Air Compensation - Using Pressure Reducing/Venting Regulator

Minn Kota 101 Floodable Volume (oz)	37.0
Minn Kota 101 Floodable Volume (ft^3)	0.038642060
Number of Minn Kota 101	4
Total Floodable Volume (ft^3)	0.1546
Orifice dia. of HP port on 1st stg. (in)	0.030
Discharge Coefficient for HP port (--)	0.830
Standard Pressure (psia)	14.70
Standard Temperature (F)	60.00
Cs for scf/min	19.17
Cn = Cs(Cd)*Tsc/Psc	563
Descent Rate (ft/s)	1.7
Regulator Cv during descent	0.742
Surface Water Temp (F)	70.000
Temperature Gradient (F/ft)	0.20
Pressure Compensation diff. Pres. (psi)	5.0
Water Specific Weight (lbf/ft^3)	62.4
Computational time step (sec)	2.0
Scuba Tank Vol (scf)	80.0
Initial Scuba Tank Pressure (psig)	500

Variable	Description
Time(s)	Time in seconds during descent
Depth(ft)	Depth calculated from Descent Rate and time
Pwg(psig)	Gage Ambient Water pressure (psig)
Pwa(psia)	Absolute Ambient Water pressure (psia)
Pm(psia)	Absolute pressure in motor = Pwa + Pres compensation differential
Tw(F)	Ambient Water Temperature in F based on temperature gradient down to 50F
Vm(scf)	Volume in the Minn Kota Motors at depth in SCF
Qd(scf/s)	Demand flow rate in SCF/s into the motors based on changing Vm(scf) and time
Vt(scf)	Volume in the scuba tanks as a function of time in SCF
Pt(psia)	Absolute pressure in the scuba tank in psia as a function of time
Qo(scf/s)	Flow rate through the HP orifice in scf/s (critical flow)
Qo>Qd?	If the flow through the HP orifice is greater than demand then Yes, else No

Time (s)	Depth(ft)	Pwg(psig)	Pwa(psia)	Pm(psia)	Tw(F)	Vm(scf)	Qd(scf/s)	Vt(scf)	Pt(psia)	Qo(scf/s)	Qo>Qd?
0.0	0.0	0.0	14.7	19.7	70.0	0.207	0.000	80.000	515	0.092	Yes
2.0	3.3	1.4	16.1	21.1	69.3	0.223	0.0077	79.9845	514	0.092	Yes
4.0	6.7	2.9	17.6	22.6	68.7	0.238	0.0078	79.9690	513	0.092	Yes
6.0	10.0	4.3	19.0	24.0	68.0	0.254	0.0078	79.9535	512	0.092	Yes
8.0	13.3	5.8	20.5	25.5	67.3	0.269	0.0078	79.9379	512	0.092	Yes
10.0	16.7	7.2	21.9	26.9	66.7	0.285	0.0078	79.9223	511	0.092	Yes
12.0	20.0	8.7	23.4	28.4	66.0	0.301	0.0078	79.9066	510	0.091	Yes
14.0	23.3	10.1	24.8	29.8	65.3	0.316	0.0079	79.8909	509	0.091	Yes
16.0	26.7	11.6	26.3	31.3	64.7	0.332	0.0079	79.8752	509	0.091	Yes
18.0	30.0	13.0	27.7	32.7	64.0	0.348	0.0079	79.8594	508	0.091	Yes
20.0	33.3	14.4	29.1	34.1	63.3	0.364	0.0079	79.8435	507	0.091	Yes
22.0	36.7	15.9	30.6	35.6	62.7	0.379	0.0079	79.8277	506	0.091	Yes
24.0	40.0	17.3	32.0	37.0	62.0	0.395	0.0080	79.8118	506	0.091	Yes
