

## 6.4 Stored buffer series for CAL pH

For automatic buffer recognition during pH calibration the temperature-dependent pH values of several common pH buffers are stored in the system. Apart from the Metrohm buffer solutions other reference and technical buffers are also included in the tables.

The following tables provide an overview of the stored pH(T) series:

The pH values printed in bold are the values at the reference temperature of the particular buffer set.

The pH values marked with <sup>1)</sup> are interpolated or extrapolated values, all the others correspond to the manufacturer's specifications.

Temp. (°C)	Metrohm			NIST (according to DIN standard 19266, 2000)				
	Met4 pH 4.00	Met7 pH 7.00	Met9 pH 9.00	NIST1 pH 1	NIST4 pH 4	NIST7 pH 7	NIST9 pH 9	NIST13 pH 13
0	3.99	7.11	9.27	-	4.010	6.984	9.464	13.423
5	3.99	7.08	9.18	1.668	4.004	6.950	9.392	13.207
10	3.99	7.06	9.13	1.670	4.001	6.922	9.331	13.003
15	3.99	7.04	9.08	1.672	4.001	6.900	9.277	12.810
20	3.99	7.02	9.04	1.676	4.003	6.880	9.228	12.627
25	<b>4.00</b>	<b>7.00</b>	<b>9.00</b>	<b>1.680</b>	<b>4.008</b>	<b>6.865</b>	<b>9.184</b>	<b>12.454</b>
30	4.00	6.99	8.96	1.685	4.015	6.853	9.144	12.289
35	4.01	6.98	8.93	1.691	4.025	6.843	9.107	12.133
40	4.02	6.98	8.90	1.697	4.036	6.837	9.076	11.984
45	4.03	6.97	8.87	1.704	4.049	6.834	9.046	11.841
50	4.04	6.97	8.84	1.712	4.064	6.833	9.018	11.705
55	4.06	6.97	8.81	1.715	4.075	6.834	8.985	11.574
60	4.07	6.97	8.79	1.723	4.091	6.836	8.962	11.449
65	4.09	6.98	8.76	1.732 <sup>1)</sup>	4.108 <sup>1)</sup>	6.840 <sup>1)</sup>	8.941 <sup>1)</sup>	-
70	4.11	6.98	8.74	1.743	4.126	6.845	8.921	-
75	4.13	6.99	8.73	1.754 <sup>1)</sup>	4.145 <sup>1)</sup>	6.852 <sup>1)</sup>	8.902 <sup>1)</sup>	-
80	4.15	7.00	8.71	1.766	4.164	6.859	8.885	-
85	4.18	7.00	8.70	1.778 <sup>1)</sup>	4.185 <sup>1)</sup>	6.867 <sup>1)</sup>	8.867 <sup>1)</sup>	-
90	4.20	7.01	8.68	1.792	4.205	6.877	8.850	-
95	4.23	7.02	8.67	1.806	4.227	6.886	8.833	-

