



Rig Mass Flow Rate Calculations

Please Enter Parameters in highlighted boxes below

Engine Data File		
Ambient Conditions		
Air Temperature	5	[C]
Atmospheric Pressure	975	[mBar]
Air Humidity	95	[%]
Viper Engine Parameters		
Engine Air Intake Mass Flow	18.7	[Kg/s]
Butane Flow Rate	1732	[Ltr/h]
Engine Speed	12150	[RPM]
ETC	650	[C]
Gas Delivery System Data File		
Gas Delivery System		
Mixed Gas (Fuel) Mass Flow rate	0.209	[Kg/s]
Oxygen Mass Flow rate	0.17	[Kg/s]

Please do not change anything in this box

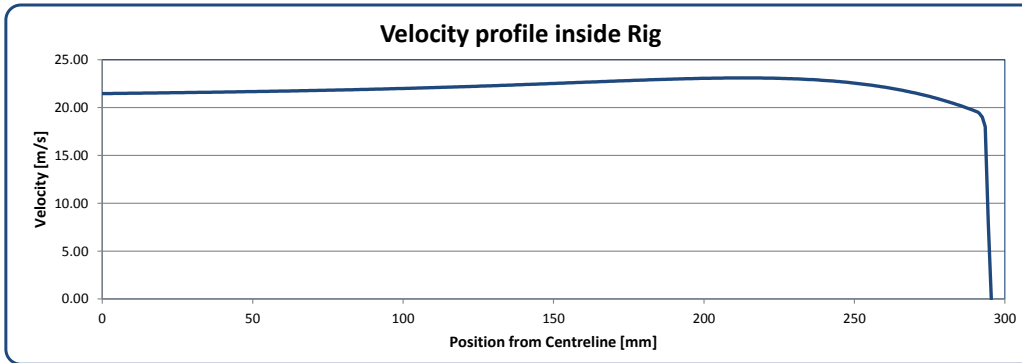
Test Date and Time = 29.04.2015 15:11:04.6

Calculated Parameters		
Air density	1.217898	[Kg/m ³]
Liquid Butane density	584	[Kg/m ³]
Butane mass Flow rate	0.280969	[Kg/s]
Air Fuel Ratio	79.23263	[]
Calculated Exhaust gas properties (Reaction Engines)		
Exhaust products density	0.389	[Kg/m ³]
Pitot Traverse Results		
Rig Gas flow rate - Integrated	2.341684	[Kg/s]
Total Rig Mass flow	2.720684	[Kg/s]
Rig Gas Temperature as read from TC 11		
Gas Temperature	516	[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

0.929058368

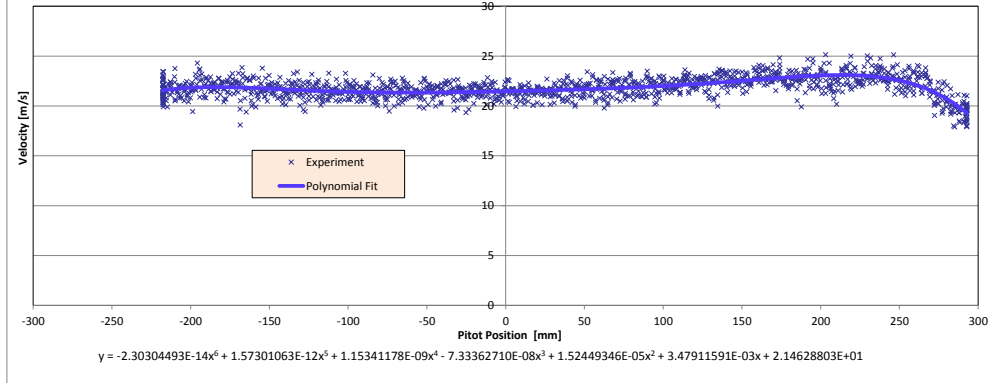
Average Vel 21.8290133 [m/s]

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 %
29.04.2015 15:11:04.6	-217.33	508.6	1.0205	16.25
29.04.2015 15:11:04.7	-217.34	508.6	1.0658	16.17
29.04.2015 15:11:04.8	-217.39	508.5	0.8778	16.43
29.04.2015 15:11:04.9	-217.4	508.6	0.9497	16.3
29.04.2015 15:11:05.0	-217.36	508.6	0.9086	16.13
29.04.2015 15:11:05.1	-217.39	508.7	0.8938	16.19
29.04.2015 15:11:05.2	-217.39	508.7	1.0097	16.4
29.04.2015 15:11:05.3	-217.37	508.8	1.0664	16.2
29.04.2015 15:11:05.4	-217.36	509	0.9461	16.14
29.04.2015 15:11:05.5	-217.4	509.1	0.8113	16.32
29.04.2015 15:11:05.6	-217.38	509	0.8057	16.3
29.04.2015 15:11:05.7	-217.4	509.1	0.806	16.2
29.04.2015 15:11:05.8	-217.39	509.2	0.9932	16.17
29.04.2015 15:11:05.9	-217.38	509.2	0.9886	16.3
29.04.2015 15:11:06.0	-217.35	509.2	0.8306	16.27
29.04.2015 15:11:06.1	-217.4	509.2	0.8544	16.3
29.04.2015 15:11:06.2	-217.35	509.3	0.7956	16.14
29.04.2015 15:11:06.3	-217.35	509.3	0.7715	16.29
29.04.2015 15:11:06.4	-215.57	509.2	0.886	16.18
29.04.2015 15:11:06.5	-215.39	509.3	0.9015	16.29
29.04.2015 15:11:06.6	-215.39	509.3	0.9334	16.2
29.04.2015 15:11:06.7	-214.71	509.3	0.7713	16.24
29.04.2015 15:11:06.8	-212.7	509.4	0.9217	16.09
29.04.2015 15:11:06.9	-212.78	509.4	0.9554	16.11
29.04.2015 15:11:07.0	-212.82	509.5	0.8655	16.11
29.04.2015 15:11:07.1	-211.83	509.6	0.889	16.23
29.04.2015 15:11:07.2	-209.81	509.6	0.8303	16.12
29.04.2015 15:11:07.3	-209.89	509.6	0.8185	16.12
29.04.2015 15:11:07.4	-210.05	509.6	0.9067	16.22
29.04.2015 15:11:07.5	-208.67	509.6	0.8979	16.26
29.04.2015 15:11:07.6	-206.88	509.6	0.9482	16.12
29.04.2015 15:11:07.7	-206.98	509.6	0.8404	16.01
29.04.2015 15:11:07.8	-206.48	509.6	0.8611	16.17
29.04.2015 15:11:07.9	-203.89	509.5	0.9418	16.15
29.04.2015 15:11:08.0	-204.06	509.5	0.8178	16.1
29.04.2015 15:11:08.1	-204.05	509.6	0.9073	16.08
29.04.2015 15:11:08.2	-203.38	509.6	0.9638	16.08
29.04.2015 15:11:08.3	-201.36	509.5	0.8859	16.12
29.04.2015 15:11:08.4	-201.35	509.5	0.8113	16.06
29.04.2015 15:11:08.5	-201.38	509.5	0.9342	16.02
29.04.2015 15:11:08.6	-199.54	509.5	0.9515	16.16
29.04.2015 15:11:08.7	-198.97	509.4	0.9008	16.13
29.04.2015 15:11:08.8	-198.72	509.3	0.7355	16.09
29.04.2015 15:11:08.9	-198.85	509.3	0.9093	16.12
29.04.2015 15:11:09.0	-196.58	509.3	0.9029	16.09
29.04.2015 15:11:09.1	-196.11	509.2	0.9544	16.09
29.04.2015 15:11:09.2	-195.76	509.1	1.1484	16.05
29.04.2015 15:11:09.3	-194.45	509.1	1.0856	16.13
29.04.2015 15:11:09.4	-192.9	509.1	1.0466	16.2
29.04.2015 15:11:09.5	-193.04	509.1	0.914	16.09
29.04.2015 15:11:09.6	-192.83	509.2	0.9943	16.1
29.04.2015 15:11:09.7	-191.49	509.2	0.8451	16.18
29.04.2015 15:11:09.8	-190.32	509.2	0.8419	16.25
29.04.2015 15:11:09.9	-190.43	509.2	0.9604	16.08
29.04.2015 15:11:10.0	-190.27	509.3	1.0027	16.07
29.04.2015 15:11:10.1	-187.27	509.3	0.8979	16.07
29.04.2015 15:11:10.2	-187.36	509.3	0.9633	16.17
29.04.2015 15:11:10.3	-187.39	509.3	1.0211	16.13
29.04.2015 15:11:10.4	-187.07	509.4	0.8929	16.21

