.36	21.290016
21.04.2015 15:39:15.7	-73.5	502.7	0.8338	16.23	20.7048049
21.04.2015 15:39:15.8	-72.89	502.8	0.808	16.22	20.3819568
21.04.2015 15:39:15.9	-72.88	502.8	0.7549	16.39	19.7008475
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21.04.2015 15:39:16.2	-70.38	502.8	0.8817	16.24	21.2912234
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21.04.2015 15:39:16.5	-67.72	502.7	0.7474	16.21	19.6027384
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21.04.2015 15:39:16.7	-67.7	502.6	0.7438	16.33	19.5554712
21.04.2015 15:39:16.8	-64.72	502.6	0.9545	16.23	22.1527764
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21.04.2015 15:39:17.1	-63.86	502.4	0.8833	16.34	21.310533
21.04.2015 15:39:17.2	-62.14	502.3	0.7759	16.3	19.9729895
21.04.2015 15:39:17.3	-62.32	502.3	0.8385	16.19	20.7630778
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21.04.2015 15:39:17.7	-59.73	502.1	0.8769	16.21	21.2331893
21.04.2015 15:39:17.8	-59.17	502.1	0.7977	16.28	20.2516304
21.04.2015 15:39:17.9	-56.57	502	0.7635	16.42	19.8127481
21.04.2015 15:39:18.0	-56.86	502	0.7315	16.25	19.3931056
21.04.2015 15:39:18.1	-56.81	502.1	0.8828	16.18	21.3045007
21.04.2015 15:39:18.2	-55.08	502.1	0.8803	16.26	21.2743132
21.04.2015 15:39:18.3	-54.14	502	0.8845	16.43	21.3250037
21.04.2015 15:39:18.4	-54.27	502	0.8041	16.3	20.3327082
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21.04.2015 15:39:18.6	-51.54	502.1	0.6652	16.26	18.493381
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21.04.2015 15:39:19.2	-48.77	502.1	0.784	16.2	20.0769727
21.04.2015 15:39:19.3	-46.77	502.1	0.7779	16.3	19.9987146
21.04.2015 15:39:19.4	-46.56	502.1	0.8727	16.41	21.1822791
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21.04.2015 15:39:19.7	-43.55	502	0.8348	16.36	20.7172171
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21.04.2015 15:39:20.2	-41.13	502	0.8854	16.47	21.3358503
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21.04.2015 15:39:20.4	-38.47	502.2	0.7388	16.38	19.4896321
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21.04.2015 15:39:21.2	-33.41	502.6	0.9225	16.25	21.7782703
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21.04.2015 15:39:21.4	-30.59	502.5	0.8456	16.28	20.8507982
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21.04.2015 15:39:30.0	32.39	504	0.9029	16.21	21.545671
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21.04.2015 15:39:57.7	240.23	505.7	0.9911	16.41	22.5735018

