

Air Compensation - Using Pressure Reducing/Venting Regulator

Minn Kota 101 Floodable Volume (oz)	37.0	Variable	Description
Minn Kota 101 Floodable Volume (ft ³)	0.038642060	Time(s)	Time in seconds during descent
Number of Minn Kota 101	4	Depth(ft)	Depth calculated from Descent Rate and time
Total Floodable Volume (ft ³)	0.1546	Pwg(psig)	Gage Ambient Water pressure (psig)
Orifice dia. of HP port on 1st stg. (in)	0.030	Pwa(psia)	Absolute Ambient Water pressure (psia)
Discharge Coefficient for HP port (-)	0.830	Pm(psia)	Absolute pressure in motor = Pwa + Pres compensation differential
Standard Pressure (psia)	14.70	Tw(F)	Ambient Water Temperature in F based on temperature gradient down to 50F
Standard Temperature (F)	60.00	Vm(scf)	Volume in the Minn Kota Motors at depth in SCF
Cs for scf/min	19.17	Qd(scf/s)	Demand flow rate in SCF/s into the motors based on changing Vm(scf) and time
Cn = Cs(Cd)*Tsc/Psc	563	Vt(scf)	Volume in the scuba tanks as a function of time in SCF
Descent Rate (ft/s)	1.7	Pt(psia)	Absolute pressure in the scuba tank in psia as a function of time
Regulator Cv during descent	0.742	Qo(scf/s)	Flow rate through the HP orifice in scf/s (critical flow)
Surface Water Temp (F)	70.000	Qo>Qd?	If the flow through the HP orifice is greater than demand then Yes, else No
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)	3000		

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	3015	0.539	Yes
2.0	3.3	1.4	16.1	21.1	69.3	0.223	0.0077	79.9845	3010	0.538	Yes
4.0	6.7	2.9	17.6	22.6	68.7	0.238	0.0078	79.9690	3006	0.538	Yes
6.0	10.0	4.3	19.0	24.0	68.0	0.254	0.0078	79.9535	3002	0.537	Yes
8.0	13.3	5.8	20.5	25.5	67.3	0.269	0.0078	79.9379	2997	0.537	Yes
10.0	16.7	7.2	21.9	26.9	66.7	0.285	0.0078	79.9223	2993	0.536	Yes
12.0	20.0	8.7	23.4	28.4	66.0	0.301	0.0078	79.9066	2988	0.536	Yes
14.0	23.3	10.1	24.8	29.8	65.3	0.316	0.0079	79.8909	2984	0.535	Yes
16.0	26.7	11.6	26.3	31.3	64.7	0.332	0.0079	79.8752	2980	0.535	Yes
18.0	30.0	13.0	27.7	32.7	64.0	0.348	0.0079	79.8594	2975	0.535	Yes
20.0	33.3	14.4	29.1	34.1	63.3	0.364	0.0079	79.8435	2971	0.534	Yes
22.0	36.7	15.9	30.6	35.6	62.7	0.379	0.0079	79.8277	2967	0.534	Yes
24.0	40.0	17.3	32.0	37.0	62.0	0.395	0.0080	79.8118	2962	0.533	Yes
26.0	43.3	18.8	33.5	38.5	61.3	0.411	0.0080	79.7958	2958	0.533	Yes
28.0	46.7	20.2	34.9	39.9	60.7	0.427	0.0080	79.7798	2953	0.532	Yes
30.0	50.0	21.7	36.4	41.4	60.0	0.443	0.0080	79.7638	2949	0.532	Yes