Calculated Velocity [m/s]
22.9058653
23.4087409
21.2440828
22.0970051
21.6135728
21.4368205
22.7843359
23.4153291
22.0550841
20.423536
20.3529272
20.356716
22.5974041
22.5450135
20.6650357
20.9590125
20.224956
19.9162772
21.3430783
21.5289606
21.9065555
19.9136955
21.7688251
22.1632179
21.0947185
21.3791817
20.6613034
20.5139616
21.5909626
21.4859313
22.0795477
20.7865885
21.0410298
22.0049071
20.5051878
21.5981052
22.2604356
21.3418738
20.423536
21.9159413
22.1179358
21.5206005
19.4460562
21.6218969
21.545671
22.1516159
24.2989098
23.6251794
23.1969327
21.6777047
22.6099143
20.8446328
20.8051309
22.221368
22.7052195
21.4859313
22.2546607
22.912598
21.4260251

Raw Data Plot with Polynomial fit on Calculated Velocity



29.04.2015 15:11:10.5	-184.71	509.4	0.9757	16.18	22.3974383
29.04.2015 15:11:10.6	-184.94	509.3	0.9073	16.33	21.5981052
29.04.2015 15:11:10.7	-184.77	509.3	0.9392	16.21	21.974512
29.04.2015 15:11:10.8	-182.14	509.4	1.0086	16.21	22.7719216
29.04.2015 15:11:10.9	-181.85	509.4	0.9418	16.44	22.0049071
29.04.2015 15:11:11.0	-182.11	509.4	1.009	16.31	22.7764367
29.04.2015 15:11:11.1	-181.17	509.4	0.8708	16.21	21.159208
29.04.2015 15:11:11.2	-178.94	509.4	0.81	16.2	20.4071664
29.04.2015 15:11:11.3	-179.36	509.5	0.9147	16.32	21.6860042
29.04.2015 15:11:11.4	-179.44	509.4	0.9751	16.23	22.3905507
29.04.2015 15:11:11.5	-178.45	509.5	0.8334	16.24	20.6998379
29.04.2015 15:11:11.6	-176.43	509.5	0.9754	16.22	22.3939948
29.04.2015 15:11:11.7	-176.72	509.5	0.8917	16.32	21.4116226
29.04.2015 15:11:11.8	-176.62	509.5	0.9909	16.21	22.571224
29.04.2015 15:11:11.9	-173.46	509.4	1.0513	16.15	23.24896
29.04.2015 15:11:12.0	-173.68	509.4	0.954	16.24	22.1469734
29.04.2015 15:11:12.1	-173.68	509.4	0.9633	16.33	22.2546607
29.04.2015 15:11:12.2	-172.63	509.4	0.942	16.15	22.0072435
29.04.2015 15:11:12.3	-170.91	509.4	0.9637	16.14	22.2592807
29.04.2015 15:11:12.4	-171.08	509.4	0.9733	16.23	22.3698751
29.04.2015 15:11:12.5	-171.12	509.3	0.8996	16.33	21.5062614
29.04.2015 15:11:12.6	-169.79	509.3	0.8881	16.09	21.3683571
29.04.2015 15:11:12.7	-168.32	509.4	0.8201	16.23	20.5340021
29.04.2015 15:11:12.8	-168.49	509.5	0.6366	16.22	18.0914558
29.04.2015 15:11:12.9	-168.57	509.4	0.7531	16.23	19.6773459
29.04.2015 15:11:13.0	-165.63	509.4	0.9255	16.17	21.8136534
29.04.2015 15:11:13.1	-165.55	509.4	0.9078	16.2	21.6040556
29.04.2015 15:11:13.2	-165.6	509.3	0.839	16.23	20.7692674
29.04.2015 15:11:13.3	-164.68	509.1	0.7322	16.23	19.4023824
29.04.2015 15:11:13.4	-162.34	509	0.9896	16.18	22.5564131
29.04.2015 15:11:13.5	-162.55	508.9	0.9952	16.18	22.6201448
29.04.2015 15:11:13.6	-162.62	508.8	0.9911	16.23	22.5735018
29.04.2015 15:11:13.7	-161.6	508.6	0.8723	16.24	21.1774241
29.04.2015 15:11:13.8	-159.81	508.6	0.9134	16.16	21.6705883
29.04.2015 15:11:13.9	-159.99	508.6	1.0088	16.13	22.7741792
29.04.2015 15:11:14.0	-160.2	508.5	1.0291	16.27	23.0021794
29.04.2015 15:11:14.1	-157.59	508.5	0.858	16.2	21.0031213
29.04.2015 15:11:14.2	-156.91	508.5	1.0105	16.12	22.7933603
29.04.2015 15:11:14.3	-157.02	508.5	0.8726	16.17	21.1810654
29.04.2015 15:11:14.4	-157.1	508.5	0.8315	16.33	20.6762285
29.04.2015 15:11:14.5	-154.66	508.5	0.9041	16.2	21.5599839
29.04.2015 15:11:14.6	-154.44	508.6	0.9162	16.25	21.7037781
29.04.2015 15:11:14.7	-154.47	508.6	1.1	16.25	23.7813519
29.04.2015 15:11:14.8	-152.37	508.5	1.0095	16.36	22.7820793
29.04.2015 15:11:14.9	-151.49	508.5	0.9182	16.17	21.7274541
29.04.2015 15:11:15.0	-151.47	508.5	0.9004	16.18	21.5158219
29.04.2015 15:11:15.1	-151.34	508.6	0.8162	16.16	20.4851191
29.04.2015 15:11:15.2	-148.85	508.5	0.8748	16.3	21.2077495
29.04.2015 15:11:15.3	-149.12	508.5	0.9466	16.19	22.0609112
29.04.2015 15:11:15.4	-148.85	508.6	0.93	16.14	21.8666207
29.04.2015 15:11:15.5	-148.59	508.6	0.9724	16.21	22.3595301
29.04.2015 15:11:15.6	-146.34	508.5	0.9156	16.38	21.6966703
29.04.2015 15:11:15.7	-146.33	508.4	0.8615	16.22	21.0459163
29.04.2015 15:11:15.8	-146.29	508.5	0.927	16.2	21.8313235
29.04.2015 15:11:15.9	-143.53	508.5	0.9152	16.27	21.6919304
29.04.2015 15:11:16.0	-143.51	508.5	0.9347	16.28	21.9218054
29.04.2015 15:11:16.1	-143.35	508.5	1.0164	16.19	22.8598052
29.04.2015 15:11:16.2	-143.32	508.6	0.9344	16.21	21.9182871
29.04.2015 15:11:16.3	-140.87	508.6	0.8397	16.32	20.7779298
29.04.2015 15:11:16.4	-141.1	508.6	0.891	16.2	21.4032167
29.04.2015 15:11:16.5	-140.68	508.7	0.9231	16.17	21.7853516
29.04.2015 15:11:16.6	-139.69	508.7	0.9634	16.23	22.2558158
29.04.2015 15:11:16.7	-137.73	508.7	0.9886	16.42	22.5450135
29.04.2015 15:11:16.8	-137.98	508.7	0.8364	16.17	20.7370612
29.04.2015 15:11:16.9	-137.8	508.8	0.8758	16.23	21.2198675
29.04.2015 15:11:17.0	-136.64	508.9	0.8324	16.22	20.6874153
29.04.2015 15:11:17.1	-135.12	508.9	0.8928	16.37	21.4248252
29.04.2015 15:11:17.2	-135.33	508.9	0.9675	16.03	22.3031232
29.04.2015 15:11:17.3	-134.58	509	1.0512	16.29	23.2478542
29.04.2015 15:11:17.4	-132.21	509	1.0663	16.32	23.4142312
29.04.2015 15:11:17.5	-132.27	508.9	0.9474	16.34	22.0702314