21.04.2015 15:39:57.8	240.08	505.8	0.8776	16.22	21.2416625
21.04.2015 15:39:57.9	240.1	505.8	0.9997	16.3	22.6712279
21.04.2015 15:39:58.0	242.44	505.8	0.9874	16.39	22.5313264
21.04.2015 15:39:58.1	243.06	505.8	1.059	16.39	23.3339454
21.04.2015 15:39:58.2	243.05	505.8	1.0908	16.22	23.6816938
21.04.2015 15:39:58.3	243.43	505.8	1.0871	16.37	23.6414955
21.04.2015 15:39:58.4	245.75	505.7	1.0707	16.34	23.4624899
21.04.2015 15:39:58.5	245.54	505.7	1.0834	16.59	23.6012287
21.04.2015 15:39:58.6	245.56	505.8	1.0115	16	22.8046358
21.04.2015 15:39:58.7	247.12	505.9	0.8883	16.5	21.370763
21.04.2015 15:39:58.8	248.25	505.7	0.8602	16.19	21.0300312
21.04.2015 15:39:58.9	248.12	505.8	0.822	16.7	20.5577749
21.04.2015 15:39:59.0	248.18	506	0.9109	16.38	21.6409115
21.04.2015 15:39:59.1	251.19	506	0.9416	16.45	22.0025705
21.04.2015 15:39:59.2	251	506	0.8986	16.3	21.4943049
21.04.2015 15:39:59.3	251.02	506.1	0.8948	16.39	21.4488091
21.04.2015 15:39:59.4	252.09	506.3	0.9022	16.34	21.5373174
21.04.2015 15:39:59.5	253.8	506.3	0.9966	16.3	22.6360497
21.04.2015 15:39:59.6	253.6	506.2	0.9224	16.45	21.7770899
21.04.2015 15:39:59.7	253.64	506.3	1.0007	16.31	22.6825641
21.04.2015 15:39:59.8	255.83	506.3	1.0059	16.38	22.7414212
21.04.2015 15:39:59.9	256.16	506.3	0.9751	16.38	22.3905507
21.04.2015 15:40:00.0	256.17	506.3	0.9327	16.24	21.8983396
21.04.2015 15:40:00.1	257.84	506.3	0.7469	16.11	19.5961803
21.04.2015 15:40:00.2	259.24	506.3	0.8194	16.24	20.5252368
21.04.2015 15:40:00.3	259.11	506.2	0.8092	16.32	20.3970863
21.04.2015 15:40:00.4	259.1	506.3	0.8427	16.24	20.8150134
21.04.2015 15:40:00.5	260.83	506.3	0.8042	16.23	20.3339725
21.04.2015 15:40:00.6	261.75	506.4	0.9124	16.24	21.6587224
21.04.2015 15:40:00.7	261.63	506.4	0.8401	16.34	20.7828781
21.04.2015 15:40:00.8	261.78	506.5	0.8792	16.33	21.2610171
21.04.2015 15:40:00.9	264.39	506.6	0.738	16.19	19.4790772
21.04.2015 15:40:01.0	264.16	506.7	0.8113	16.34	20.423536
21.04.2015 15:40:01.1	264.22	506.6	0.9521	16.34	22.1249083
21.04.2015 15:40:01.2	266.69	506.6	0.8852	16.15	21.3334404
21.04.2015 15:40:01.3	267.18	506.7	0.7976	16.17	20.250361
21.04.2015 15:40:01.4	267.13	506.6	0.8467	16.27	20.8643557
21.04.2015 15:40:01.5	267.15	506.4	0.7977	16.31	20.2516304
21.04.2015 15:40:01.6	269.15	506.4	0.7937	16.18	20.2007916
21.04.2015 15:40:01.7	269.32	506.5	0.8427	16.22	20.8150134
21.04.2015 15:40:01.8	269.36	506.6	0.8411	16.25	20.7952437
21.04.2015 15:40:01.9	270.1	506.5	0.9557	16.39	22.1666973
21.04.2015 15:40:02.0	272.54	506.6	0.956	16.24	22.1701761
21.04.2015 15:40:02.1	272.24	506.8	0.7821	16.34	20.05263
21.04.2015 15:40:02.2	272.25	506.8	0.832	16.34	20.6824442
21.04.2015 15:40:02.3	274.34	506.7	0.8598	16.31	21.025141
21.04.2015 15:40:02.4	275.25	506.9	0.7177	16.27	19.2093058
21.04.2015 15:40:02.5	275.2	507	0.7489	16.31	19.6223995
21.04.2015 15:40:02.6	275.42	507	0.7362	16.33	19.4553077
21.04.2015 15:40:02.7	277.92	507	0.6433	16.37	18.1864098
21.04.2015 15:40:02.8	277.74	507.1	0.7569	16.28	19.7269276
21.04.2015 15:40:02.9	277.75	507.1	0.6385	16.31	18.1184336
21.04.2015 15:40:03.0	279.04	507	0.744	16.49	19.5581001
21.04.2015 15:40:03.1	280.43	507	0.7455	16.25	19.577806
21.04.2015 15:40:03.2	280.28	507.1	0.8784	16.37	21.251342
21.04.2015 15:40:03.3	280.88	507.1	0.8746	16.38	21.205325
21.04.2015 15:40:03.4	283.09	507	0.7539	16.74	19.6877946
21.04.2015 15:40:03.5	282.84	507.1	0.7587	16.23	19.7503701
21.04.2015 15:40:03.6	282.9	507.3	0.7609	16.26	19.7789845
21.04.2015 15:40:03.7	283.72	507.3	0.707	16.31	19.0655748
21.04.2015 15:40:03.8	286.03	507.3	0.6301	16.47	17.9988574
21.04.2015 15:40:03.9	285.73	507.3	0.5988	16.34	17.5461199
21.04.2015 15:40:04.0	285.98	507.4	0.6289	16.12	17.9817102
21.04.2015 15:40:04.1	288.49	507.5	0.6208	16.3	17.865536
21.04.2015 15:40:04.2	288.33	507.4	0.6458	16.09	18.2217136
21.04.2015 15:40:04.3	288.36	507.4	0.771	16.37	19.9098224
21.04.2015 15:40:04.4	289.52	507.6	0.6465	16.22	18.2315865
21.04.2015 15:40:04.5	291.06	507.6	0.7215	16.44	19.2600923
21.04.2015 15:40:04.6	290.88	507.5	0.6315	16.32	18.0188419
21.04.2015 15:40:04.7	291.19	507.5	0.6407	16.42	18.1496209
21.04.2015 15:40:04.8	292.69	507.6	0.6072	16.3	17.6687603