26.0	43.3	18.8	33.5	38.5	61.3	0.411	0.0080	79.7958	505	0.091	Yes
28.0	46.7	20.2	34.9	39.9	60.7	0.427	0.0080	79.7798	504	0.091	Yes
30.0	50.0	21.7	36.4	41.4	60.0	0.443	0.0080	79.7638	503	0.091	Yes
32.0	53.3	23.1	37.8	42.8	59.3	0.459	0.0080	79.7477	503	0.091	Yes
34.0	56.7	24.6	39.3	44.3	58.7	0.476	0.0081	79.7316	502	0.091	Yes
36.0	60.0	26.0	40.7	45.7	58.0	0.492	0.0081	79.7155	501	0.091	Yes
38.0	63.3	27.4	42.1	47.1	57.3	0.508	0.0081	79.6993	501	0.090	Yes
40.0	66.7	28.9	43.6	48.6	56.7	0.524	0.0081	79.6831	500	0.090	Yes
42.0	70.0	30.3	45.0	50.0	56.0	0.540	0.0081	79.6668	499	0.090	Yes
44.0	73.3	31.8	46.5	51.5	55.3	0.557	0.0082	79.6505	498	0.090	Yes
46.0	76.7	33.2	47.9	52.9	54.7	0.573	0.0082	79.6341	498	0.090	Yes
48.0	80.0	34.7	49.4	54.4	54.0	0.589	0.0082	79.6177	497	0.090	Yes
50.0	83.3	36.1	50.8	55.8	53.3	0.606	0.0082	79.6012	496	0.090	Yes
52.0	86.7	37.6	52.3	57.3	52.7	0.622	0.0082	79.5848	495	0.090	Yes
54.0	90.0	39.0	53.7	58.7	52.0	0.639	0.0083	79.5682	495	0.090	Yes
56.0	93.3	40.4	55.1	60.1	51.3	0.655	0.0083	79.5516	494	0.090	Yes
58.0	96.7	41.9	56.6	61.6	50.7	0.672	0.0083	79.5350	493	0.090	Yes
60.0	100.0	43.3	58.0	63.0	50.0	0.689	0.0083	79.5184	492	0.090	Yes
62.0	103.3	44.8	59.5	64.5	50.0	0.705	0.0079	79.5026	492	0.090	Yes
64.0	106.7	46.2	60.9	65.9	50.0	0.720	0.0079	79.4868	492	0.090	Yes
66.0	110.0	47.7	62.4	67.4	50.0	0.736	0.0079	79.4710	492	0.090	Yes
68.0	113.3	49.1	63.8	68.8	50.0	0.752	0.0079	79.4552	492	0.090	Yes
70.0	116.7	50.6	65.3	70.3	50.0	0.768	0.0079	79.4394	492	0.090	Yes
72.0	120.0	52.0	66.7	71.7	50.0	0.783	0.0079	79.4237	492	0.090	Yes
74.0	123.3	53.4	68.1	73.1	50.0	0.799	0.0079	79.4079	492	0.090	Yes
76.0	126.7	54.9	69.6	74.6	50.0	0.815	0.0079	79.3921	492	0.090	Yes
78.0	130.0	56.3	71.0	76.0	50.0	0.831	0.0079	79.3763	491	0.089	Yes
80.0	133.3	57.8	72.5	77.5	50.0	0.847	0.0079	79.3605	491	0.089	Yes
82.0	136.7	59.2	73.9	78.9	50.0	0.862	0.0079	79.3447	491	0.089	Yes
84.0	140.0	60.7	75.4	80.4	50.0	0.878	0.0079	79.3290	491	0.089	Yes
86.0	143.3	62.1	76.8	81.8	50.0	0.894	0.0079	79.3132	491	0.089	Yes
88.0	146.7	63.6	78.3	83.3	50.0	0.910	0.0079	79.2974	491	0.089	Yes
90.0	150.0	65.0	79.7	84.7	50.0	0.926	0.0079	79.2816	491	0.089	Yes
92.0	153.3	66.4	81.1	86.1	50.0	0.941	0.0079	79.2658	491	0.089	Yes
94.0	156.7	67.9	82.6	87.6	50.0	0.957	0.0079	79.2500	491	0.089	Yes
96.0	160.0	69.3	84.0	89.0	50.0	0.973	0.0079	79.2343	491	0.089	Yes
98.0	163.3	70.8	85.5	90.5	50.0	0.989	0.0079	79.2185	490	0.089	Yes