29.04.2015 15:11:17.6	-132.42	508.9	0.8951	16.28	21.4524044
29.04.2015 15:11:17.7	-130.63	509	0.783	16.18	20.0641644
29.04.2015 15:11:17.8	-129.76	509	0.8638	16.23	21.0739913
29.04.2015 15:11:17.9	-129.84	508.8	0.927	16.26	21.8313235
29.04.2015 15:11:18.0	-128.8	508.7	0.9389	16.24	21.9710022
29.04.2015 15:11:18.1	-126.91	508.7	0.8839	16.15	21.3177696
29.04.2015 15:11:18.2	-127.25	508.7	0.735	16.36	19.4394452
29.04.2015 15:11:18.3	-127.42	508.6	0.8069	16.26	20.3680783
29.04.2015 15:11:18.4	-124.9	508.6	0.8561	16.21	20.9798532
29.04.2015 15:11:18.5	-124.47	508.6	0.9539	16.25	22.1458127
29.04.2015 15:11:18.6	-124.69	508.6	0.8901	16.31	21.3924043
29.04.2015 15:11:18.7	-124.73	508.5	0.8228	16.21	20.5677762
29.04.2015 15:11:18.8	-122.15	508.5	0.8519	16.25	20.9283267
29.04.2015 15:11:18.9	-121.98	508.5	0.9047	16.31	21.5671368
29.04.2015 15:11:19.0	-122	508.5	0.9417	16.34	22.0037389
29.04.2015 15:11:19.1	-120.23	508.5	0.8252	16.23	20.5977511
29.04.2015 15:11:19.2	-118.79	508.5	0.993	16.1	22.5951288
29.04.2015 15:11:19.3	-119.13	508.5	0.8553	16.17	20.9700484
29.04.2015 15:11:19.4	-119.01	508.5	0.97	16.24	22.33192
29.04.2015 15:11:19.5	-117.3	508.5	0.7839	16.11	20.0756922
29.04.2015 15:11:19.6	-116.39	508.6	0.8199	16.13	20.5314982
29.04.2015 15:11:19.7	-116.47	508.7	0.868	16.24	21.1251626
29.04.2015 15:11:19.8	-116.16	508.5	0.8402	16.24	20.784115
29.04.2015 15:11:19.9	-113.38	508.5	0.8236	16.29	20.5777727
29.04.2015 15:11:20.0	-113.48	508.6	0.9804	16.17	22.4513184
29.04.2015 15:11:20.1	-113.53	508.6	0.9486	16.34	22.0842044
29.04.2015 15:11:20.2	-112.34	508.4	0.8241	16.23	20.5840181
29.04.2015 15:11:20.3	-110.87	508.3	0.893	16.34	21.4272248
29.04.2015 15:11:20.4	-110.87	508.4	0.8759	16.25	21.2210789
29.04.2015 15:11:20.5	-110.95	508.4	0.9154	16.34	21.6943005
29.04.2015 15:11:20.6	-108.18	508.2	0.886	16.24	21.3430783
29.04.2015 15:11:20.7	-107.88	508.2	0.821	16.28	20.5452663
29.04.2015 15:11:20.8	-107.82	508.3	0.9072	16.29	21.5969149
29.04.2015 15:11:20.9	-107.4	508.3	1.001	16.38	22.6859639
29.04.2015 15:11:21.0	-105.86	508.2	0.8896	16.28	21.386395
29.04.2015 15:11:21.1	-105.67	508.2	0.878	16.25	21.2465028
29.04.2015 15:11:21.2	-105.71	508.2	0.9518	16.29	22.1214223
29.04.2015 15:11:21.3	-103.54	508.2	0.8737	16.35	21.1944116
29.04.2015 15:11:21.4	-102.87	508.2	0.897	16.2	21.4751605
29.04.2015 15:11:21.5	-102.69	508.2	0.9116	16.11	21.6492251
29.04.2015 15:11:21.6	-102.4	508.2	0.8253	16.23	20.5989992
29.04.2015 15:11:21.7	-99.67	508.1	0.8282	16.32	20.6351586
29.04.2015 15:11:21.8	-100.04	508.1	0.8694	16.16	21.1421921
29.04.2015 15:11:21.9	-99.74	508.2	0.836	16.12	20.732102
29.04.2015 15:11:22.0	-98.61	508.2	0.8297	16.32	20.6538369
29.04.2015 15:11:22.1	-97.54	508.1	0.9408	16.33	21.9932217
29.04.2015 15:11:22.2	-97.68	508	0.8655	16.16	21.0947185
29.04.2015 15:11:22.3	-96.79	508.2	0.856	16.12	20.9786279
29.04.2015 15:11:22.4	-94.42	508.2	0.812	16.17	20.4323449
29.04.2015 15:11:22.5	-94.7	508	0.9596	16.26	22.2118799
29.04.2015 15:11:22.6	-94.79	507.9	0.9076	16.13	21.6016756
29.04.2015 15:11:22.7	-92.74	508	0.935	16.17	21.9253231
29.04.2015 15:11:22.8	-92.07	508	0.813	16.25	20.4449226
29.04.2015 15:11:22.9	-92.23	507.8	0.935	16.28	21.9253231
29.04.2015 15:11:23.0	-90.93	507.8	0.9187	16.17	21.7333691
29.04.2015 15:11:23.1	-89.27	507.9	0.9052	16.25	21.5730957
29.04.2015 15:11:23.2	-89.5	507.9	0.9263	16.33	21.8230792
29.04.2015 15:11:23.3	-89.62	507.9	0.8192	16.3	20.5227318
29.04.2015 15:11:23.4	-88.05	507.9	0.9326	16.24	21.8971656
29.04.2015 15:11:23.5	-86.71	507.9	0.9686	16.37	22.3157984
29.04.2015 15:11:23.6	-87.04	508	0.8532	16.33	20.9442889
29.04.2015 15:11:23.7	-87.06	508	0.8975	16.25	21.481145
29.04.2015 15:11:23.8	-84.27	508	1.0386	16.2	23.1081063
29.04.2015 15:11:23.9	-84.34	508	0.8442	16.42	20.8335304
29.04.2015 15:11:24.0	-84.26	508	0.8	16.36	20.2808051
29.04.2015 15:11:24.1	-82.34	508	0.8102	16.3	20.4096857
29.04.2015 15:11:24.2	-81.22	508.1	0.7787	16.24	20.0089954
29.04.2015 15:11:24.3	-81.47	508.1	0.805	16.38	20.3440839
29.04.2015 15:11:24.4	-81.17	507.9	0.8731	16.34	21.1871329
29.04.2015 15:11:24.5	-78.72	507.8	0.9026	16.27	21.5420913
29.04.2015 15:11:24.6	-78.83	507.9	0.8706	16.2	21.156778

29.04.2015 15:11:24.7	-78.81	507.9	0.8869	16.33	21.3539157
29.04.2015 15:11:24.8	-76.57	507.7	0.8585	16.32	21.0092402
29.04.2015 15:11:24.9	-76.21	507.7	0.8255	16.32	20.6014949
29.04.2015 15:11:25.0	-76.14	507.8	0.8441	16.17	20.8322965
29.04.2015 15:11:25.1	-76.24	507.9	0.7786	16.27	20.0077106
29.04.2015 15:11:25.2	-73.92	507.8	0.7388	16.3	19.4896321
29.04.2015 15:11:25.3	-73.6	507.8	0.9212	16.37	21.7629198
29.04.2015 15:11:25.4	-73.55	507.9	0.8621	16.25	21.0532438
29.04.2015 15:11:25.5	-72.94	507.8	1.0014	16.34	22.6904961
29.04.2015 15:11:25.6	-70.89	507.7	0.865	16.25	21.0886244
29.04.2015 15:11:25.7	-70.97	507.7	0.9692	16.21	22.3227091
29.04.2015 15:11:25.8	-70.74	507.8	0.7766	16.29	19.981997
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29.04.2015 15:11:26.2	-66.97	507.7	0.9179	16.28	21.7239044
29.04.2015 15:11:26.3	-65.33	507.6	0.9054	16.31	21.5754788
29.04.2015 15:11:26.4	-65.54	507.6	0.8049	16.25	20.3428202
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29.04.2015 15:11:26.6	-64.13	507.7	0.8297	16.27	20.6538369
29.04.2015 15:11:26.7	-62.81	507.7	0.9363	16.28	21.94056
29.04.2015 15:11:26.8	-63	507.7	0.8361	16.16	20.7333419
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29.04.2015 15:11:27.0	-59.76	507.9	0.9343	16.21	21.9171143
29.04.2015 15:11:27.1	-59.93	507.7	0.875	16.24	21.2101736
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29.04.2015 15:11:27.7	-54.65	507.8	0.8461	16.25	20.8569618
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29.04.2015 15:11:28.0	-53.24	507.6	0.8538	16.16	20.951652
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29.04.2015 15:11:29.3	-43.74	507.4	0.8723	16.31	21.1774241
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29.04.2015 15:11:29.8	-39.83	507.1	0.8707	16.26	21.157993
29.04.2015 15:11:29.9	-38.36	507.1	0.9558	16.19	22.1678569
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29.04.2015 15:11:30.4	-35.88	507.2	0.9821	16.26	22.4707751
29.04.2015 15:11:30.5	-35.03	507.2	0.8838	16.31	21.3165637
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29.04.2015 15:11:31.0	-30.49	507.2	0.762	16.27	19.7932761
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29.04.2015 15:11:36.9	14.85	507.9	0.8622	16.17	21.0544648
29.04.2015 15:11:37.0	14.59	507.9	0.9676	16.27	22.3042758
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29.04.2015 15:11:44.5	70.49	510	0.8326	16.22	20.6899004
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29.04.2015 15:11:45.3	77.35	509.9	0.8576	16.2	20.9982249
29.04.2015 15:11:45.4	78.65	510	0.8574	16.24	20.9957763
29.04.2015 15:11:45.5	78.44	509.9	0.9494	16.27	22.0935147
29.04.2015 15:11:45.6	78.33	509.8	0.9547	16.16	22.1550971
29.04.2015 15:11:45.7	81.09	510	0.8273	16.09	20.6239435
29.04.2015 15:11:45.8	81.04	510	0.868	16.22	21.1251626
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29.04.2015 15:11:46.1	84.38	509.8	0.8967	16.18	21.4715691
29.04.2015 15:11:46.2	83.92	509.8	0.8684	16.4	21.1300296
29.04.2015 15:11:46.3	83.73	509.7	0.855	16.18	20.9663704
29.04.2015 15:11:46.4	86.19	509.7	0.8554	16.33	20.9712743
29.04.2015 15:11:46.5	86.69	509.7	0.8511	16.24	20.9184977
29.04.2015 15:11:46.6	86.53	509.7	0.9394	16.38	21.9768516
29.04.2015 15:11:46.7	86.91	509.7	0.9835	16.25	22.4867856
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29.04.2015 15:11:46.9	89.13	509.8	0.8483	16.25	20.8840599
29.04.2015 15:11:47.0	89.2	509.8	0.8806	16.32	21.2779379
29.04.2015 15:11:47.1	90.82	509.8	0.9813	16.23	22.4616211
29.04.2015 15:11:47.2	92.29	509.9	0.9345	16.16	21.91946
29.04.2015 15:11:47.3	92.08	509.9	0.9625	16.32	22.2454178
29.04.2015 15:11:47.4	92.14	509.7	0.9738	16.34	22.3756202
29.04.2015 15:11:47.5	94.79	509.7	0.9865	16.25	22.5210556
29.04.2015 15:11:47.6	94.74	509.9	0.8495	16.14	20.8988259
29.04.2015 15:11:47.7	94.7	509.9	0.7928	16.26	20.1893352
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29.04.2015 15:11:48.4	100.44	510.1	1.0277	16.21	22.9865279
29.04.2015 15:11:48.5	100.65	510.2	0.9121	16.34	21.6551614
29.04.2015 15:11:48.6	102.48	510.1	0.9279	16.26	21.8419186
29.04.2015 15:11:48.7	102.59	510.1	0.9332	16.29	21.9042084
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29.04.2015 15:11:49.3	108.16	510.4	0.9129	16.61	21.6646562
29.04.2015 15:11:49.4	107.96	510.4	1.0013	16.24	22.6893631
29.04.2015 15:11:49.5	108.37	510.4	0.9145	16.15	21.6836332
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29.04.2015 15:11:50.0	113.27	510.5	0.9993	16.36	22.6666919
29.04.2015 15:11:50.1	113.21	510.3	0.9855	16.32	22.509638
29.04.2015 15:11:50.2	113.67	510.2	0.9798	16.27	22.4444473
29.04.2015 15:11:50.3	116.09	510.4	0.8954	16.17	21.4559991
29.04.2015 15:11:50.4	115.78	510.4	1.0332	16.31	23.0479549
29.04.2015 15:11:50.5	115.71	510.3	0.9994	16.34	22.667826
29.04.2015 15:11:50.6	117.55	510.3	0.943	16.28	22.0189215
29.04.2015 15:11:50.7	118.55	510.5	0.9311	16.24	21.8795487
29.04.2015 15:11:50.8	118.29	510.5	0.9457	16.29	22.0504213
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29.04.2015 15:11:51.0	121.21	510.5	0.9092	16.3	21.620708
29.04.2015 15:11:51.1	121.05	510.5	0.9309	16.26	21.8771988
29.04.2015 15:11:51.2	120.87	510.6	0.9361	16.31	21.9382166
29.04.2015 15:11:51.3	122.08	510.6	0.9879	16.2	22.5370304
29.04.2015 15:11:51.4	124.21	510.7	1.0256	16.19	22.9630305
29.04.2015 15:11:51.5	123.89	510.8	1.0106	16.23	22.7944881
29.04.2015 15:11:51.6	123.8	510.8	0.9639	16.37	22.2615904
29.04.2015 15:11:51.7	126.23	510.8	0.9742	16.14	22.3802153
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29.04.2015 15:11:51.9	126.39	510.9	0.8975	16.29	21.481145
29.04.2015 15:11:52.0	127.16	510.9	0.8872	16.27	21.357527
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29.04.2015 15:11:52.8	134.72	511.3	0.9668	16.18	22.2950535
29.04.2015 15:11:52.9	134.57	511.4	0.8663	16.21	21.1044653
29.04.2015 15:11:53.0	134.69	511.6	0.777	16.19	19.9871424