Temp. (°C)	DIN (according to DIN standard 19267, 1978)					
	DIN1 pH 1	DIN3 pH 3	DIN4 pH 4	DIN7 pH 7	DIN9 pH 9	DIN12 pH 12
0	1.08	-	4.67	6.89	9.48	-
5	1.08 <sup>1)</sup>	-	4.66 <sup>1)</sup>	6.86 <sup>1)</sup>	9.43 <sup>1)</sup>	-
10	1.09	3.10	4.66	6.84	9.37	13.37
15	1.09 <sup>1)</sup>	3.08 <sup>1)</sup>	4.65 <sup>1)</sup>	6.82 <sup>1)</sup>	9.32 <sup>1)</sup>	13.15 <sup>1)</sup>
20	1.09	3.07	4.65	6.80	9.27	12.96
25	<b>1.09</b>	<b>3.06</b>	<b>4.65</b>	<b>6.79</b>	<b>9.23</b>	<b>12.75</b>
30	1.10	3.05	4.65	6.78	9.18	12.61
35	1.10 <sup>1)</sup>	3.05 <sup>1)</sup>	4.66 <sup>1)</sup>	6.77 <sup>1)</sup>	9.13 <sup>1)</sup>	12.44 <sup>1)</sup>
40	1.10	3.04	4.66	6.76	9.09	12.29
45	1.10 <sup>1)</sup>	3.04 <sup>1)</sup>	4.67 <sup>1)</sup>	6.76 <sup>1)</sup>	9.04 <sup>1)</sup>	12.13 <sup>1)</sup>
50	1.11	3.04	4.68	6.76	9.00	11.98
55	1.11 <sup>1)</sup>	3.04 <sup>1)</sup>	4.69 <sup>1)</sup>	6.76 <sup>1)</sup>	8.97 <sup>1)</sup>	11.84 <sup>1)</sup>
60	1.11	3.04	4.70	6.76	8.92	11.69
65	1.11 <sup>1)</sup>	3.04 <sup>1)</sup>	4.71 <sup>1)</sup>	6.76 <sup>1)</sup>	8.90 <sup>1)</sup>	11.56 <sup>1)</sup>
70	1.11	3.04	4.72	6.76	8.88	11.43
75	1.12 <sup>1)</sup>	3.04 <sup>1)</sup>	4.74 <sup>1)</sup>	6.77 <sup>1)</sup>	8.86 <sup>1)</sup>	11.30 <sup>1)</sup>
80	1.12	3.05	4.75	6.78	8.85	11.19
85	1.12 <sup>1)</sup>	3.06 <sup>1)</sup>	4.77 <sup>1)</sup>	6.79 <sup>1)</sup>	8.83 <sup>1)</sup>	11.08 <sup>1)</sup>
90	1.13	3.07	4.79	6.80	8.82	10.99
95	-	-	-	-	-	-

Temp. (°C)	Fisher				Fluka Basel		
	Fis2 pH 2	Fis4 pH 4	Fis7 pH 7	Fis10 pH 10	FBS4 pH 4	FBS7 pH 7	FBS9 pH 9
0	-	4.01	7.13	10.34	4.01	7.11	9.20
5	1.98	3.99	7.10	10.26	4.00	7.08	9.15
10	1.98	4.00	7.07	10.19	4.00	7.05	9.10
15	2.02	3.99	7.05	10.12	4.00	7.02	9.05
20	2.00	4.00	7.02	10.06	<b>4.00</b>	<b>7.00</b>	<b>9.00</b>
25	<b>2.00</b>	<b>4.00</b>	<b>7.00</b>	<b>10.00</b>	4.01	6.98	8.96
30	2.00	4.01	6.99	9.94	4.01	6.97	8.91
35	2.02	4.02	6.98	9.90	4.02	6.96	8.88
40	2.01	4.03	6.97	9.85	4.03	6.95	8.84
45	2.01	4.04 <sup>1)</sup>	6.97 <sup>1)</sup>	9.81 <sup>1)</sup>	4.04	6.94	8.80
50	2.01	4.06	6.97	9.78	4.06	6.94	8.77
55	-	4.07 <sup>1)</sup>	6.97 <sup>1)</sup>	9.74 <sup>1)</sup>	4.07	6.93	8.74
60	-	4.09	6.98	9.70	4.09	6.93	8.71
65	-	4.11 <sup>1)</sup>	6.99 <sup>1)</sup>	9.68 <sup>1)</sup>	4.11 <sup>1)</sup>	6.93 <sup>1)</sup>	8.69 <sup>1)</sup>
70	-	4.13 <sup>1)</sup>	7.00 <sup>1)</sup>	9.65 <sup>1)</sup>	4.13	6.94	8.67
75	-	4.14 <sup>1)</sup>	7.02 <sup>1)</sup>	9.63 <sup>1)</sup>	4.14 <sup>1)</sup>	6.94 <sup>1)</sup>	8.65 <sup>1)</sup>
80	-	4.16 <sup>1)</sup>	7.03 <sup>1)</sup>	9.62 <sup>1)</sup>	4.16	6.95	8.63
85	-	4.18 <sup>1)</sup>	7.06 <sup>1)</sup>	9.61 <sup>1)</sup>	4.18 <sup>1)</sup>	6.96 <sup>1)</sup>	8.61 <sup>1)</sup>
90	-	4.21 <sup>1)</sup>	7.08 <sup>1)</sup>	9.60 <sup>1)</sup>	4.21	6.97	8.60
95	-	4.23 <sup>1)</sup>	7.11 <sup>1)</sup>	9.60 <sup>1)</sup>	4.23 <sup>1)</sup>	6.98 <sup>1)</sup>	8.59 <sup>1)</sup>