21.04.2015 15:40:04.9	292.54	507.5	0.6336	16.47	18.0487771
21.04.2015 15:40:05.0	292.55	507.3	0.6735	16.34	18.6083985
21.04.2015 15:40:05.1	292.66	507.4	0.6948	16.37	18.9003611
21.04.2015 15:40:05.2	292.68	507.4	0.6379	16.41	18.1099186
21.04.2015 15:40:05.3	292.6	507.3	0.6075	16.26	17.6731246
21.04.2015 15:40:05.4	292.58	507.2	0.5293	16.41	16.4964747
21.04.2015 15:40:05.5	292.55	507.3	0.5341	16.14	16.5711056
21.04.2015 15:40:05.6	292.55	507.3	0.7265	16.42	19.3267134
21.04.2015 15:40:05.7	292.53	507.2	0.7002	16.39	18.973666
21.04.2015 15:40:05.8	292.57	507.2	0.8235	16.5	20.5765234
21.04.2015 15:40:05.9	292.55	507.2	0.7511	16.3	19.6512001
21.04.2015 15:40:06.0	292.55	507.3	0.6338	16.44	18.0516255
21.04.2015 15:40:06.1	292.54	507.3	0.691	16.33	18.8486053
21.04.2015 15:40:06.2	292.54	507.3	0.6597	16.32	18.4167689
21.04.2015 15:40:06.3	292.56	507.4	0.6398	16.27	18.136869
21.04.2015 15:40:06.4	292.58	507.4	0.7001	16.41	18.972311
21.04.2015 15:40:06.5	292.58	507.3	0.6284	16.42	17.9745607
21.04.2015 15:40:06.6	292.58	507.2	0.7115	16.16	19.126154
21.04.2015 15:40:06.7	292.61	507.5	0.6515	16.15	18.3019518
21.04.2015 15:40:06.8	292.53	507.4	0.688	16.23	18.8076449
21.04.2015 15:40:06.9	292.56	507.4	0.7983	16.39	20.2592452
21.04.2015 15:40:07.0	292.58	507.4	0.6807	16.24	18.7075999
21.04.2015 15:40:07.1	292.57	507.6	0.8027	16.27	20.3150001
21.04.2015 15:40:07.2	292.55	507.5	0.8027	16.35	20.3150001
21.04.2015 15:40:07.3	292.57	507.5	0.7482	16.37	19.6132267
21.04.2015 15:40:07.4	292.54	507.5	0.702	16.33	18.9980381
21.04.2015 15:40:07.5	292.55	507.7	0.5976	16.3	17.5285298
21.04.2015 15:40:07.6	292.51	507.6	0.6578	16.35	18.3902288
21.04.2015 15:40:07.7	292.52	507.5	0.6849	16.24	18.7652252
21.04.2015 15:40:07.8	292.51	507.5	0.68	16.35	18.6979784
21.04.2015 15:40:07.9	292.45	507.6	0.7597	16.31	19.7633818
21.04.2015 15:40:08.0	292.42	507.5	0.7048	16.45	19.0358882
21.04.2015 15:40:08.1	292.41	507.5	0.6155	16.25	17.7891102
21.04.2015 15:40:08.2	292.4	507.5	0.6563	16.34	18.3692489
21.04.2015 15:40:08.3	292.21	507.5	0.5728	16.29	17.1609649
21.04.2015 15:40:08.4	292.17	507.5	0.6162	16.35	17.799223
21.04.2015 15:40:08.5	292.2	507.4	0.6759	16.18	18.6415243
21.04.2015 15:40:08.6	290.38	507.5	0.7445	16.19	19.564671
21.04.2015 15:40:08.7	289.62	507.6	0.7971	16.33	20.2440127
21.04.2015 15:40:08.8	289.69	507.6	0.7362	16.44	19.4553077
21.04.2015 15:40:08.9	289.37	507.6	0.7955	16.34	20.2236849
21.04.2015 15:40:09.0	286.57	507.8	0.7939	16.22	20.2033365
21.04.2015 15:40:09.1	286.78	507.7	0.8379	16.44	20.7556478
21.04.2015 15:40:09.2	286.74	507.7	0.7302	16.27	19.3758655
21.04.2015 15:40:09.3	285.4	507.6	0.7608	16.36	19.7776847
21.04.2015 15:40:09.4	284.06	507.8	0.7582	16.37	19.7438611
21.04.2015 15:40:09.5	284.24	507.8	0.813	16.23	20.4449226
21.04.2015 15:40:09.6	284.2	507.7	0.7735	16.28	19.9420755
21.04.2015 15:40:09.7	281.67	507.8	0.8731	16.71	21.1871329
21.04.2015 15:40:09.8	281.67	507.9	0.7597	16.67	19.7633818
21.04.2015 15:40:09.9	281.62	507.9	0.7654	16.65	19.8373852
21.04.2015 15:40:10.0	280.72	507.8	0.9073	16.1	21.5981052
21.04.2015 15:40:10.1	278.44	507.9	0.8147	16.66	20.4662868
21.04.2015 15:40:10.2	278.77	508	0.7573	16.22	19.7321394
21.04.2015 15:40:10.3	278.7	508	0.8596	16.42	21.0226955
21.04.2015 15:40:10.4	276.74	508	0.9494	16.56	22.0935147
21.04.2015 15:40:10.5	276.12	508	1.0957	16.3	23.7348247
21.04.2015 15:40:10.6	276.17	508.1	0.9661	16.29	22.2869808
21.04.2015 15:40:10.7	275.79	508	0.9412	16.56	21.9978966
21.04.2015 15:40:10.8	273.38	507.9	1.0887	16.24	23.6588869
21.04.2015 15:40:10.9	273.62	507.9	1.0726	16.18	23.4832982
21.04.2015 15:40:11.0	273.62	507.9	0.9536	16.2	22.14233
21.04.2015 15:40:11.1	271.92	507.9	1.0097	16.37	22.7843359
21.04.2015 15:40:11.2	270.51	507.8	0.9795	16.41	22.4410109
21.04.2015 15:40:11.3	270.71	507.9	0.8881	16.25	21.3683571
21.04.2015 15:40:11.4	270.69	507.9	0.9522	16.31	22.1260702
21.04.2015 15:40:11.5	267.96	507.8	1.0519	16.31	23.2555934
21.04.2015 15:40:11.6	268.08	507.9	0.9581	16.21	22.1945129
21.04.2015 15:40:11.7	268.16	508	1.05	16.13	23.2345811
21.04.2015 15:40:11.8	266.19	508.1	1.0776	16.29	23.5379691
21.04.2015 15:40:11.9	265.51	507.9	1.003	16.27	22.7086159