29.04.2015 15:11:53.1	135.95	511.5	1.0123	16.25	22.8136522
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29.04.2015 15:11:53.3	137.3	511.4	1.0201	16.21	22.9013757
29.04.2015 15:11:53.4	137.37	511.5	1.0812	16.24	23.5772536
29.04.2015 15:11:53.5	140	511.5	1.049	16.24	23.2235144
29.04.2015 15:11:53.6	139.96	511.5	0.9517	16.21	22.1202602
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29.04.2015 15:11:54.2	145.38	511.6	1.0274	16.29	22.9831726
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29.04.2015 15:11:54.4	145.32	511.5	0.9383	16.25	21.9639808
29.04.2015 15:11:54.5	146.65	511.5	0.9746	16.15	22.3848094
29.04.2015 15:11:54.6	147.94	511.5	1.0611	16.28	23.3570696
29.04.2015 15:11:54.7	147.91	511.4	0.9808	16.35	22.4558979
29.04.2015 15:11:54.8	148.37	511.3	0.9851	16.19	22.5050694
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29.04.2015 15:11:55.4	153.06	511.6	0.894	16.28	21.4392188
29.04.2015 15:11:55.5	153.82	511.5	0.9781	16.26	22.4249677
29.04.2015 15:11:55.6	155.93	511.5	0.9607	16.22	22.2246071
29.04.2015 15:11:55.7	155.72	511.6	0.9972	16.22	22.6428626
29.04.2015 15:11:55.8	155.62	511.7	0.9775	16.29	22.4180885
29.04.2015 15:11:55.9	157.6	511.6	1.1056	16.16	23.8418094
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29.04.2015 15:12:00.0	187.77	511.7	0.7712	16.23	19.9124046
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29.04.2015 15:12:00.3	190.53	512	0.9955	16.17	22.6235539
29.04.2015 15:12:00.4	190.24	512.1	0.8841	16.23	21.3201813
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29.04.2015 15:12:00.6	193.08	512.2	0.9211	16.24	21.7617386
29.04.2015 15:12:00.7	192.94	512.3	0.9473	16.19	22.0690666
29.04.2015 15:12:00.8	194.2	512.2	0.9923	16.33	22.5871634
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29.04.2015 15:12:01.7	200.63	512.7	0.9196	16.2	21.744012
29.04.2015 15:12:01.8	201.73	512.9	1.0389	16.16	23.1114434
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29.04.2015 15:12:02.2	205.46	513.3	1.1483	16.14	24.2978518
29.04.2015 15:12:02.3	205.86	513.5	0.9422	16.17	22.0095796
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29.04.2015 15:12:02.5	206.45	513.5	0.9152	16.18	21.6919304
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29.04.2015 15:12:02.7	208.26	513.9	0.8825	16.16	21.3008804
29.04.2015 15:12:02.8	208.33	513.9	0.8364	16.18	20.7370612
29.04.2015 15:12:02.9	210.14	514	0.7924	16.16	20.1842414
29.04.2015 15:12:03.0	211.1	514.2	0.902	16.15	21.5349301
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29.04.2015 15:12:03.2	211.04	514.3	0.9873	16.04	22.5301854
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29.04.2015 15:12:03.4	213.88	514.6	0.8907	16.21	21.3996132
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29.04.2015 15:12:03.8	216.51	514.9	0.9584	16.26	22.1979874
29.04.2015 15:12:03.9	216.58	514.8	1.0932	16.28	23.707732
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29.04.2015 15:12:04.1	219.25	515	1.2154	16.1	24.9976863
29.04.2015 15:12:04.2	219.15	515.2	1.0532	16.22	23.2699592
29.04.2015 15:12:04.3	219.72	515	0.9128	16.25	21.6634695
29.04.2015 15:12:04.4	222.26	515	0.9949	16.14	22.6167352
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29.04.2015 15:12:04.6	222	515.4	0.9364	16.23	21.9417317
29.04.2015 15:12:04.7	223.69	515.4	0.9828	16.16	22.4787818
29.04.2015 15:12:04.8	224.82	515.4	0.9693	16.05	22.3238607
29.04.2015 15:12:04.9	224.77	515.6	0.9835	16.15	22.4867856
29.04.2015 15:12:05.0	225.61	515.6	0.9594	16.24	22.2095651
29.04.2015 15:12:05.1	227.29	515.5	0.9565	16.19	22.175973
29.04.2015 15:12:05.2	227.41	515.6	1.0553	16.19	23.2931469
29.04.2015 15:12:05.3	227.38	515.7	1.0308	16.24	23.0211705
29.04.2015 15:12:05.4	229.33	515.7	1.0276	16.32	22.9854095
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29.04.2015 15:12:05.6	229.96	515.9	1.0235	16.19	22.9395091
29.04.2015 15:12:05.7	231.22	515.9	0.9645	16.28	22.2685179
29.04.2015 15:12:05.8	232.59	515.9	1.0095	16.26	22.7820793
29.04.2015 15:12:05.9	232.33	516	1.0459	16.09	23.189174
29.04.2015 15:12:06.0	233.17	516.1	0.9885	16.17	22.5438732
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29.04.2015 15:12:06.4	236.95	516.3	1.0568	16.17	23.3096955
29.04.2015 15:12:06.5	237.6	516.4	1.0769	16.27	23.5303228
29.04.2015 15:12:06.6	237.56	516.3	1.1066	16.26	23.8525893
29.04.2015 15:12:06.7	238.71	516.3	1.1015	16.18	23.797561
29.04.2015 15:12:06.8	240.47	516.5	0.9987	16.16	22.6598861
29.04.2015 15:12:06.9	240.13	516.5	0.991	16.23	22.5723629
29.04.2015 15:12:07.0	239.93	516.4	0.9848	16.28	22.5016423
29.04.2015 15:12:07.1	242.56	516.4	0.9137	16.24	21.6741468
29.04.2015 15:12:07.2	242.94	516.4	1.0306	16.15	23.0189371