32.0	53.3	23.1	37.8	42.8	59.3	0.459	0.0080	79.7477	2945	0.531	Yes
34.0	56.7	24.6	39.3	44.3	58.7	0.476	0.0081	79.7316	2940	0.531	Yes
36.0	60.0	26.0	40.7	45.7	58.0	0.492	0.0081	79.7155	2936	0.531	Yes
38.0	63.3	27.4	42.1	47.1	57.3	0.508	0.0081	79.6993	2932	0.530	Yes
40.0	66.7	28.9	43.6	48.6	56.7	0.524	0.0081	79.6831	2927	0.530	Yes
42.0	70.0	30.3	45.0	50.0	56.0	0.540	0.0081	79.6668	2923	0.529	Yes
44.0	73.3	31.8	46.5	51.5	55.3	0.557	0.0082	79.6505	2918	0.529	Yes
46.0	76.7	33.2	47.9	52.9	54.7	0.573	0.0082	79.6341	2914	0.528	Yes
48.0	80.0	34.7	49.4	54.4	54.0	0.589	0.0082	79.6177	2910	0.528	Yes
50.0	83.3	36.1	50.8	55.8	53.3	0.606	0.0082	79.6012	2905	0.527	Yes
52.0	86.7	37.6	52.3	57.3	52.7	0.622	0.0082	79.5848	2901	0.527	Yes
54.0	90.0	39.0	53.7	58.7	52.0	0.639	0.0083	79.5682	2897	0.526	Yes
56.0	93.3	40.4	55.1	60.1	51.3	0.655	0.0083	79.5516	2892	0.526	Yes
58.0	96.7	41.9	56.6	61.6	50.7	0.672	0.0083	79.5350	2888	0.526	Yes
60.0	100.0	43.3	58.0	63.0	50.0	0.689	0.0083	79.5184	2883	0.525	Yes
62.0	103.3	44.8	59.5	64.5	50.0	0.705	0.0079	79.5026	2883	0.525	Yes
64.0	106.7	46.2	60.9	65.9	50.0	0.720	0.0079	79.4868	2882	0.525	Yes
66.0	110.0	47.7	62.4	67.4	50.0	0.736	0.0079	79.4710	2882	0.525	Yes
68.0	113.3	49.1	63.8	68.8	50.0	0.752	0.0079	79.4552	2881	0.525	Yes
70.0	116.7	50.6	65.3	70.3	50.0	0.768	0.0079	79.4394	2881	0.525	Yes
72.0	120.0	52.0	66.7	71.7	50.0	0.783	0.0079	79.4237	2880	0.524	Yes
74.0	123.3	53.4	68.1	73.1	50.0	0.799	0.0079	79.4079	2879	0.524	Yes
76.0	126.7	54.9	69.6	74.6	50.0	0.815	0.0079	79.3921	2879	0.524	Yes
78.0	130.0	56.3	71.0	76.0	50.0	0.831	0.0079	79.3763	2878	0.524	Yes
80.0	133.3	57.8	72.5	77.5	50.0	0.847	0.0079	79.3605	2878	0.524	Yes
82.0	136.7	59.2	73.9	78.9	50.0	0.862	0.0079	79.3447	2877	0.524	Yes
84.0	140.0	60.7	75.4	80.4	50.0	0.878	0.0079	79.3290	2877	0.524	Yes
86.0	143.3	62.1	76.8	81.8	50.0	0.894	0.0079	79.3132	2876	0.524	Yes
88.0	146.7	63.6	78.3	83.3	50.0	0.910	0.0079	79.2974	2875	0.524	Yes
90.0	150.0	65.0	79.7	84.7	50.0	0.926	0.0079	79.2816	2875	0.524	Yes
92.0	153.3	66.4	81.1	86.1	50.0	0.941	0.0079	79.2658	2874	0.523	Yes
94.0	156.7	67.9	82.6	87.6	50.0	0.957	0.0079	79.2500	2874	0.523	Yes
96.0	160.0	69.3	84.0	89.0	50.0	0.973	0.0079	79.2343	2873	0.523	Yes
98.0	163.3	70.8	85.5	90.5	50.0	0.989	0.0079	79.2185	2873	0.523	Yes
100.0	166.7	72.2	86.9	91.9	50.0	1.004	0.0079	79.2027	2872	0.523	Yes
102.0	170.0	73.7	88.4	93.4	50.0	1.020	0.0079	79.1869	2871	0.523	Yes
