

WET & DRY BULB HYGROMETER

INSTRUCTIONS FOR USE.

INSTALLATION.

The instrument should be hung in a shaded position with a steady flow of air around the mercury bulbs. For outdoor use, a ventilated screen of the Stevenson type is recommended.

OPERATION.

Fill the cistern with distilled or clean rain water to avoid the wick becoming clogged with impurities. The wick should be changed regularly to ensure a constant flow of moisture to the wet bulb.

TO TAKE A READING.

1. Fan the bulbs gently until the mercury columns remain steady.
2. Take the reading of the wet and dry bulb columns.
3. Subtract the reading of the wet bulb column from that of the dry, thus arriving at the depression value.

USE OF TABLES.

The dry bulb temperatures from -1°C . to $+60^{\circ}\text{C}$ are given down the left-hand side of each table and the depression readings of the wet bulb from 0° to 7.0° , 7.5° to 14° and 17° to 30° respectively across the top. It should be noted that the depression value increases by 0.5° from 0° to 10° and by 1° from 10° to 30° . Similarly, the dry bulb readings increase by 1° from -1° to 30° and by 2° from 30° to 60° . Locate the readings of the dry bulb and the depression value given by the Hygrometer and at the intersection of the two columns, read off the percentage humidity. In the case of temperatures falling between those given on the tables, interpolation is necessary. Interpolation should never be made across the thick zig-zag line but the required value should be obtained by extra-polation downwards or upwards according as to whether the wet bulb is water covered or ice covered. The values of relative humidity above the thick line are valid only when the wet bulb is coated with ice. The following examples illustrate the method of using the tables—

(a) Dry Bulb	30°C
Wet Bulb	25°C

Hence, the Depression of the Wet Bulb = $30^{\circ} - 25^{\circ} = 5^{\circ}\text{C}$.

Reading directly from the tables, the relative humidity is 65%.

(b) Dry Bulb	28.5°C
Wet Bulb	17°C

The Depression of the Wet Bulb = $28.5^{\circ} - 17^{\circ} = 11.5^{\circ}\text{C}$. In order to find the relative humidity, it is necessary to interpolate between the "Dry Bulb" columns 28 and 29 and the "Depression of Wet Bulb" columns 11 and 12. The result is 26%.

(c) Dry Bulb	5.5°C
Wet Bulb	-0.25°C

The Depression of the Wet Bulb = $5.5^{\circ} - (-0.25^{\circ}) = 5.75^{\circ}\text{C}$. To obtain the relative humidity, it is necessary to interpolate between the "Dry Bulb" columns 5 and 6 and the "Depression of Wet Bulb" columns 5.5 and 6.0. As the wet bulb is below 0°C , it is assumed that it is covered with ice, hence extra-polation should be numerically upwards from the figures below the line. The values for "Dry Bulb" 5° and Depression 5.5° and 6.0° are respectively 21 and 15. Looking at the run of figures outwards from the line and extra-polaing numerically upwards, the corresponding value for "Dry Bulb" 8° would be 24 and 19. Hence the value required is found by interpolating midway between 21 15 24 19.

This gives a relative humidity of 19.75%.

INSTRUCTIONS TO REPLACE TUBE AND SCALE

Remove existing tube and scale by pressing top of metal scale inwards and at same time sliding upwards. This will free bottom of scale and make it possible to remove tube and scale from case. To fit replacement, carry out these instructions in the reverse order.

HYGROMETRIC

TABLES

FOR THE

COMPUTATION OF

RELATIVE HUMIDITY

CELSIUS

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OPERATION.

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TO TAKE A READING.

1. Fan the bulbs gently until the mercury columns remain steady.
2. Take the reading of the wet and dry bulb columns.
3. Subtract the reading of the wet bulb column from that of the dry, thus arriving at the depression value.

USE OF TABLES.

The dry bulb temperatures from 30° to 140°F . are given down the left hand side of each table, the depression readings of the wet bulb from 1° to 14° , 15° to 28° and 27° to 40° respectively across the top.

Locate the readings of the dry bulb and the depression value, given by the Hygrometer and at the intersection of the two columns, read off the percentage relative humidity.

In the case of temperatures falling between those given on the tables, interpolation is necessary. Interpolation should never be made across the thick zig-zag line, but the required value should be obtained by extra-polation downwards or upwards according as to whether the wet bulb is water covered or ice covered. The values of relative humidity above the thick line are valid only when the wet bulb is coated with ice. The following examples illustrate the method of using the tables—

(a) Dry Bulb	80°F .
Wet Bulb	60°F .

Hence the Depression of Wet Bulb = $80^{\circ} - 60^{\circ} = 20^{\circ}\text{F}$. Reading directly from the tables, the relative humidity is 25 per cent.

(b) Dry Bulb	76.5°F .
Wet Bulb	65°F .