29.04.2015 15:12:07.3	242.66	516.3	0.9475	16.26	22.0713962
29.04.2015 15:12:07.4	243.23	516.3	1.0602	16.19	23.347162
29.04.2015 15:12:07.5	245.64	516.2	1.1008	16.13	23.7899981
29.04.2015 15:12:07.6	245.38	516.2	1.0266	16.17	22.9742227
29.04.2015 15:12:07.7	245.34	516.2	1.0012	16.31	22.6882301
29.04.2015 15:12:07.8	247.05	516.1	0.8725	16.22	21.1798517
29.04.2015 15:12:07.9	248.11	516.1	0.9877	16.08	22.5347489
29.04.2015 15:12:08.0	247.88	516.1	0.9246	16.23	21.8030445
29.04.2015 15:12:08.1	248.14	516	1.0043	16.23	22.7233275
29.04.2015 15:12:08.2	250.84	516	0.9934	16.18	22.5996792
29.04.2015 15:12:08.3	250.97	516.2	0.9938	16.12	22.6042287
29.04.2015 15:12:08.4	250.88	516.2	0.9669	16.32	22.2962065
29.04.2015 15:12:08.5	252.06	516.1	1.0616	16.31	23.362572
29.04.2015 15:12:08.6	253.59	516.2	0.9728	16.15	22.3641285
29.04.2015 15:12:08.7	253.54	516.3	1.0179	16.15	22.8766672
29.04.2015 15:12:08.8	253.48	516.4	1.0777	16.13	23.5390612
29.04.2015 15:12:08.9	255.88	516.3	1.0097	16.23	22.7843359
29.04.2015 15:12:09.0	256.04	516.3	1.1182	16.14	23.9772814
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29.04.2015 15:12:09.3	259.19	516.5	0.8662	16.27	21.1032472
29.04.2015 15:12:09.4	259.03	516.5	0.9434	16.18	22.023591
29.04.2015 15:12:09.5	259.06	516.7	0.8987	16.29	21.4955008
29.04.2015 15:12:09.6	260.83	516.6	0.9455	16.22	22.0480895
29.04.2015 15:12:09.7	261.5	516.6	1.0178	16.21	22.8755435
29.04.2015 15:12:09.8	261.71	516.7	1.064	16.15	23.3889654
29.04.2015 15:12:09.9	262.74	516.8	1.015	16.2	22.8440561
29.04.2015 15:12:10.0	264.3	516.8	0.8819	16.32	21.2936381
29.04.2015 15:12:10.1	263.95	516.8	0.9148	16.2	21.6871895
29.04.2015 15:12:10.2	264.36	516.8	0.8797	16	21.2670618
29.04.2015 15:12:10.3	266.5	516.9	0.9415	16.21	22.0014022
29.04.2015 15:12:10.4	266.72	516.9	1.0584	16.34	23.3273343
29.04.2015 15:12:10.5	266.66	516.9	1.0541	16.19	23.2798996
29.04.2015 15:12:10.6	267.47	517	1.007	16.1	22.7538522
29.04.2015 15:12:10.7	269.47	517	0.9864	16.22	22.5199141
29.04.2015 15:12:10.8	269.38	516.9	0.8872	16.19	21.357527
29.04.2015 15:12:10.9	269.3	516.9	0.8498	16.16	20.9025158
29.04.2015 15:12:11.0	272.5	517.1	0.7948	16.12	20.214785
29.04.2015 15:12:11.1	272.22	517.3	0.7827	16.2	20.0603203
29.04.2015 15:12:11.2	272.26	517.3	0.8089	16.19	20.393305
29.04.2015 15:12:11.3	272.29	517.4	0.7057	16.15	19.0480383
29.04.2015 15:12:11.4	274.8	517.6	0.795	16.09	20.2173282
29.04.2015 15:12:11.5	274.46	517.7	0.8325	16.19	20.6886579
29.04.2015 15:12:11.6	274.41	517.6	0.7987	16.14	20.2643202
29.04.2015 15:12:11.7	277.09	517.7	0.7228	16.09	19.277436
29.04.2015 15:12:11.8	277.52	517.8	0.7349	16.1	19.4381228
29.04.2015 15:12:11.9	277.43	517.9	0.821	16.04	20.5452663
29.04.2015 15:12:12.0	277.87	518	0.7585	16.1	19.7477668
29.04.2015 15:12:12.1	280.37	518.1	0.9461	16.03	22.0550841
29.04.2015 15:12:12.2	280.14	518.3	0.8068	16.06	20.3668161
29.04.2015 15:12:12.3	279.89	518.4	0.8154	16.13	20.4750773
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29.04.2015 15:12:12.7	284.42	518.7	0.6311	16.18	18.0131343
29.04.2015 15:12:12.8	285.13	518.7	0.6232	15.97	17.9000366
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29.04.2015 15:12:13.1	287.99	519	0.7265	16.14	19.3267134
29.04.2015 15:12:13.2	287.75	519.1	0.7487	16.06	19.6197791
29.04.2015 15:12:13.3	287.87	519.3	0.7263	15.98	19.324053
29.04.2015 15:12:13.4	290.05	519.4	0.8045	16.17	20.3377648
29.04.2015 15:12:13.5	290.37	519.3	0.7462	16.14	19.5869953
29.04.2015 15:12:13.6	290.25	519.4	0.789	16.06	20.1408919
29.04.2015 15:12:13.7	291.04	519.5	0.8148	15.96	20.4675428
29.04.2015 15:12:13.8	292.92	519.6	0.7426	16.04	19.53969
29.04.2015 15:12:13.9	292.59	519.5	0.7058	16.04	19.0493878
29.04.2015 15:12:14.0	292.78	519.6	0.7433	16.03	19.5488972
29.04.2015 15:12:14.1	292.83	519.7	0.7823	16	20.0551938
29.04.2015 15:12:14.2	292.69	519.7	0.7497	16.09	19.6328773
29.04.2015 15:12:14.3	292.63	519.8	0.7926	16	20.1867884

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29.04.2015 15:12:14.5	292.92	520	0.7968	16.02	20.2402028
29.04.2015 15:12:14.6	292.69	520	0.7567	16.07	19.7243211
29.04.2015 15:12:14.7	292.51	520.1	0.7077	16.04	19.0750109
29.04.2015 15:12:14.8	292.98	520.2	0.6711	15.92	18.5752136
29.04.2015 15:12:14.9	292.83	520.3	0.7215	16.06	19.2600923
29.04.2015 15:12:15.0	292.64	520.4	0.7696	16.09	19.8917378
29.04.2015 15:12:15.1	292.62	520.5	0.7189	15.99	19.2253581
29.04.2015 15:12:15.2	292.86	520.6	0.6565	15.89	18.3720476
29.04.2015 15:12:15.3	292.63	520.7	0.7269	16.07	19.3320332
29.04.2015 15:12:15.4	292.76	520.8	0.6902	16.15	18.8376913
29.04.2015 15:12:15.5	292.79	520.8	0.7653	16.02	19.8360893
29.04.2015 15:12:15.6	292.82	521	0.7574	15.98	19.7334422
29.04.2015 15:12:15.7	292.76	521.1	0.7505	16.13	19.6433496
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29.04.2015 15:12:15.9	292.56	521.2	0.7794	15.99	20.0179868
29.04.2015 15:12:16.0	292.86	521.4	0.8589	15.96	21.0141341
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29.04.2015 15:12:16.4	292.89	521.5	0.631	16.21	18.0117071
29.04.2015 15:12:16.5	292.74	521.5	0.6247	16.13	17.9215658
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29.04.2015 15:12:18.7	277.54	522.1	0.96	16.03	22.2165088
29.04.2015 15:12:18.8	274.64	522.2	0.9744	16.03	22.3825125
29.04.2015 15:12:18.9	274.74	522.1	0.9194	16.14	21.7416473
29.04.2015 15:12:19.0	274.96	522.1	0.8716	16.06	21.1689252
29.04.2015 15:12:19.1	273.76	522.2	0.8621	16.17	21.0532438
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29.04.2015 15:12:19.3	271.83	522.1	0.9074	16.13	21.5992954
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29.04.2015 15:12:20.2	264.13	522.5	0.9365	16.09	21.9429032
29.04.2015 15:12:20.3	264.14	522.6	1.0269	16.2	22.9775793
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29.04.2015 15:12:20.5	262.35	522.5	1.1145	16.09	23.9375795
29.04.2015 15:12:20.6	261.62	522.7	1.0274	16.07	22.9831726
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29.04.2015 15:12:21.1	258.87	522.8	1.0612	16.09	23.3581702
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29.04.2015 15:12:21.3	256.5	522.7	0.9365	16.07	21.9429032
29.04.2015 15:12:21.4	256.41	522.7	0.9994	16.12	22.667826