100.0	166.7	72.2	86.9	91.9	50.0	1.004	0.0079	79.2027	490	0.089	Yes
102.0	170.0	73.7	88.4	93.4	50.0	1.020	0.0079	79.1869	490	0.089	Yes
104.0	173.3	75.1	89.8	94.8	50.0	1.036	0.0079	79.1711	490	0.089	Yes
106.0	176.7	76.6	91.3	96.3	50.0	1.052	0.0079	79.1553	490	0.089	Yes
108.0	180.0	78.0	92.7	97.7	50.0	1.068	0.0079	79.1396	490	0.089	Yes
110.0	183.3	79.4	94.1	99.1	50.0	1.083	0.0079	79.1238	490	0.089	Yes
112.0	186.7	80.9	95.6	100.6	50.0	1.099	0.0079	79.1080	490	0.089	Yes
114.0	190.0	82.3	97.0	102.0	50.0	1.115	0.0079	79.0922	490	0.089	Yes
116.0	193.3	83.8	98.5	103.5	50.0	1.131	0.0079	79.0764	490	0.089	Yes
118.0	196.7	85.2	99.9	104.9	50.0	1.147	0.0079	79.0606	489	0.089	Yes
120.0	200.0	86.7	101.4	106.4	50.0	1.162	0.0079	79.0449	489	0.089	Yes
122.0	203.3	88.1	102.8	107.8	50.0	1.178	0.0079	79.0291	489	0.089	Yes
124.0	206.7	89.6	104.3	109.3	50.0	1.194	0.0079	79.0133	489	0.089	Yes
126.0	210.0	91.0	105.7	110.7	50.0	1.210	0.0079	78.9975	489	0.089	Yes
128.0	213.3	92.4	107.1	112.1	50.0	1.225	0.0079	78.9817	489	0.089	Yes

130.0	216.7	93.9	108.6	113.6	50.0	1.241	0.0079	78.9659	489	0.089	Yes
132.0	220.0	95.3	110.0	115.0	50.0	1.257	0.0079	78.9502	489	0.089	Yes
134.0	223.3	96.8	111.5	116.5	50.0	1.273	0.0079	78.9344	489	0.089	Yes
136.0	226.7	98.2	112.9	117.9	50.0	1.289	0.0079	78.9186	489	0.089	Yes
138.0	230.0	99.7	114.4	119.4	50.0	1.304	0.0079	78.9028	488	0.089	Yes
140.0	233.3	101.1	115.8	120.8	50.0	1.320	0.0079	78.8870	488	0.089	Yes
142.0	236.7	102.6	117.3	122.3	50.0	1.336	0.0079	78.8712	488	0.089	Yes
144.0	240.0	104.0	118.7	123.7	50.0	1.352	0.0079	78.8554	488	0.089	Yes
146.0	243.3	105.4	120.1	125.1	50.0	1.367	0.0079	78.8397	488	0.089	Yes
148.0	246.7	106.9	121.6	126.6	50.0	1.383	0.0079	78.8239	488	0.089	Yes
150.0	250.0	108.3	123.0	128.0	50.0	1.399	0.0079	78.8081	488	0.089	Yes
152.0	253.3	109.8	124.5	129.5	50.0	1.415	0.0079	78.7923	488	0.089	Yes
154.0	256.7	111.2	125.9	130.9	50.0	1.431	0.0079	78.7765	488	0.089	Yes
156.0	260.0	112.7	127.4	132.4	50.0	1.446	0.0079	78.7607	488	0.089	Yes
158.0	263.3	114.1	128.8	133.8	50.0	1.462	0.0079	78.7450	488	0.089	Yes
160.0	266.7	115.6	130.3	135.3	50.0	1.478	0.0079	78.7292	487	0.089	Yes
162.0	270.0	117.0	131.7	136.7	50.0	1.494	0.0079	78.7134	487	0.089	Yes
164.0	273.3	118.4	133.1	138.1	50.0	1.510	0.0079	78.6976	487	0.089	Yes
166.0	276.7	119.9	134.6	139.6	50.0	1.525	0.0079	78.6818	487	0.089	Yes
168.0	280.0	121.3	136.0	141.0	50.0	1.541	0.0079	78.6660	487	0.089	Yes
170.0	283.3	122.8	137.5	142.5	50.0	1.557	0.0079	78.6503	487	0.089	Yes