21.04.2015 15:40:12.0	265.58	508	1.0065	16.18	22.7482026
21.04.2015 15:40:12.1	265.26	508.1	1.095	16.19	23.7272418
21.04.2015 15:40:12.2	262.8	508	1.0542	16.33	23.2810039
21.04.2015 15:40:12.3	263.03	507.9	1.0608	16.36	23.3537675
21.04.2015 15:40:12.4	262.98	507.8	1.0278	16.38	22.9876462
21.04.2015 15:40:12.5	260.64	507.8	1.0043	16.19	22.7233275
21.04.2015 15:40:12.6	260.42	507.8	1.0503	16.35	23.2379001
21.04.2015 15:40:12.7	260.44	507.6	1.0511	16.27	23.2467484
21.04.2015 15:40:12.8	258.86	507.6	1.0539	16.29	23.277691
21.04.2015 15:40:12.9	257.79	507.6	0.9954	16.35	22.6224176
21.04.2015 15:40:13.0	257.87	507.5	0.9454	16.3	22.0469236
21.04.2015 15:40:13.1	257.78	507.4	1.0298	16.33	23.0100012
21.04.2015 15:40:13.2	255.17	507.5	0.9555	16.28	22.1643777
21.04.2015 15:40:13.3	255.36	507.5	0.8985	16.37	21.4931088
21.04.2015 15:40:13.4	255.28	507.5	0.8657	16.35	21.0971556
21.04.2015 15:40:13.5	253.33	507.5	0.959	16.22	22.2049347
21.04.2015 15:40:13.6	252.74	507.6	0.9769	16.18	22.4112073
21.04.2015 15:40:13.7	252.74	507.6	0.9479	16.25	22.0760546
21.04.2015 15:40:13.8	252.36	507.5	0.9404	16.33	21.9885457
21.04.2015 15:40:13.9	249.99	507.4	0.9814	16.23	22.4627655
21.04.2015 15:40:14.0	250.22	507.4	1.065	16.25	23.3999539
21.04.2015 15:40:14.1	250.16	507.5	1.053	16.41	23.2677497
21.04.2015 15:40:14.2	248.73	507.4	0.9928	16.35	22.5928533
21.04.2015 15:40:14.3	247.53	507.4	1.0492	16.39	23.2257281
21.04.2015 15:40:14.4	247.66	507.6	1.1877	16.26	24.7111852
21.04.2015 15:40:14.5	247.65	507.6	1.154	16.4	24.3580828
21.04.2015 15:40:14.6	245	507.5	1.2205	16.38	25.0500784
21.04.2015 15:40:14.7	245.04	507.5	1.115	16.33	23.9429485
21.04.2015 15:40:14.8	245.09	507.6	1.1397	16.18	24.2066935
21.04.2015 15:40:14.9	242.92	507.7	1.1359	16.29	24.1663047
21.04.2015 15:40:15.0	242.07	507.7	1.0767	16.27	23.5281377
21.04.2015 15:40:15.1	242.17	507.7	0.9586	16.26	22.2003034
21.04.2015 15:40:15.2	242.17	507.8	0.9711	16.28	22.3445789
21.04.2015 15:40:15.3	240.3	507.8	0.9932	16.36	22.5974041
21.04.2015 15:40:15.4	239.93	507.8	1.0098	16.3	22.7854642
21.04.2015 15:40:15.5	239.95	507.9	1.0182	16.36	22.8800381
21.04.2015 15:40:15.6	238.41	508	1.1262	16.32	24.0628996
21.04.2015 15:40:15.7	236.88	508.1	1.1579	16.37	24.3992077
21.04.2015 15:40:15.8	237.06	508.1	1.0142	16.29	22.8350518
21.04.2015 15:40:15.9	237.04	508.2	1.0202	16.33	22.9024982
21.04.2015 15:40:16.0	234.51	508.3	1.0466	16.32	23.1969327
21.04.2015 15:40:16.1	234.5	508.2	0.9868	16.32	22.5244797
21.04.2015 15:40:16.2	234.43	508.2	1.0686	16.28	23.4394697
21.04.2015 15:40:16.3	232.66	508.3	0.9425	16.11	22.0130833
21.04.2015 15:40:16.4	231.86	508.3	1.0349	16.27	23.0669084
21.04.2015 15:40:16.5	231.9	508.4	1.0607	16.35	23.3526667
21.04.2015 15:40:16.6	230.87	508.4	0.9574	16.2	22.1864036
21.04.2015 15:40:16.7	229.21	508.5	1.0356	16.17	23.0747082
21.04.2015 15:40:16.8	229.4	508.5	1.0175	16.3	22.8721719
21.04.2015 15:40:16.9	229.33	508.5	1.018	16.38	22.8777909
21.04.2015 15:40:17.0	227.13	508.5	0.928	16.22	21.8430955
21.04.2015 15:40:17.1	226.79	508.6	0.9355	16.25	21.9311847
21.04.2015 15:40:17.2	226.75	508.6	0.8778	16.39	21.2440828
21.04.2015 15:40:17.3	225.38	508.6	0.9489	16.41	22.0876962
21.04.2015 15:40:17.4	224.15	508.6	0.9879	16.21	22.5370304
21.04.2015 15:40:17.5	224.24	508.8	0.8729	16.38	21.1847061
21.04.2015 15:40:17.6	224.28	508.7	0.859	16.43	21.0153573
21.04.2015 15:40:17.7	221.61	508.6	0.9984	16.44	22.6564824
21.04.2015 15:40:17.8	221.69	508.5	0.9255	16.29	21.8136534
21.04.2015 15:40:17.9	221.65	508.6	1.0635	16.61	23.3834692
21.04.2015 15:40:18.0	220.78	508.6	1.0726	16.09	23.4832982
21.04.2015 15:40:18.1	218.89	508.5	0.9767	16.43	22.408913
21.04.2015 15:40:18.2	219.13	508.5	1.0932	16.07	23.707732
21.04.2015 15:40:18.3	219.14	508.6	1.0687	16.38	23.4405664
21.04.2015 15:40:18.4	217.01	508.6	1.0417	16.39	23.142567
21.04.2015 15:40:18.5	216.51	508.6	1.1095	16.36	23.8838234
21.04.2015 15:40:18.6	216.6	508.6	1.0044	16.37	22.7244588
21.04.2015 15:40:18.7	216.02	508.8	1.0706	16.3	23.4613942
21.04.2015 15:40:18.8	213.38	508.7	0.982	16.4	22.469631
21.04.2015 15:40:18.9	213.66	508.7	0.9853	16.29	22.5073538
21.04.2015 15:40:19.0	213.67	508.8	0.9489	16.33	22.0876962