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29.04.2015 15:12:22.3	248.46	522.4	1.0001	16.14	22.6757631
29.04.2015 15:12:22.4	248.58	522.3	1.0472	16.03	23.203581
29.04.2015 15:12:22.5	248.69	522.3	1.1325	15.91	24.13011
29.04.2015 15:12:22.6	246.39	522.4	1.2275	15.93	25.1218112
29.04.2015 15:12:22.7	245.97	522.2	1.1152	16.02	23.9450957
29.04.2015 15:12:22.8	246.08	522.2	1.0308	16.02	23.0211705
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29.04.2015 15:12:23.0	242.86	522.3	1.0585	15.97	23.3284363
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29.04.2015 15:12:23.2	243.18	522.2	0.9803	16.08	22.4501733
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29.04.2015 15:12:23.5	240.43	522.1	1.0531	15.95	23.2688545
29.04.2015 15:12:23.6	240.56	522.1	1.0943	15.98	23.7196566
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29.04.2015 15:12:24.1	234.71	521.8	1.0106	16.09	22.7944881
29.04.2015 15:12:24.2	235	521.8	0.9677	16.07	22.3054283
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29.04.2015 15:12:24.4	232.77	521.8	1.0235	15.8	22.9395091
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29.04.2015 15:12:25.1	227.71	521.5	1.1139	16.05	23.9311351
29.04.2015 15:12:25.2	226.93	521.7	0.9949	15.98	22.6167352
29.04.2015 15:12:25.3	226.92	521.6	1.0513	16.09	23.24896
29.04.2015 15:12:25.4	226.49	521.5	0.9393	16.07	21.9756818
29.04.2015 15:12:25.5	224.23	521.4	0.9811	16.03	22.459332
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29.04.2015 15:12:25.7	224.14	521.3	0.9586	16.06	22.2003034
29.04.2015 15:12:25.8	222.84	521.3	0.9843	16.14	22.4959294
29.04.2015 15:12:25.9	221.69	521.2	1.1005	15.99	23.7867562
29.04.2015 15:12:26.0	221.76	521.2	1.1081	16.1	23.8687499
29.04.2015 15:12:26.1	220.97	521.2	1.0246	16.15	22.9518329
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29.04.2015 15:12:26.5	217.24	521	1.0001	16.15	22.6757631
29.04.2015 15:12:26.6	216.32	520.9	1.1068	16.02	23.8547447
29.04.2015 15:12:26.7	216.67	520.9	1.0442	16	23.1703205
29.04.2015 15:12:26.8	216.3	520.9	1.1253	16.13	24.0532828
29.04.2015 15:12:26.9	213.44	520.7	1.0983	16.2	23.7629683
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29.04.2015 15:12:27.1	213.58	520.7	1.0738	16.01	23.4964308
29.04.2015 15:12:27.2	211.44	520.7	0.9497	16.03	22.0970051
29.04.2015 15:12:27.3	210.97	520.5	0.9798	16.06	22.4444473
29.04.2015 15:12:27.4	210.97	520.5	1.0227	15.96	22.9305423
29.04.2015 15:12:27.5	210.66	520.6	1.0169	15.99	22.8654273
29.04.2015 15:12:27.6	208.2	520.6	1.0138	16.09	22.8305482
29.04.2015 15:12:27.7	208.15	520.5	0.9555	16.05	22.1643777
29.04.2015 15:12:27.8	208.53	520.4	0.994	16.02	22.6065031
29.04.2015 15:12:27.9	206.95	520.4	0.895	16.03	21.4512061
29.04.2015 15:12:28.0	205.68	520.3	0.9418	16.09	22.0049071
29.04.2015 15:12:28.1	205.64	520.2	0.939	16.09	21.9721722
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29.04.2015 15:12:28.3	203.16	520.2	1.2295	16.13	25.1422687
29.04.2015 15:12:28.4	203.23	520.1	1.0622	16.09	23.3691731
29.04.2015 15:12:28.5	203.2	520.1	1.0481	16.03	23.2135498

29.04.2015 15:12:28.6	202.2	520.1	1.1458	15.93	24.2713876
29.04.2015 15:12:28.7	200.03	520.1	1.1014	16.12	23.7964807
29.04.2015 15:12:28.8	200.26	520.1	1.0806	16.09	23.5707108
29.04.2015 15:12:28.9	200.18	520.1	1.0702	15.98	23.4570109
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29.04.2015 15:12:29.1	197.65	520.2	0.9534	16.14	22.1400079
29.04.2015 15:12:29.2	197.74	520.1	0.9502	16.16	22.1028212
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29.04.2015 15:12:29.4	195	520.1	1.0277	15.98	22.9865279
29.04.2015 15:12:29.5	195.15	520.2	1.1496	16.14	24.3116019
29.04.2015 15:12:29.6	195.07	520.1	1.1885	16.18	24.7195062
29.04.2015 15:12:29.7	192.95	520.1	1.1006	16.08	23.7878369
29.04.2015 15:12:29.8	192.19	520.3	1.0384	16.05	23.1058812
29.04.2015 15:12:29.9	192.19	520.3	1.0404	16.1	23.128122
29.04.2015 15:12:30.0	191.84	520.1	1.186	16.04	24.6934938
29.04.2015 15:12:30.1	189.52	520.1	1.0287	16.08	22.9977086
29.04.2015 15:12:30.2	189.68	520.2	1.0463	15.95	23.1936078
29.04.2015 15:12:30.3	189.54	520.2	1.089	16.13	23.6621464
29.04.2015 15:12:30.4	187.31	520.1	1.0029	15.98	22.7074838
29.04.2015 15:12:30.5	187.14	520.1	0.9899	15.97	22.5598319
29.04.2015 15:12:30.6	187.16	520.1	1.0366	16.1	23.0858463
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29.04.2015 15:12:30.8	184.15	520.1	1.0062	15.95	22.7448121
29.04.2015 15:12:30.9	184.6	520.1	1.0813	15.92	23.5783439
29.04.2015 15:12:31.0	184.38	520.2	0.9834	16.03	22.4856424
29.04.2015 15:12:31.1	181.84	520.1	0.9957	16.1	22.6258264
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29.04.2015 15:12:31.3	181.87	520.2	1.0104	15.87	22.7922325
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29.04.2015 15:12:31.5	179.19	520.2	1.0096	16.09	22.7832076
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29.04.2015 15:12:51.6	28.79	519.9	0.9198	16.2	21.7463763
29.04.2015 15:12:51.7	28.48	520	0.9195	16.29	21.7428297
29.04.2015 15:12:51.8	25.98	519.9	0.9043	16.36	21.5623684
29.04.2015 15:12:51.9	26.09	519.9	0.9053	16.13	21.5742873
29.04.2015 15:12:52.0	26.17	520	1.0022	16.27	22.6995578
29.04.2015 15:12:52.1	24.82	520.1	0.8779	16.28	21.2452928
29.04.2015 15:12:52.2	23.05	520	0.8935	16.39	21.4332227
29.04.2015 15:12:52.3	23.03	520	0.9235	16.21	21.7900711
29.04.2015 15:12:52.4	23.25	520.1	0.9109	16.26	21.6409115
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29.04.2015 15:12:52.6	20.52	520	0.9323	16.32	21.8936434
29.04.2015 15:12:52.7	20.52	520	0.9222	16.17	21.7747289
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29.04.2015 15:12:52.9	17.82	520.1	0.9064	16.22	21.5873904
29.04.2015 15:12:53.0	17.88	520	0.8999	16.42	21.5098471
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29.04.2015 15:13:10.9	-117.92	520.8	0.8427	16.25	20.8150134
29.04.2015 15:13:11.0	-117.78	520.8	0.9244	16.28	21.8006863
29.04.2015 15:13:11.1	-117.79	520.8	0.8973	16.34	21.4787514