104.0	173.3	75.1	89.8	94.8	50.0	1.036	0.0079	79.1711	2871	0.523	Yes
106.0	176.7	76.6	91.3	96.3	50.0	1.052	0.0079	79.1553	2870	0.523	Yes
108.0	180.0	78.0	92.7	97.7	50.0	1.068	0.0079	79.1396	2870	0.523	Yes
110.0	183.3	79.4	94.1	99.1	50.0	1.083	0.0079	79.1238	2869	0.522	Yes
112.0	186.7	80.9	95.6	100.6	50.0	1.099	0.0079	79.1080	2869	0.522	Yes
114.0	190.0	82.3	97.0	102.0	50.0	1.115	0.0079	79.0922	2868	0.522	Yes
116.0	193.3	83.8	98.5	103.5	50.0	1.131	0.0079	79.0764	2867	0.522	Yes
118.0	196.7	85.2	99.9	104.9	50.0	1.147	0.0079	79.0606	2867	0.522	Yes
120.0	200.0	86.7	101.4	106.4	50.0	1.162	0.0079	79.0449	2866	0.522	Yes
122.0	203.3	88.1	102.8	107.8	50.0	1.178	0.0079	79.0291	2866	0.522	Yes
124.0	206.7	89.6	104.3	109.3	50.0	1.194	0.0079	79.0133	2865	0.522	Yes
126.0	210.0	91.0	105.7	110.7	50.0	1.210	0.0079	78.9975	2865	0.522	Yes
128.0	213.3	92.4	107.1	112.1	50.0	1.225	0.0079	78.9817	2864	0.522	Yes

130.0	216.7	93.9	108.6	113.6	50.0	1.241	0.0079	78.9659	2863	0.521	Yes
132.0	220.0	95.3	110.0	115.0	50.0	1.257	0.0079	78.9502	2863	0.521	Yes
134.0	223.3	96.8	111.5	116.5	50.0	1.273	0.0079	78.9344	2862	0.521	Yes
136.0	226.7	98.2	112.9	117.9	50.0	1.289	0.0079	78.9186	2862	0.521	Yes
138.0	230.0	99.7	114.4	119.4	50.0	1.304	0.0079	78.9028	2861	0.521	Yes
140.0	233.3	101.1	115.8	120.8	50.0	1.320	0.0079	78.8870	2861	0.521	Yes
142.0	236.7	102.6	117.3	122.3	50.0	1.336	0.0079	78.8712	2860	0.521	Yes
144.0	240.0	104.0	118.7	123.7	50.0	1.352	0.0079	78.8554	2859	0.521	Yes
146.0	243.3	105.4	120.1	125.1	50.0	1.367	0.0079	78.8397	2859	0.521	Yes
148.0	246.7	106.9	121.6	126.6	50.0	1.383	0.0079	78.8239	2858	0.521	Yes
150.0	250.0	108.3	123.0	128.0	50.0	1.399	0.0079	78.8081	2858	0.520	Yes
152.0	253.3	109.8	124.5	129.5	50.0	1.415	0.0079	78.7923	2857	0.520	Yes
154.0	256.7	111.2	125.9	130.9	50.0	1.431	0.0079	78.7765	2857	0.520	Yes
156.0	260.0	112.7	127.4	132.4	50.0	1.446	0.0079	78.7607	2856	0.520	Yes
158.0	263.3	114.1	128.8	133.8	50.0	1.462	0.0079	78.7450	2855	0.520	Yes
160.0	266.7	115.6	130.3	135.3	50.0	1.478	0.0079	78.7292	2855	0.520	Yes
162.0	270.0	117.0	131.7	136.7	50.0	1.494	0.0079	78.7134	2854	0.520	Yes
164.0	273.3	118.4	133.1	138.1	50.0	1.510	0.0079	78.6976	2854	0.520	Yes
166.0	276.7	119.9	134.6	139.6	50.0	1.525	0.0079	78.6818	2853	0.520	Yes
168.0	280.0	121.3	136.0	141.0	50.0	1.541	0.0079	78.6660	2853	0.519	Yes
170.0	283.3	122.8	137.5	142.5	50.0	1.557	0.0079	78.6503	2852	0.519	Yes
172.0	286.7	124.2	138.9	143.9	50.0	1.573	0.0079	78.6345	2851	0.519	Yes