21.04.2015 15:40:19.1	212.07	508.9	0.8796	16.25
21.04.2015 15:40:19.2	210.97	508.9	0.9827	16.45
21.04.2015 15:40:19.3	211.09	509	0.9503	16.38
21.04.2015 15:40:19.4	211.01	509.1	0.9854	16.28
21.04.2015 15:40:19.5	208.37	509.2	0.9647	16.35
21.04.2015 15:40:19.6	208.56	509.2	0.9102	16.41
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21.04.2015 15:40:19.8	206.22	509.4	1.0043	16.25
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21.04.2015 15:40:41.7	43.22	509.6	0.9586	16.35	22.2003034
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21.04.2015 15:40:42.0	40.16	509.6	0.8466	16.37	20.8631235
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21.04.2015 15:40:47.9	-2.06	509.3	0.8714	16.23	21.1664963
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21.04.2015 15:41:01.9	-107.69	509	0.9266	16.51	21.8266128
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21.04.2015 15:41:03.2	-118.02	509.4	0.953	16.37	22.135363
21.04.2015 15:41:03.3	-117.91	509.4	0.8833	16.34	21.310533
21.04.2015 15:41:03.4	-117.93	509.4	0.9147	16.4	21.6860042
21.04.2015 15:41:03.5	-119.81	509.4	0.8966	16.41	21.4703718
21.04.2015 15:41:03.6	-120.49	509.3	0.8834	16.38	21.3117393
21.04.2015 15:41:03.7	-120.52	509.3	0.98	16.33	22.4467379
21.04.2015 15:41:03.8	-120.8	509.3	1.0159	16.31	22.8541818
21.04.2015 15:41:03.9	-123.17	509.3	0.9273	16.33	21.8348557
21.04.2015 15:41:04.0	-123.03	509.2	0.9521	16.42	22.1249083
21.04.2015 15:41:04.1	-123.05	509.3	0.8646	16.28	21.0837478
21.04.2015 15:41:04.2	-123.52	509.3	0.8796	16.51	21.265853
21.04.2015 15:41:04.3	-125.75	509.2	0.8375	16.53	20.750693
21.04.2015 15:41:04.4	-125.57	509.2	0.9561	16.36	22.1713356
21.04.2015 15:41:04.5	-125.57	509.3	0.8295	16.3	20.6513474
21.04.2015 15:41:04.6	-128.55	509.2	0.7825	16.39	20.0577572
21.04.2015 15:41:04.7	-128.52	509.1	0.8455	16.58	20.8495652
21.04.2015 15:41:04.8	-128.54	509.1	0.965	16.32	22.2742892
21.04.2015 15:41:04.9	-128.59	509.2	0.9357	16.35	21.9335289
21.04.2015 15:41:05.0	-131.21	509.2	0.9691	16.44	22.3215575
21.04.2015 15:41:05.1	-131.01	509.1	0.9064	16.45	21.5873904
21.04.2015 15:41:05.2	-131.06	509.2	0.8849	16.32	21.3298251
21.04.2015 15:41:05.3	-132.21	509.3	0.9373	16.27	21.9522735
21.04.2015 15:41:05.4	-133.75	509.4	0.9488	16.35	22.0865323
21.04.2015 15:41:05.5	-133.6	509.3	1.0178	16.4	22.8755435
21.04.2015 15:41:05.6	-133.65	509.3	0.8913	16.34	21.4068197
21.04.2015 15:41:05.7	-136.25	509.5	0.9383	16.33	21.9639808
21.04.2015 15:41:05.8	-136.49	509.5	0.9436	16.31	22.0259254
21.04.2015 15:41:05.9	-136.54	509.4	0.9926	16.31	22.5905775
21.04.2015 15:41:06.0	-137.26	509.5	0.9315	16.26	21.884248
21.04.2015 15:41:06.1	-139.69	509.6	0.8419	16.26	20.8051309
21.04.2015 15:41:06.2	-139.44	509.5	0.9167	16.3	21.7096995
21.04.2015 15:41:06.3	-139.51	509.5	0.9233	16.21	21.7877114
21.04.2015 15:41:06.4	-140.3	509.5	1.014	16.32	22.8328001
21.04.2015 15:41:06.5	-142.21	509.6	0.9556	16.28	22.1655375
21.04.2015 15:41:06.6	-141.99	509.5	1.0216	16.43	22.9182071
21.04.2015 15:41:06.7	-141.99	509.5	0.962	16.28	22.239639
21.04.2015 15:41:06.8	-144.08	509.6	0.8564	16.35	20.9835289
21.04.2015 15:41:06.9	-144.62	509.5	0.9049	16.44	21.5695205
21.04.2015 15:41:07.0	-144.59	509.5	0.9505	16.5	22.1063101
21.04.2015 15:41:07.1	-144.62	509.5	0.9784	16.31	22.4284065
21.04.2015 15:41:07.2	-147.21	509.6	0.9827	16.27	22.4776381
21.04.2015 15:41:07.3	-147.49	509.6	0.8648	16.41	21.0861862
21.04.2015 15:41:07.4	-147.49	509.5	0.8539	16.44	20.9528789
21.04.2015 15:41:07.5	-149.25	509.5	0.8945	16.29	21.4452133
21.04.2015 15:41:07.6	-150.51	509.6	0.7836	16.27	20.0718504
21.04.2015 15:41:07.7	-150.39	509.6	1.0236	16.38	22.9406298
21.04.2015 15:41:07.8	-150.43	509.4	0.9873	16.39	22.5301854
21.04.2015 15:41:07.9	-152.24	509.4	0.8533	16.38	20.9455163
21.04.2015 15:41:08.0	-153.03	509.6	0.7553	16.33	19.7060663
21.04.2015 15:41:08.1	-152.98	509.6	0.7434	16.3	19.5502122
21.04.2015 15:41:08.2	-153.2	509.5	0.8289	16.38	20.6438772
21.04.2015 15:41:08.3	-156.06	509.6	1.0238	16.42	22.9428708
21.04.2015 15:41:08.4	-155.87	509.7	1.0806	16.35	23.5707108
21.04.2015 15:41:08.5	-155.9	509.7	1.0256	16.38	22.9630305
21.04.2015 15:41:08.6	-157.14	509.7	0.9707	16.31	22.3399765
21.04.2015 15:41:08.7	-158.64	509.8	0.8718	16.36	21.1713538