Temp. (°C)	Mettler Toledo					Beckman		
	MT2 pH 2	MT4 pH 4	MT7 pH 7	MT9 pH 9	MT11 pH 11	Bec4 pH 4	Bec7 pH 7	Bec10 pH 10
0	2.03 <sup>1)</sup>	4.01 <sup>1)</sup>	7.12 <sup>1)</sup>	9.52 <sup>1)</sup>	11.90 <sup>1)</sup>	4.00	7.12	10.32
5	2.02	4.01	7.09	9.45	11.72	4.00	7.09	10.25
10	2.01	4.00	7.06	9.38	11.54	4.00	7.06	10.18
15	2.00	4.00	7.04	9.32	11.36	4.00	7.04	10.12
20	2.00	4.00	7.02	9.26	11.18	4.00	7.02	10.06
25	<b>2.00</b>	<b>4.01</b>	<b>7.00</b>	<b>9.21</b>	<b>11.00</b>	<b>4.00</b>	<b>7.00</b>	<b>10.01</b>
30	1.99	4.01	6.99	9.16	10.82	4.01	6.99	9.97
35	1.99	4.02	6.98	9.11	10.64	4.02	6.99	9.93
40	1.98	4.03	6.97	9.06	10.46	4.03	6.98	9.89
45	1.98	4.04	6.97	9.03	10.28	4.05	6.98	9.86
50	1.98	4.06	6.97	8.99	10.10	4.06	6.97	9.83
55	1.98 <sup>1)</sup>	4.08 <sup>1)</sup>	6.98 <sup>1)</sup>	8.96 <sup>1)</sup>	-	4.08	6.98	-
60	1.98 <sup>1)</sup>	4.10 <sup>1)</sup>	6.98 <sup>1)</sup>	8.93 <sup>1)</sup>	-	4.09	6.98	-
65	1.98 <sup>1)</sup>	4.13 <sup>1)</sup>	6.99 <sup>1)</sup>	8.90 <sup>1)</sup>	-	4.11	6.99	-
70	1.99 <sup>1)</sup>	4.16 <sup>1)</sup>	7.00 <sup>1)</sup>	8.88 <sup>1)</sup>	-	4.12	6.99	-
75	1.99 <sup>1)</sup>	4.19 <sup>1)</sup>	7.02 <sup>1)</sup>	8.85 <sup>1)</sup>	-	4.14	7.00	-
80	2.00 <sup>1)</sup>	4.22 <sup>1)</sup>	7.04 <sup>1)</sup>	8.83 <sup>1)</sup>	-	4.16	7.00	-
85	2.00 <sup>1)</sup>	4.26 <sup>1)</sup>	7.06 <sup>1)</sup>	8.81 <sup>1)</sup>	-	4.18	7.01	-
90	2.00 <sup>1)</sup>	4.30 <sup>1)</sup>	7.09 <sup>1)</sup>	8.79 <sup>1)</sup>	-	4.19	7.02	-
95	-	4.35 <sup>1)</sup>	7.12 <sup>1)</sup>	8.77 <sup>1)</sup>	-	4.21	7.03	-