The Depression of Wet Bulb = $76.5^{\circ} - 65^{\circ} = 11.5^{\circ}\text{F}$. In order to find the relative humidity, it is necessary to interpolate between the "Dry Bulb" columns 76 and 78 and the "Depression of Wet Bulb" columns 11 and 12. The result is 51.25 per cent.

(c) Dry Bulb	41°F .
Wet Bulb	31.5°F .

The Depression of Wet Bulb = $41^{\circ} - 31.5^{\circ} = 9.5^{\circ}\text{F}$.

To obtain the relative humidity it is necessary to interpolate between the "Dry Bulb" columns 40 and 42 and the "Depression of Wet Bulb" columns 9 and 10. As the "wet" bulb is below 32°F , it is assumed that it is covered with ice, hence extra-polation should be numerically upwards from the figures below the line.

INSTRUCTIONS TO REPLACE TUBE AND SCALE

Remove existing tube and scale by pressing top of metal scale inwards and at same time sliding upwards. This will free bottom of scale and make it possible to remove tube and scale from case. To fit replacement, carry out these instructions in the reverse order.

HYGROMETRIC

TABLES

FOR THE

COMPUTATION OF

RELATIVE HUMIDITY

FAHRENHEIT

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**TABLE OF WET & DRY BULB THERMOMETER READINGS
WITH CORRESPONDING PERCENTAGES OF HUMIDITY**

Dry Bulb	DEPRESSION OF WET BULB °C													
-C	0.5	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0
-1	90	79	69	59	49	39	30	20	10	1				
0	90	81	71	61	52	44	34	25	16	7				
-1	90	81	73	64	55	47	38	29	20	13	4			
2	91	82	73	64	57	49	41	33	24	17	9	1		
3	91	82	74	65	57	49	43	36	28	21	14	7		
4	92	83	75	67	59	51	43	35	22	15	11	4		
5	92	84	76	68	61	53	46	38	31	24	21	15	8	3
6	92	85	77	70	62	55	48	41	34	27	20	14	12	6
7	93	85	78	71	64	57	50	44	37	30	24	17	11	5
8	93	86	79	72	65	58	52	46	39	33	27	21	15	9
9	93	86	80	73	67	60	54	48	42	36	30	24	18	12
10	93	87	81	74	68	62	56	50	44	38	33	27	21	16
11	94	87	81	75	69	63	58	52	46	41	35	30	24	19
12	94	88	82	76	70	65	58	52	48	43	37	32	27	22
13	94	88	83	77	71	66	60	55	50	45	40	35	30	25
14	94	89	83	78	72	67	62	57	52	47	42	37	32	27
15	94	89	84	78	73	68	63	58	53	48	42	39	34	30
16	95	89	84	79	74	69	64	59	55	50	43	41	37	32
17	95	90	85	80	75	70	65	61	56	52	47	43	39	34
18	95	90	85	80	76	71	66	62	57	53	49	45	40	36
19	95	90	86	81	76	72	67	63	59	54	50	46	42	38
20	95	91	86	81	77	73	68	64	60	56	52	48	44	40
21	95	91	86	82	78	73	69	65	61	57	53	49	45	42
22	95	91	87	82	78	74	70	66	62	58	54	50	47	43
23	96	91	87	83	79	75	71	67	62	59	55	52	48	45
24	96	91	87	83	79	75	71	68	64	60	57	53	49	46
25	96	92	88	84	80	76	72	68	65	61	58	54	51	47
26	96	92	88	84	80	76	73	69	66	62	59	55	53	49
27	96	92	88	84	81	77	73	70	66	63	59	56	53	50
28	96	92	88	85	81	77	74	70	67	64	60	57	54	51
29	96	92	89	85	81	78	74	71	68	64	61	58	55	52
30	96	93	89	85	82	78	75	72	68	65	62	58	56	53
31	96	93	89	86	82	79	76	72	70	67	64	61	58	55
34	96	93	89	86	83	80	77	74	71	68	65	62	59	56
36	96	93	89	87	84	81	78	75	72	69	66	63	61	58
38	96	94	90	87	84	81	78	75	73	70	67	64	62	59
40	96	94	91	88	85	82	79	76	74	71	68	65	63	61
42	97	94	91	89	85	83	80	77	75	73	70	67	65	62
44	97	94	91	89	86	83	81	78	75	72	70	67	65	63
46	97	94	91	89	86	83	81	78	76	73	71	68	66	64
48	97	95	92	89	86	83	81	78	76	74	72	69	67	65
50	97	95	92	89	87	84	82	79	77	74	72	70	68	65
52	97	95	92	89	87	84	82	79	77	75	73	70	68	66
54	97	95	93	90	87	85	83	80	78	75	73	71	69	67
56	97	95	93	90	87	85	83	80	78	76	74	71	69	67
58	97	95	93	90	87	85	83	81	79	75	73	70	68	66
60	98	96	93	90	87	85	83	81	79	77	75	73	70	68