21.04.2015 15:41:08.8	-158.47	509.9	0.9592	16.36	22.20725
21.04.2015 15:41:08.9	-158.44	509.9	0.9418	16.39	22.0049071
21.04.2015 15:41:09.0	-161.22	509.9	0.9112	16.37	21.6444748
21.04.2015 15:41:09.1	-161.4	509.9	1.0005	16.31	22.6802973
21.04.2015 15:41:09.2	-161.36	509.9	0.9121	16.41	21.6551614
21.04.2015 15:41:09.3	-162.08	509.9	0.9841	16.46	22.4936438
21.04.2015 15:41:09.4	-164.23	509.9	0.9894	16.39	22.5541337
21.04.2015 15:41:09.5	-163.94	510	0.8841	16.26	21.3201813
21.04.2015 15:41:09.6	-164.04	510.1	0.8361	16.47	20.7333419
21.04.2015 15:41:09.7	-166.67	510	0.8579	16.44	21.0018973
21.04.2015 15:41:09.8	-166.49	510	0.8478	16.38	20.8779043
21.04.2015 15:41:09.9	-166.49	510.2	0.9189	16.26	21.7357346
21.04.2015 15:41:10.0	-167.64	510.1	1.0043	16.36	22.7233275
21.04.2015 15:41:10.1	-169.26	510	0.9635	16.42	22.2569708
21.04.2015 15:41:10.2	-169.06	510	0.9767	16.37	22.408913
21.04.2015 15:41:10.3	-169.11	510.2	1.0619	16.27	23.3658728
21.04.2015 15:41:10.4	-170.49	510.2	0.9475	16.39	22.0713962
21.04.2015 15:41:10.5	-171.68	510.1	0.9898	16.32	22.5586924
21.04.2015 15:41:10.6	-171.63	510.1	1.0539	16.4	23.277691
21.04.2015 15:41:10.7	-172.34	510.3	1.0045	16.29	22.72559
21.04.2015 15:41:10.8	-174.77	510.3	1.0056	16.39	22.7380297
21.04.2015 15:41:10.9	-174.55	510.2	1.0023	16.36	22.7006902
21.04.2015 15:41:11.0	-174.62	510.2	1.0049	16.35	22.7301143
21.04.2015 15:41:11.1	-175.42	510.3	0.9289	16.28	21.853685
21.04.2015 15:41:11.2	-177.3	510.3	0.8485	16.39	20.8865216
21.04.2015 15:41:11.3	-177.09	510.2	0.8668	16.38	21.1105549
21.04.2015 15:41:11.4	-177.09	510.3	0.9299	16.34	21.865445
21.04.2015 15:41:11.5	-179.43	510.4	0.9594	16.37	22.2095651
21.04.2015 15:41:11.6	-180.05	510.3	0.8818	16.43	21.2924308
21.04.2015 15:41:11.7	-180.03	510.3	0.8446	16.4	20.8384655
21.04.2015 15:41:11.8	-180.02	510.4	0.7722	16.33	19.9253104
21.04.2015 15:41:11.9	-182.31	510.5	0.8315	16.41	20.6762285
21.04.2015 15:41:12.0	-182.58	510.4	0.7366	16.51	19.4605923
21.04.2015 15:41:12.1	-182.58	510.3	0.8727	16.24	21.1822791
21.04.2015 15:41:12.2	-183.26	510.4	0.949	16.21	22.08886
21.04.2015 15:41:12.3	-185.69	510.3	1.0198	16.58	22.8980079
21.04.2015 15:41:12.4	-185.46	510.1	0.9064	16.28	21.5873904
21.04.2015 15:41:12.5	-185.53	510.1	0.8711	16.37	21.1628525
21.04.2015 15:41:12.6	-188.21	510.1	1.0182	16.14	22.8800381
21.04.2015 15:41:12.7	-188.02	510.1	0.9981	16.52	22.6530782
21.04.2015 15:41:12.8	-188.08	509.9	0.9636	16.47	22.2581258
21.04.2015 15:41:12.9	-188.27	509.9	0.9291	16.42	21.8560375
21.04.2015 15:41:13.0	-190.75	510	0.9665	16.22	22.2915941
21.04.2015 15:41:13.1	-190.57	510	0.995	16.47	22.6178718
21.04.2015 15:41:13.2	-190.64	509.9	0.9986	16.43	22.6587516
21.04.2015 15:41:13.3	-193.14	509.9	0.9237	16.44	21.7924305
21.04.2015 15:41:13.4	-193.59	510.1	0.9873	16.18	22.5301854
21.04.2015 15:41:13.5	-193.56	510.2	0.9087	16.4	21.6147622
21.04.2015 15:41:13.6	-193.54	510.1	1.0063	16.43	22.7459423
21.04.2015 15:41:13.7	-195.97	510.1	0.8526	16.46	20.9369233
21.04.2015 15:41:13.8	-196.1	510.3	0.829	16.36	20.6451224
21.04.2015 15:41:13.9	-196.08	510.2	0.8983	16.44	21.4907166
21.04.2015 15:41:14.0	-196.84	510.1	0.932	16.41	21.8901206
21.04.2015 15:41:14.1	-198.94	510.2	0.9469	16.35	22.0644068
21.04.2015 15:41:14.2	-198.66	510.2	0.9151	16.46	21.6907453
21.04.2015 15:41:14.3	-198.68	510.1	0.955	16.34	22.1585778
21.04.2015 15:41:14.4	-199.79	510.1	1.0278	16.42	22.9876462
21.04.2015 15:41:14.5	-201.8	510.2	1.0231	16.23	22.9350261
21.04.2015 15:41:14.6	-201.54	510.3	0.8384	16.44	20.7618396
21.04.2015 15:41:14.7	-201.61	510.2	0.8742	16.39	21.2004753
21.04.2015 15:41:14.8	-204.1	510.3	0.929	16.28	21.8548613
21.04.2015 15:41:14.9	-204.55	510.4	1.0063	16.2	22.7459423
21.04.2015 15:41:15.0	-204.51	510.4	0.9868	16.4	22.5244797
21.04.2015 15:41:15.1	-205.94	510.3	0.9025	16.47	21.5408979
21.04.2015 15:41:15.2	-207.2	510.3	0.961	16.23	22.2280769
21.04.2015 15:41:15.3	-207.06	510.4	0.9724	16.32	22.3595301
21.04.2015 15:41:15.4	-207.08	510.4	0.9625	16.38	22.2454178
21.04.2015 15:41:15.5	-208.69	510.3	0.9136	16.49	21.6729607
21.04.2015 15:41:15.6	-209.71	510.4	0.9567	16.28	22.1782913
21.04.2015 15:41:15.7	-209.67	510.6	0.9998	16.35	22.6723618
21.04.2015 15:41:15.8	-209.73	510.6	0.9962	16.36	22.6315066