172.0	286.7	124.2	138.9	143.9	50.0	1.573	0.0079	78.6345	487	0.089	Yes
174.0	290.0	125.7	140.4	145.4	50.0	1.588	0.0079	78.6187	487	0.089	Yes
176.0	293.3	127.1	141.8	146.8	50.0	1.604	0.0079	78.6029	487	0.089	Yes
178.0	296.7	128.6	143.3	148.3	50.0	1.620	0.0079	78.5871	487	0.089	Yes
180.0	300.0	130.0	144.7	149.7	50.0	1.636	0.0079	78.5713	486	0.089	Yes
182.0	303.3	131.4	146.1	151.1	50.0	1.652	0.0079	78.5556	486	0.089	Yes
184.0	306.7	132.9	147.6	152.6	50.0	1.667	0.0079	78.5398	486	0.089	Yes
186.0	310.0	134.3	149.0	154.0	50.0	1.683	0.0079	78.5240	486	0.089	Yes
188.0	313.3	135.8	150.5	155.5	50.0	1.699	0.0079	78.5082	486	0.089	Yes
190.0	316.7	137.2	151.9	156.9	50.0	1.715	0.0079	78.4924	486	0.088	Yes
192.0	320.0	138.7	153.4	158.4	50.0	1.731	0.0079	78.4766	486	0.088	Yes
194.0	323.3	140.1	154.8	159.8	50.0	1.746	0.0079	78.4609	486	0.088	Yes
196.0	326.7	141.6	156.3	161.3	50.0	1.762	0.0079	78.4451	486	0.088	Yes
198.0	330.0	143.0	157.7	162.7	50.0	1.778	0.0079	78.4293	486	0.088	Yes
200.0	333.3	144.4	159.1	164.1	50.0	1.794	0.0079	78.4135	485	0.088	Yes
202.0	336.7	145.9	160.6	165.6	50.0	1.809	0.0079	78.3977	485	0.088	Yes
204.0	340.0	147.3	162.0	167.0	50.0	1.825	0.0079	78.3819	485	0.088	Yes
206.0	343.3	148.8	163.5	168.5	50.0	1.841	0.0079	78.3662	485	0.088	Yes
208.0	346.7	150.2	164.9	169.9	50.0	1.857	0.0079	78.3504	485	0.088	Yes
210.0	350.0	151.7	166.4	171.4	50.0	1.873	0.0079	78.3346	485	0.088	Yes
212.0	353.3	153.1	167.8	172.8	50.0	1.888	0.0079	78.3188	485	0.088	Yes
214.0	356.7	154.6	169.3	174.3	50.0	1.904	0.0079	78.3030	485	0.088	Yes
216.0	360.0	156.0	170.7	175.7	50.0	1.920	0.0079	78.2872	485	0.088	Yes
218.0	363.3	157.4	172.1	177.1	50.0	1.936	0.0079	78.2715	485	0.088	Yes
220.0	366.7	158.9	173.6	178.6	50.0	1.951	0.0079	78.2557	484	0.088	Yes
222.0	370.0	160.3	175.0	180.0	50.0	1.967	0.0079	78.2399	484	0.088	Yes
224.0	373.3	161.8	176.5	181.5	50.0	1.983	0.0079	78.2241	484	0.088	Yes
226.0	376.7	163.2	177.9	182.9	50.0	1.999	0.0079	78.2083	484	0.088	Yes
228.0	380.0	164.7	179.4	184.4	50.0	2.015	0.0079	78.1925	484	0.088	Yes
230.0	383.3	166.1	180.8	185.8	50.0	2.030	0.0079	78.1767	484	0.088	Yes
232.0	386.7	167.6	182.3	187.3	50.0	2.046	0.0079	78.1610	484	0.088	Yes
234.0	390.0	169.0	183.7	188.7	50.0	2.062	0.0079	78.1452	484	0.088	Yes
236.0	393.3	170.4	185.1	190.1	50.0	2.078	0.0079	78.1294	484	0.088	Yes
238.0	396.7	171.9	186.6	191.6	50.0	2.094	0.0079	78.1136	484	0.088	Yes
240.0	400.0	173.3	188.0	193.0	50.0	2.109	0.0079	78.0978	484	0.088	Yes