Temp. (°C)	Radiometer			Baker			
	Rad4.01 pH 4.01	Rad7.00 pH 7	Rad9.18 pH 9.18	Bak4 pH 4.00	Bak7 pH 7.00	Bak9 pH 9.00	Bak10 pH 10.00
0	4.000	7.118	9.464	4.00	7.13	9.23	10.30
5	3.998	7.087	9.395	4.00 <sup>1)</sup>	7.09 <sup>1)</sup>	9.17 <sup>1)</sup>	10.24 <sup>1)</sup>
10	3.997	7.059	9.332	4.00	7.05	9.10	10.17
15	3.998	7.036	9.276	4.00 <sup>1)</sup>	7.03 <sup>1)</sup>	9.05 <sup>1)</sup>	10.11 <sup>1)</sup>
20	4.001	7.016	9.225	<b>4.00</b>	<b>7.00</b>	<b>9.00</b>	10.05
25	<b>4.005</b>	<b>7.000</b>	<b>9.180</b>	4.00 <sup>1)</sup>	6.98 <sup>1)</sup>	8.96 <sup>1)</sup>	<b>10.00</b>
30	4.011	6.987	9.139	4.01	6.98	8.91	9.96
35	4.018	6.977	9.102	4.02 <sup>1)</sup>	6.98 <sup>1)</sup>	8.88 <sup>1)</sup>	9.93 <sup>1)</sup>
40	4.027	6.970	9.068	4.03	6.97	8.84	9.89
45	4.038	6.965	9.038	4.04 <sup>1)</sup>	6.97 <sup>1)</sup>	8.81 <sup>1)</sup>	9.86 <sup>1)</sup>
50	4.050	6.964	9.011	4.05	6.96	8.78	9.82
55	4.064	6.965	8.985	4.07 <sup>1)</sup>	6.96 <sup>1)</sup>	8.76 <sup>1)</sup>	9.79 <sup>1)</sup>
60	4.080	6.968	8.962	4.08	6.96	8.73	9.76
65	4.097	6.974	8.941	4.10 <sup>1)</sup>	6.97 <sup>1)</sup>	8.71 <sup>1)</sup>	9.74 <sup>1)</sup>
70	4.116	6.982	8.921	4.12	6.97	8.69	9.72
75	4.137	6.992	8.900	4.14 <sup>1)</sup>	6.98 <sup>1)</sup>	8.68 <sup>1)</sup>	9.70 <sup>1)</sup>
80	4.159	7.004	8.885	4.16	6.98	8.66	9.68
85	4.183	7.018	8.867	4.19 <sup>1)</sup>	6.99 <sup>1)</sup>	8.64 <sup>1)</sup>	9.66 <sup>1)</sup>
90	4.210	7.034	8.850	4.21	7.00	8.62	9.64
95	4.240	-	-	-	-	-	-

Temp. (°C)	Hamilton DURACAL				Precisa		
	Ham4.01 pH 4.01	Ham7.00 pH 7.00	Ham9.21 pH 9.21	Ham10.01 pH10.01	Pre4 pH 4.00	Pre7 pH 7.00	Pre9 pH 9.00
0	-	-	-	-	3.99	7.11	9.27
5	4.01	7.09	9.45	10.19	3.99	7.08	9.18
10	4.00	7.06	9.38	10.15	3.99	7.06	9.13
15	4.00	7.04	9.32	10.11	3.99	7.04	9.08
20	4.00	7.02	9.26	10.06	3.99	7.02	9.04
25	<b>4.01</b>	<b>7.00</b>	<b>9.21</b>	<b>10.01</b>	<b>4.00</b>	<b>7.00</b>	<b>9.00</b>
30	4.01	6.99	9.16	9.97	4.00	6.99	8.96
35	4.02	6.98	9.11	9.92	4.01	6.98	8.93
40	4.03	6.97	9.06	9.86	4.02	6.98	8.90
45	4.04	6.97	9.03	9.83	4.03	6.97	8.87
50	4.06	6.97	8.99	9.79	4.04	6.97	8.84
55	-	-	-	-	4.06	6.97	8.81
60	-	-	-	-	4.07	6.97	8.79
65	-	-	-	-	4.09	6.98	8.76
70	-	-	-	-	4.11	6.98	8.74
75	-	-	-	-	4.13	6.99	8.73
80	-	-	-	-	4.15	7.00	8.71
85	-	-	-	-	4.18	7.00	8.70
90	-	-	-	-	4.20	7.01	8.68
95	-	-	-	-	4.23	7.02	8.67