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29.04.2015 15:13:13.0	-133.91	522.2	0.8812	16.12	21.2851856
29.04.2015 15:13:13.1	-133.55	522.3	0.9033	16.13	21.550443
29.04.2015 15:13:13.2	-133.66	522.3	0.9775	16.25	22.4180885
29.04.2015 15:13:13.3	-134.36	522.2	0.9363	16.14	21.94056
29.04.2015 15:13:13.4	-136.44	522.3	0.9365	16.12	21.9429032
29.04.2015 15:13:13.5	-136.17	522.4	0.9615	16.09	22.2338587
29.04.2015 15:13:13.6	-136.38	522.4	0.8981	16.19	21.4883241
29.04.2015 15:13:13.7	-139.42	522.5	0.8866	16.17	21.3503039
29.04.2015 15:13:13.8	-139.08	522.6	0.8723	16.15	21.1774241
29.04.2015 15:13:13.9	-139.06	522.8	0.9034	16.18	21.5516358
29.04.2015 15:13:14.0	-139.6	522.8	0.7871	16.28	20.1166265
29.04.2015 15:13:14.1	-141.98	522.9	0.8554	16.16	20.9712743
29.04.2015 15:13:14.2	-141.61	523	0.7945	16.12	20.2109696
29.04.2015 15:13:14.3	-141.71	523.1	0.8252	16.1	20.5977511
29.04.2015 15:13:14.4	-143.39	523.2	0.8458	16.22	20.8532638
29.04.2015 15:13:14.5	-144.86	523.3	0.8368	16.1	20.7420192
29.04.2015 15:13:14.6	-144.61	523.6	0.9673	16.09	22.3008179
29.04.2015 15:13:14.7	-144.77	523.7	0.9191	16.22	21.7380999
29.04.2015 15:13:14.8	-146.39	523.7	0.9585	16.31	22.1991454
29.04.2015 15:13:14.9	-147.48	523.9	0.9011	16.13	21.5241838
29.04.2015 15:13:15.0	-147.17	524.2	0.8791	16.17	21.259808
29.04.2015 15:13:15.1	-148.34	524.5	0.9041	16.21	21.5599839
29.04.2015 15:13:15.2	-150.41	524.4	0.9549	16.18	22.1574176
29.04.2015 15:13:15.3	-150.23	524.6	0.932	16.08	21.8901206
29.04.2015 15:13:15.4	-150.21	524.9	1.0349	16.16	23.0669084
29.04.2015 15:13:15.5	-151.33	525.1	0.9502	16.17	22.1028212
29.04.2015 15:13:15.6	-153.1	525.1	0.8551	16.24	20.9675965
29.04.2015 15:13:15.7	-152.8	525.3	0.8509	16.12	20.9160398
29.04.2015 15:13:15.8	-152.72	525.5	0.8935	16.14	21.4332227
29.04.2015 15:13:15.9	-155.2	525.6	0.9632	16.14	22.2535055
29.04.2015 15:13:16.0	-155.49	525.5	0.9578	16.06	22.1910378
29.04.2015 15:13:16.1	-155.32	525.6	0.9024	16.08	21.5397045
29.04.2015 15:13:16.2	-155.42	525.8	0.8863	16.18	21.3466914
29.04.2015 15:13:16.3	-158.35	525.8	0.9313	16.26	21.8818985
29.04.2015 15:13:16.4	-158.57	525.9	0.7701	16.11	19.8981985
29.04.2015 15:13:16.5	-158.18	526	0.8839	16.09	21.3177696
29.04.2015 15:13:16.6	-160.36	526.1	0.7883	16.23	20.1319554
29.04.2015 15:13:16.7	-161.35	526.2	0.8964	16.3	21.467977
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29.04.2015 15:13:16.9	-161.21	526.4	0.7768	16.08	19.9845699
29.04.2015 15:13:17.0	-163.32	526.5	0.9157	16.27	21.6978551
29.04.2015 15:13:17.1	-163.92	526.5	1.0119	16.27	22.8091444
29.04.2015 15:13:17.2	-163.95	526.5	1.0075	16.13	22.7595004
29.04.2015 15:13:17.3	-164.28	526.8	1.0011	16.15	22.687097
29.04.2015 15:13:17.4	-167	526.9	0.9622	16.23	22.2419507
29.04.2015 15:13:17.5	-166.89	526.9	1.0143	16.21	22.8361775
29.04.2015 15:13:17.6	-166.86	527	1.0488	16.11	23.2213004
29.04.2015 15:13:17.7	-167.39	527.2	1.1061	16.12	23.8472
29.04.2015 15:13:17.8	-169.58	527.4	1.0529	16.12	23.2666448
29.04.2015 15:13:17.9	-169.48	527.3	0.9741	16.28	22.3790666
29.04.2015 15:13:18.0	-169.35	527.5	0.952	16.12	22.1237464
29.04.2015 15:13:18.1	-171.32	527.7	0.99	16.11	22.5609714
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29.04.2015 15:13:18.3	-172.47	527.8	0.9413	16.18	21.9990652
29.04.2015 15:13:18.4	-173.26	527.9	0.999	16.07	22.6632892
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29.04.2015 15:13:18.6	-174.95	528	0.9541	16.2	22.1481341
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29.04.2015 15:13:18.8	-176.11	528.2	0.8858	16.02	21.3406693
29.04.2015 15:13:18.9	-177.7	528.3	0.9759	16.22	22.3997337
29.04.2015 15:13:19.0	-177.56	528.2	0.8326	16.23	20.6899004
29.04.2015 15:13:19.1	-178.32	528.3	0.9172	16.19	21.7156193
29.04.2015 15:13:19.2	-180.61	528.4	0.9352	16.09	21.927668
29.04.2015 15:13:19.3	-180.5	528.4	0.9483	16.24	22.080712
29.04.2015 15:13:19.4	-180.52	528.3	0.976	16.26	22.4008814
29.04.2015 15:13:19.5	-182.21	528.3	1.0059	16.14	22.7414212
29.04.2015 15:13:19.6	-183.08	528.5	0.9231	16.13	21.7853516
29.04.2015 15:13:19.7	-183.09	528.6	0.8359	16.18	20.730862
29.04.2015 15:13:19.8	-183.16	528.5	0.8908	16.11	21.4008144
29.04.2015 15:13:19.9	-185.07	528.5	0.9576	16.07	22.1887208
29.04.2015 15:13:20.0	-185.57	528.7	0.9671	16.08	22.2985123
29.04.2015 15:13:20.1	-185.71	528.8	0.914	16.09	21.6777047
29.04.2015 15:13:20.2	-187.08	528.7	0.9376	16.17	21.9557864
29.04.2015 15:13:20.3	-188.68	528.7	0.9379	16.1	21.9592986
29.04.2015 15:13:20.4	-188.54	528.9	0.9151	16.2	21.6907453
29.04.2015 15:13:20.5	-188.69	529	0.9896	16.14	22.5564131
29.04.2015 15:13:20.6	-190.13	529	1.0167	16.2	22.8631786
29.04.2015 15:13:20.7	-191.15	529	0.9473	16.08	22.0690666
29.04.2015 15:13:20.8	-191.15	529.1	0.9381	16.2	21.9616398
29.04.2015 15:13:20.9	-191.25	529.2	0.8691	16.18	21.1385441
29.04.2015 15:13:21.0	-194.23	529.2	0.8489	16.16	20.8914442
29.04.2015 15:13:21.1	-194.03	529.3	0.9885	16.05	22.5438732
29.04.2015 15:13:21.2	-194.14	529.4	1.0932	16.22	23.707732
29.04.2015 15:13:21.3	-194.23	529.4	1.0363	16.18	23.0825054
29.04.2015 15:13:21.4	-196.92	529.4	1.0445	16.11	23.1736487
29.04.2015 15:13:21.5	-196.72	529.5	1.0093	16.09	22.7798224
29.04.2015 15:13:21.6	-196.91	529.6	0.914	16.22	21.6777047
29.04.2015 15:13:21.7	-199.16	529.6	0.9724	16.12	22.3595301
29.04.2015 15:13:21.8	-199.73	529.6	0.8915	16.01	21.4092213
29.04.2015 15:13:21.9	-199.66	529.7	0.9387	15.99	21.968662
29.04.2015 15:13:22.0	-200.14	529.8	0.8423	16.11	20.8100727
29.04.2015 15:13:22.1	-202.51	529.7	0.9806	16.21	22.4536083
29.04.2015 15:13:22.2	-202.18	529.7	0.8685	16.13	21.1312461
29.04.2015 15:13:22.3	-202.32	529.8	0.8523	16.16	20.9332395
29.04.2015 15:13:22.4	-203.96	529.8	0.8935	16.15	21.4332227
29.04.2015 15:13:22.5	-205.06	529.7	0.9226	16.17	21.7794507
29.04.2015 15:13:22.6	-204.8	529.7	0.9377	16.06	21.9569572
29.04.2015 15:13:22.7	-205.64	529.8	0.8432	16.19	20.8211875
29.04.2015 15:13:22.8	-207.66	529.8	0.9347	16.09	21.9218054
29.04.2015 15:13:22.9	-207.45	529.8	0.8738	16.15	21.1956245
29.04.2015 15:13:23.0	-207.36	529.9	0.9453	15.93	22.0457575
29.04.2015 15:13:23.1	-208.48	529.9	0.8847	16.21	21.3274146
29.04.2015 15:13:23.2	-210.24	529.9	1.0222	16.22	22.9249362
29.04.2015 15:13:23.3	-210.07	530	0.9728	16.11	22.3641285
29.04.2015 15:13:23.4	-209.97	530.2	1.097	16.06	23.7489007
29.04.2015 15:13:23.5	-212.51	530.3	0.9715	16.18	22.3491803
29.04.2015 15:13:23.6	-212.94	530.4	0.9788	16.16	22.4329908
29.04.2015 15:13:23.7	-212.93	530.5	0.9363	16.14	21.94056
29.04.2015 15:13:23.8	-214.32	530.7	0.9615	16.03	22.2338587
29.04.2015 15:13:23.9	-215.56	530.9	0.8994	16.12	21.5038706
29.04.2015 15:13:24.0	-215.47	530.9	0.8197	16.14	20.5289939
29.04.2015 15:13:24.1	-215.51	531	0.8425	16.13	20.8125432
29.04.2015 15:13:24.2	-216.84	531.3	0.8281	16.01	20.6339127
29.04.2015 15:13:24.3	-217.59	531.4	0.8701	16.13	21.1507018
29.04.2015 15:13:24.4	-217.64	531.3	0.8875	16.03	21.3611376
29.04.2015 15:13:24.5	-217.55	531.3	0.9553	15.96	22.1620579
29.04.2015 15:13:24.6	-217.6	531.4	1.0017	16	22.6938946
29.04.2015 15:13:24.7	-217.57	531.4	0.9294	16.04	21.8595658
29.04.2015 15:13:24.8	-217.58	531.4	0.8613	15.99	21.0434732
29.04.2015 15:13:24.9	-217.58	531.4	0.9892	15.98	22.551854
29.04.2015 15:13:25.0	-217.58	531.5	1.0366	15.99	23.0858463
29.04.2015 15:13:25.1	-217.59	531.5	1.0703	16.08	23.4581068
29.04.2015 15:13:25.2	-217.59	531.4	0.9139	16.09	21.6765188
29.04.2015 15:13:25.3	-217.58	531.5	0.9581	16.06	22.1945129