21.04.2015 15:41:15.9	-212.69	510.5	0.9212	16.47	21.7629198
21.04.2015 15:41:16.0	-212.54	510.6	0.9334	16.29	21.9065555
21.04.2015 15:41:16.1	-212.57	510.8	0.8818	16.34	21.2924308
21.04.2015 15:41:16.2	-214.57	510.8	0.954	16.36	22.1469734
21.04.2015 15:41:16.3	-215.13	510.7	0.9274	16.39	21.836033
21.04.2015 15:41:16.4	-215.13	510.8	0.8453	16.28	20.8470991
21.04.2015 15:41:16.5	-215.09	511	0.9088	16.28	21.6159515
21.04.2015 15:41:16.6	-217.29	511	0.9008	16.44	21.5206005
21.04.2015 15:41:16.7	-217.56	511	0.9408	16.31	21.9932217
21.04.2015 15:41:16.8	-217.51	511	0.9136	16.32	21.6729607
21.04.2015 15:41:16.9	-217.52	511.1	0.8964	16.4	21.467977
21.04.2015 15:41:17.0	-217.5	511	0.8134	16.49	20.4499514
21.04.2015 15:41:17.1	-217.58	510.9	0.9373	16.38	21.9522735
21.04.2015 15:41:17.2	-217.55	511	0.9594	16.3	22.2095651
21.04.2015 15:41:17.3	-217.54	511	1.0015	16.37	22.691629
21.04.2015 15:41:17.4	-217.55	510.9	1.0296	16.39	23.0077667
21.04.2015 15:41:17.5	-217.57	510.9	0.8984	16.19	21.4919127
21.04.2015 15:41:17.6	-217.53	511.1	0.9774	16.18	22.4169418
21.04.2015 15:41:17.7	-217.5	511.1	0.8843	16.31	21.3225926
21.04.2015 15:41:17.8	-217.53	511	0.8615	16.35	21.0459163
21.04.2015 15:41:17.9	-217.57	511	0.8208	16.25	20.5427637
21.04.2015 15:41:18.0	-217.53	511.1	0.9395	16.25	21.9780213
21.04.2015 15:41:18.1	-217.54	511.2	0.9047	16.34	21.5671368
21.04.2015 15:41:18.2	-217.55	511.1	1.001	16.51	22.6859639
21.04.2015 15:41:18.3	-217.55	511.2	0.9809	16.4	22.4570427
21.04.2015 15:41:18.4	-217.52	511.3	0.9119	16.46	21.6527871
21.04.2015 15:41:18.5	-217.52	511.4	0.8907	16.17	21.3996132
21.04.2015 15:41:18.6	-217.52	511.3	0.9972	16.41	22.6428626
21.04.2015 15:41:18.7	-217.56	511.4	0.9703	16.34	22.3353732
21.04.2015 15:41:18.8	-217.56	511.5	0.9438	16.47	22.0282595
21.04.2015 15:41:18.9	-217.54	511.5	0.9153	16.45	21.6931155

Calculation of mass flow rate based on polynomial equation fitted to the experimental data

$$y = -3.04842213E-14x^6 + 2.08646389E-12x^5 + 1.89417942E-09x^4 - 1.04025860E-07x^3 + 5.03779003E-06x^2 + 2.47070553E-03x + 2.09893684E+01$$

Please enter below Polynomial Coefficients

Order no	Coeff
6	-3.04842213E-14
5	2.08646389E-12
4	1.89417942E-09
3	-1.04025860E-07
2	5.03779003E-06
1	2.47070553E-03
0	2.09893684E+01

Actual Area	0.274324656	[m2]
Integrated area	0.274324656	[m2]
Area Error	0	[%]
Integrated Mass flow	2.29328584	[Kg/s]

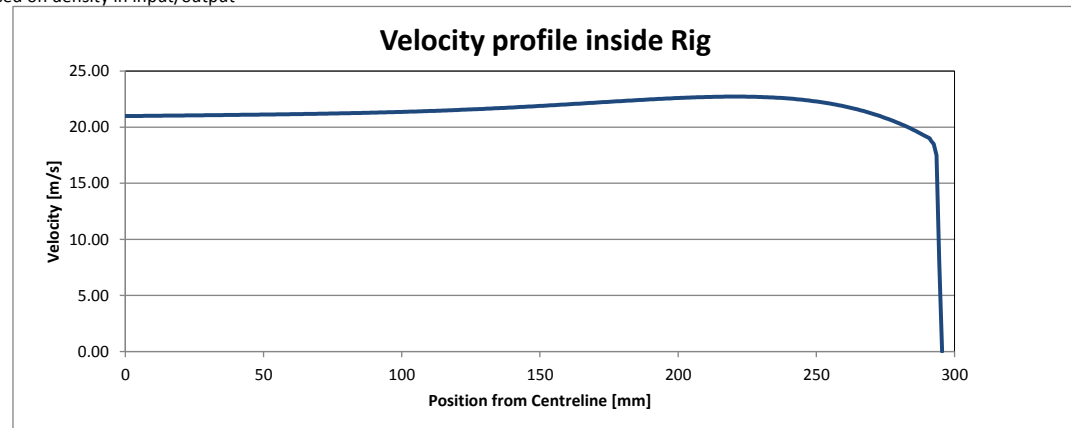
Polynomial curve (dP vs position)

Please do NOT alter any of the figures below

position [mm]	Velocity [m/s]
0	20.989368
1	20.991844
2	20.994329
3	20.996823
4	20.999326
5	21.001836
6	21.004354
7	21.006879
8	21.009411
9	21.011950
10	21.014494
11	21.017045
12	21.019602
13	21.022165
14	21.024734
15	21.027309
16	21.029889
17	21.032476
18	21.035068
19	21.037668
20	21.040273
21	21.042886
22	21.045506
23	21.048133
24	21.050768
25	21.053412
26	21.056065
27	21.058727
28	21.061400
29	21.064083
30	21.066778
31	21.069485
32	21.072204
33	21.074938