Temp. (°C)	Merck Titrisol				
	Mer2 pH 2	Mer4 pH 4	Mer7 pH 7	Mer9 pH 9	Mer12 pH 12
0	2.01	4.05	7.13	9.24	12.58
5	2.01	4.04	7.07	9.16	12.41
10	2.01	4.02	7.05	9.11	12.26
15	2.00	4.01	7.02	9.05	12.10
20	<b>2.00</b>	<b>4.00</b>	<b>7.00</b>	<b>9.00</b>	<b>12.00</b>
25	2.00	4.01	6.98	8.95	11.88
30	2.00	4.01	6.98	8.91	11.72
35	2.00	4.01	6.96	8.88	11.67
40	2.00	4.01	6.95	8.85	11.54
45	2.00 <sup>1)</sup>	4.00 <sup>1)</sup>	6.95 <sup>1)</sup>	8.82 <sup>1)</sup>	11.44 <sup>1)</sup>
50	2.00	4.00	6.95	8.79	11.33
55	2.00 <sup>1)</sup>	4.00 <sup>1)</sup>	6.95 <sup>1)</sup>	8.76 <sup>1)</sup>	11.19 <sup>1)</sup>
60	2.00	4.00	6.96	8.73	11.04
65	2.00 <sup>1)</sup>	4.00 <sup>1)</sup>	6.96 <sup>1)</sup>	8.715 <sup>1)</sup>	10.97 <sup>1)</sup>
70	2.01	4.00	6.96	8.70	10.90
75	2.01 <sup>1)</sup>	4.00 <sup>1)</sup>	6.96 <sup>1)</sup>	8.68 <sup>1)</sup>	10.80 <sup>1)</sup>
80	2.01	4.00	6.97	8.66	10.70
85	2.01 <sup>1)</sup>	4.00 <sup>1)</sup>	6.98 <sup>1)</sup>	8.65 <sup>1)</sup>	10.59 <sup>1)</sup>
90	2.01	4.00	7.00	8.64	10.48
95	-	4.00 <sup>1)</sup>	7.02 <sup>1)</sup>	-	-

Temp. (°C)	Merck CertiPUR (25 °C)			
	MerC4.01 pH 4.01	MerC7.00 pH 7.00	MerC9.00 pH 9.00	MerC10.00 pH 10.00
0	-	-	-	-
5	4.00	7.09	9.22	10.22
10	4.00	7.06	9.16	10.16
15	4.00	7.04	9.10	10.10
20	4.00	7.02	9.05	10.05
25	<b>4.01</b>	<b>7.00</b>	<b>9.00</b>	<b>10.00</b>
30	4.01	6.98	8.96	9.94
35	4.03	6.98	8.93	9.90
40	4.03	6.97	8.89	9.86
45	4.05	6.97	8.87	9.80
50	4.06	6.97	8.84	9.73
55	-	-	-	-
60	-	-	-	-
65	-	-	-	-
70	-	-	-	-
75	-	-	-	-
80	-	-	-	-
85	-	-	-	-
90	-	-	-	-
95	-	-	-	-

When using Merck CertiPUR (20 °C) buffers, you have to select the buffer type "Merck Titrisol".