29.04.2015 15:13:25.4	-217.57	531.5	0.8591	16.05	21.0165806
29.04.2015 15:13:25.5	-217.57	531.5	0.7887	16.11	20.1370625
29.04.2015 15:13:25.6	-217.59	531.5	0.809	16.08	20.3945655
29.04.2015 15:13:25.7	-217.55	531.5	0.8556	15.89	20.9737258
29.04.2015 15:13:25.8	-217.54	531.6	0.8253	16.19	20.5989992
29.04.2015 15:13:25.9	-217.62	531.5	0.8798	16.08	21.2682705
29.04.2015 15:13:26.0	-217.6	531.4	0.9525	16.13	22.1295554
29.04.2015 15:13:26.1	-217.57	531.5	0.9974	16.04	22.6451332
29.04.2015 15:13:26.2	-217.56	531.4	0.8427	16.18	20.8150134
29.04.2015 15:13:26.3	-217.46	531.3	0.8563	16.06	20.9823037
29.04.2015 15:13:26.4	-217.42	531.3	0.9095	16.01	21.6242747
29.04.2015 15:13:26.5	-217.43	531.4	0.9449	15.99	22.0410927
29.04.2015 15:13:26.6	-217.4	531.3	0.8568	16.1	20.9884287
29.04.2015 15:13:26.7	-217.44	531.1	0.9518	16.05	22.1214223

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

$$= -2.30304493E-14x^6 + 1.57301063E-12x^5 + 1.15341178E-09x^4 + 1.52449346E-05x^2 + 3.47911591E-03x + 2.14628803E+01$$

Please enter below Polynomial Coefficients

Order no	Coeff
6	-2.30304493E-14
5	1.57301063E-12
4	1.15341178E-09
3	-7.33362710E-08
2	1.52449346E-05
1	3.47911591E-03
0	2.14628803E+01

Actual Area	0.274324656	[m2]
Integrated area	0.274324656	[m2]
Area Error	0	[%]
Integrated Mass flow	2.341683984	[Kg/s]

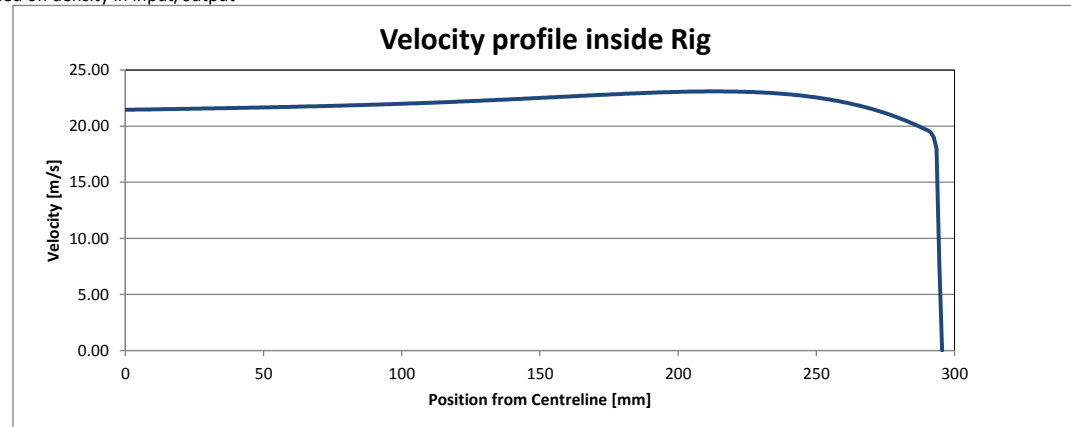
Polynomial curve (dP vs position)

Please do NOT alter any of the figures below

position [mm]	Velocity [m/s]
0	21.462880
1	21.466375
2	21.469899
3	21.473453
4	21.477036
5	21.480649
6	21.484289
7	21.487959
8	21.491656
9	21.495381
10	21.499134
11	21.502915
12	21.506722
13	21.510557
14	21.514420
15	21.518309
16	21.522225
17	21.526169
18	21.530139
19	21.534137
20	21.538162
21	21.542214
22	21.546294
23	21.550402
24	21.554537
25	21.558701
26	21.562893
27	21.567113
28	21.571363
29	21.575641
30	21.579950
31	21.584288
32	21.588657
33	21.593057

Delta Area [m2]	Delta Mass flow [Kg/s]
0	0
3.14159E-06	2.62336E-05
9.42478E-06	7.87138E-05
1.5708E-05	0.000131211
2.19911E-05	0.000183727
2.82743E-05	0.00023626
3.45575E-05	0.000288811
4.08407E-05	0.00034138
4.71239E-05	0.000393968
5.34071E-05	0.000446574
5.96903E-05	0.000499199
6.59734E-05	0.000551844
7.22566E-05	0.000604507
7.85398E-05	0.00065719
8.4823E-05	0.000709893
9.11062E-05	0.000762615
9.73894E-05	0.000815358
0.000103673	0.000868121
0.000109956	0.000920904
0.000116239	0.000973708
0.000122522	0.001026533
0.000128805	0.001079378
0.000135088	0.001132245
0.000141372	0.001185134
0.000147655	0.001238044
0.000153938	0.001290976
0.000160221	0.00134393
0.000166504	0.001396907
0.000172788	0.001449906
0.000179071	0.001502928
0.000185354	0.001555972
0.000191637	0.001609041
0.00019792	0.001662133
0.000204204	0.001715248

Based on density in input/output



34	21.597488
35	21.601951
36	21.606447
37	21.610975
38	21.615537
39	21.620132
40	21.624763
41	21.629428
42	21.634130
43	21.638868
44	21.643644
45	21.648457
46	21.653310
47	21.658202
48	21.663134
49	21.668107
50	21.673122
51	21.678180
52	21.683281
53	21.688427
54	21.693618
55	21.698855
56	21.704139
57	21.709471
58	21.714852
59	21.720283
60	21.725765
61	21.731299
62	21.736885
63	21.742525
64	21.748220
65	21.753970
66	21.759777
67	21.765642
68	21.771565
69	21.777548
70	21.783592
71	21.789697
72	21.795866
73	21.802097
74	21.808394
75	21.814757
76	21.821186
77	21.827683
78	21.834248
79	21.840884
80	21.847590
81	21.854368
82	21.861218
83	21.868142

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0.000248186	0.002087747
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0.000260752	0.002194406
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0.000273319	0.002301172
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0.000285885	0.002408048
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0.000417832	0.003537713
0.000424115	0.003591889
0.000430398	0.003646104
0.000436681	0.003700358
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0.000468097	0.003972246
0.00047438	0.004026751
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0.000486947	0.004135894
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0.000499513	0.004245219
0.000505796	0.004299952
0.00051208	0.004354732
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85	21.882215
86	21.889365
87	21.896592
88	21.903898
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90	21.918747
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97	21.973297
98	21.981427
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100	21.997946
101	22.006336
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103	22.023380
104	22.032034
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111	22.095124
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113	22.113960
114	22.123514
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118	22.162628
119	22.172630
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126	22.245091
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132	22.310461
133	22.321631

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223	23.071151
224	23.064525
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226	23.048973
227	23.040006
228	23.030217
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271	21.463384
272	21.390143
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274	21.236977
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276	21.074618
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278	20.902721
279	20.813085
280	20.720931
281	20.626214
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283	20.428902

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0.00149854	0.013326833
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0.001762433	0.014141056
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286	20.112530
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290	19.650564
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0.00183469	0.013560195
0.001840973	0.012890495
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 ³)
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	Universal gas constant, 8.314 J/(K·mol)

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

$$0.318090154$$

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
ϕ	Relative humidity
p_{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 ^[1] 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:

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

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

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

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