Delta Area [m2]	Delta Mass flow [Kg/s]
0	0
3.14159E-06	2.56537E-05
9.42478E-06	7.69702E-05
1.5708E-05	0.000128299
2.19911E-05	0.00017964
2.82743E-05	0.000230993
3.45575E-05	0.000282359
4.08407E-05	0.000333737
4.71239E-05	0.000385128
5.34071E-05	0.000436531
5.96903E-05	0.000487946
6.59734E-05	0.000539375
7.22566E-05	0.000590815
7.85398E-05	0.000642269
8.4823E-05	0.000693735
9.11062E-05	0.000745214
9.73894E-05	0.000796706
0.000103673	0.000848211
0.000109956	0.000899728
0.000116239	0.000951259
0.000122522	0.001002803
0.000128805	0.001054359
0.000135088	0.001105929
0.000141372	0.001157512
0.000147655	0.001209109
0.000153938	0.001260718
0.000160221	0.001312341
0.000166504	0.001363978
0.000172788	0.001415629
0.000179071	0.001467293
0.000185354	0.001518971
0.000191637	0.001570664
0.00019792	0.00162237
0.000204204	0.001674091

Based on density in input/output



34	21.077686
35	21.080450
36	21.083231
37	21.086028
38	21.088845
39	21.091681
40	21.094537
41	21.097416
42	21.100317
43	21.103243
44	21.106194
45	21.109172
46	21.112177
47	21.115213
48	21.118279
49	21.121377
50	21.124509
51	21.127677
52	21.130881
53	21.134123
54	21.137405
55	21.140728
56	21.144095
57	21.147506
58	21.150964
59	21.154470
60	21.158026
61	21.161633
62	21.165294
63	21.169010
64	21.172783
65	21.176615
66	21.180507
67	21.184462
68	21.188482
69	21.192568
70	21.196722
71	21.200946
72	21.205242
73	21.209612
74	21.214058
75	21.218582
76	21.223185
77	21.227871
78	21.232640
79	21.237494
80	21.242437
81	21.247468
82	21.252592
83	21.257808

0.000210487	0.001725827
0.00021677	0.001777577
0.000223053	0.001829342
0.000229336	0.001881123
0.000235619	0.001932918
0.000241903	0.00198473
0.000248186	0.002036557
0.000254469	0.0020884
0.000260752	0.00214026
0.000267035	0.002192136
0.000273319	0.00224403
0.000279602	0.002295941
0.000285885	0.002347869
0.000292168	0.002399816
0.000298451	0.002451781
0.000304734	0.002503764
0.000311018	0.002555767
0.000317301	0.00260779
0.000323584	0.002659833
0.000329867	0.002711896
0.00033615	0.00276398
0.000342434	0.002816086
0.000348717	0.002868214
0.000355	0.002920365
0.000361283	0.002972538
0.000367566	0.003024736
0.00037385	0.003076958
0.000380133	0.003129205
0.000386416	0.003181478
0.000392699	0.003233777
0.000398982	0.003286103
0.000405265	0.003338457
0.000411549	0.003390839
0.000417832	0.00344325
0.000424115	0.003495691
0.000430398	0.003548163
0.000436681	0.003600667
0.000442965	0.003653203
0.000449248	0.003705772
0.000455531	0.003758376
0.000461814	0.003811014
0.000468097	0.003863688
0.00047438	0.0039164
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289	19.272082
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0.00183469	0.013203347
0.001840973	0.012532426
0.001847256	0.005748662
0.00185354	0

Please do not change any of the values in this sheet

Patm	Atmospheric air pressure - (As recorded from engine data)	975 [mBar]
Patm		97500 [Pa]
Tatm		5 [C]
Tatm		278 [K]
Relative Humidity		95 [%]

$$\rho_{\text{humid air}}^{[1]} = \frac{p_d}{R_d T} + \frac{p_v}{R_v T} = \frac{p_d M_d + p_v M_v}{RT}$$

where:

$\rho_{\text{humid air}}$	Density of the humid air (kg/m <sup>3</sup> )
$p_d$	Partial pressure of dry air (Pa)
$R_d$	Specific gas constant for dry air, 287.058 J/(kg·K)
$T$	Temperature (K)
$p_v$	Pressure of water vapor (Pa)
$R_v$	Specific gas constant for water vapor, 461.495 J/(kg·K)
$M_d$	Molar mass of dry air, 0.028964 (kg/mol)
$M_v$	Molar mass of water vapor, 0.018016 (kg/mol)
$R$	<a href="#">Universal gas constant, 8.314 J/(K·mol)</a>

$$\rho_{\text{humid air}} = 1.217898 \text{ Kg/m}^3$$

$$0.318090154$$

The vapor pressure of water may be calculated from the [saturation vapor pressure](#) and [relative humidity](#). It is found by:

$$p_v = \phi p_{\text{sat}}$$

$$p_u = 828.6578 \text{ [Pa]}$$

Where:

$p_v$	Vapor pressure of water
$\phi$	Relative humidity
$p_{\text{sat}}$	Saturation vapor pressure

The [saturation vapor pressure of water](#) at any given temperature is the vapor pressure when relative humidity is 100%. One formula <sup>[1]</sup> used to find the saturation vapor pressure is:

$$p_{\text{sat}} = 6.1078 \times 10^{\frac{7.5T}{T+237.3}}$$

$$p_{\text{sat}} = 8.722714 \text{ hPa}$$

$$p_{\text{sat}} = 872.2714 \text{ [Pa]}$$

where T is in degrees C. Note:

$$\rho = \frac{p}{R_{\text{specific}} T} \quad 1.22177 \text{ [kg/m}^3]$$

$$R = 287.058 \text{ J/Kg K}$$

$$T = \text{Temperature in degrees Kelvin}$$

$$P = \text{Absolute Pressure in Pa}$$