174.0	290.0	125.7	140.4	145.4	50.0	1.588	0.0079	78.6187	2851	0.519	Yes
176.0	293.3	127.1	141.8	146.8	50.0	1.604	0.0079	78.6029	2850	0.519	Yes
178.0	296.7	128.6	143.3	148.3	50.0	1.620	0.0079	78.5871	2850	0.519	Yes
180.0	300.0	130.0	144.7	149.7	50.0	1.636	0.0079	78.5713	2849	0.519	Yes
182.0	303.3	131.4	146.1	151.1	50.0	1.652	0.0079	78.5556	2849	0.519	Yes
184.0	306.7	132.9	147.6	152.6	50.0	1.667	0.0079	78.5398	2848	0.519	Yes
186.0	310.0	134.3	149.0	154.0	50.0	1.683	0.0079	78.5240	2847	0.519	Yes
188.0	313.3	135.8	150.5	155.5	50.0	1.699	0.0079	78.5082	2847	0.518	Yes
190.0	316.7	137.2	151.9	156.9	50.0	1.715	0.0079	78.4924	2846	0.518	Yes
192.0	320.0	138.7	153.4	158.4	50.0	1.731	0.0079	78.4766	2846	0.518	Yes
194.0	323.3	140.1	154.8	159.8	50.0	1.746	0.0079	78.4609	2845	0.518	Yes
196.0	326.7	141.6	156.3	161.3	50.0	1.762	0.0079	78.4451	2845	0.518	Yes
198.0	330.0	143.0	157.7	162.7	50.0	1.778	0.0079	78.4293	2844	0.518	Yes
200.0	333.3	144.4	159.1	164.1	50.0	1.794	0.0079	78.4135	2843	0.518	Yes
202.0	336.7	145.9	160.6	165.6	50.0	1.809	0.0079	78.3977	2843	0.518	Yes
204.0	340.0	147.3	162.0	167.0	50.0	1.825	0.0079	78.3819	2842	0.518	Yes
206.0	343.3	148.8	163.5	168.5	50.0	1.841	0.0079	78.3662	2842	0.517	Yes
208.0	346.7	150.2	164.9	169.9	50.0	1.857	0.0079	78.3504	2841	0.517	Yes
210.0	350.0	151.7	166.4	171.4	50.0	1.873	0.0079	78.3346	2841	0.517	Yes
212.0	353.3	153.1	167.8	172.8	50.0	1.888	0.0079	78.3188	2840	0.517	Yes
214.0	356.7	154.6	169.3	174.3	50.0	1.904	0.0079	78.3030	2839	0.517	Yes
216.0	360.0	156.0	170.7	175.7	50.0	1.920	0.0079	78.2872	2839	0.517	Yes
218.0	363.3	157.4	172.1	177.1	50.0	1.936	0.0079	78.2715	2838	0.517	Yes
220.0	366.7	158.9	173.6	178.6	50.0	1.951	0.0079	78.2557	2838	0.517	Yes
222.0	370.0	160.3	175.0	180.0	50.0	1.967	0.0079	78.2399	2837	0.517	Yes
224.0	373.3	161.8	176.5	181.5	50.0	1.983	0.0079	78.2241	2837	0.517	Yes
226.0	376.7	163.2	177.9	182.9	50.0	1.999	0.0079	78.2083	2836	0.516	Yes
228.0	380.0	164.7	179.4	184.4	50.0	2.015	0.0079	78.1925	2835	0.516	Yes
230.0	383.3	166.1	180.8	185.8	50.0	2.030	0.0079	78.1767	2835	0.516	Yes
232.0	386.7	167.6	182.3	187.3	50.0	2.046	0.0079	78.1610	2834	0.516	Yes
234.0	390.0	169.0	183.7	188.7	50.0	2.062	0.0079	78.1452	2834	0.516	Yes
236.0	393.3	170.4	185.1	190.1	50.0	2.078	0.0079	78.1294	2833	0.516	Yes
238.0	396.7	171.9	186.6	191.6	50.0	2.094	0.0079	78.1136	2833	0.516	Yes
240.0	400.0	173.3	188.0	193.0	50.0	2.109	0.0079	78.0978	2832	0.516	Yes