CELSIUS SCALE															
Dry Bulb °C	DEPRESSION OF WET BULB °C														Dry Bulb °C
	7.5	8.0	8.5	9.0	9.5	10	11	12	13	14	15	16			
-1															-1
0															0
+1															+1
2															2
3															3
4															4
5															5
6															6
7															7
8	3														8
9	7	1													9
10	10	5													10
11	14	9	4												11
12	17	12	7	2											12
13	20	15	11	6	1										13
14	23	18	14	9	6	1									14
15	25	21	17	12	8	4									15
16	28	24	19	15	11	7									16
17	30	26	23	18	14	10	3								17
18	32	28	24	21	17	13	6								18
19	34	30	27	23	19	16	9	2							19
20	36	32	29	25	22	18	11	3							20
21	38	34	31	27	24	20	14	7	1						21
22	40	36	33	29	26	23	16	10	4						22
23	41	38	34	31	28	25	18	12	6	1					23
24	43	39	36	33	30	27	20	15	9	3					24
25	44	41	38	35	31	28	22	17	11	6	1				25
26	45	42	39	36	33	30	24	19	13	8	3				26
27	47	44	41	38	35	32	26	21	15	10	5	1			27
28	48	45	42	39	36	33	28	23	17	12	8	3			28
29	49	46	43	40	37	35	29	24	19	14	10	5			29
30	50	47	44	42	39	36	31	26	21	16	12	7			30
32	52	49	46	44	41	39	34	29	24	20	15	11			32
34	54	51	48	46	43	41	36	32	27	23	19	15			34
36	55	53	50	48	45	43	38	34	30	26	22	18			36
38	57	54	52	50	47	45	40	36	32	28	24	20			38
40	58	56	53	51	49	47	42	38	34	30	27	23			40
42	60	57	55	53	50	48	44	40	36	32	29	25			42
44	61	58	56	54	52	50	46	42	38	34	31	27			44
46	62	59	57	55	53	51	47	43	39	36	33	29			46
48	63	60	58	56	54	52	48	44	41	37	34	31			48
50	63	61	59	57	55	53	49	45	42	38	36	32			50
52	64	62	60	58	56	54	50	47	43	40	37	34			52
54	65	63	61	59	57	55	51	48	44	41	38	35			54
56	66	64	62	60	58	56	52	49	45	42	39	37			56
58	66	64	63	61	59	57	53	50	47	43	40	38			58
60	67	65	64	62	60	57	54	51	48	45	42	39			60

**TABLE OF WET & DRY BULB THERMOMETER READINGS
WITH CORRESPONDING PERCENTAGES OF HUMIDITY**

Dry Bulb	DEPRESSION OF WET BULB °F													
°F.	1	2	3	4	5	6	7	8	9	10	11	12	13	14
38	88	77	66	54	43	33	22	12	1					
32	89	79	68	57	47	36	27	17	7					
34	90	79	70	60	50	41	31	21	13	3				
36	90	80	70	60	54	44	35	26	18	9				
28	91	81	72	63	54	44	39	31	22	14	6			
40	91	82	73	65	56	47	39	30	27	19	11	3		
42	91	83	74	66	58	50	42	34	26	18	10	6		
44	92	84	75	68	60	52	45	37	29	22	15	8	7	
46	92	84	77	69	62	54	47	40	33	26	19	12	6	
48	92	85	77	70	63	56	49	42	36	29	22	16	10	4
50	93	86	79	71	65	59	52	45	38	32	26	20	14	8
52	93	86	79	73	66	60	54	47	41	35	29	23	17	12
54	93	87	80	74	68	61	55	49	43	38	32	26	21	15
56	94	87	81	75	69	63	57	51	46	40	35	29	24	19
58	94	88	82	76	70	64	59	53	48	42	37	31	26	22
60	94	88	82	77	71	65	60	55	50	44	39	34	29	25
62	94	88	83	77	72	67	61	56	51	46	41	37	32	27
64	94	89	83	78	73	68	63	58	53	48	43	39	34	30
66	95	89	84	79	74	69	64	59	54	50	45	41	36	32
68	95	90	84	79	75	70	65	60	56	51	47	43	38	34
70	95	90	85	80	75	71	66	62	57	53	49	44	40	36
72	95	90	85	80	76	71	67	62	58	54	50	46	42	38
74	95	90	86	81	77	72	68	64	60	56	52	48	44	40
76	95	91	86	82	78	73	69	65	61	57	53	49	45	42
78	95	91	86	82	78	74	70	66	62	58	54	50	47	43
80	96	91	87	83	79	74	70	66	63	59	55	52	48	45
82	96	91	87	83	79	75	71	67	64	60	56	53	49	46
84	96	92	87	83	79	76	72	68	64	61	57	54	51	47
86	96	92	88	84	80	76	72	69	65	62	58	55	52	49
88	96	92	88	84	80	77	73	69	66	63	59	56	53	50
90	96	92	88	84	81	77	74	70	67	63	60	57	54	51
92	96	92	88	85	81	78	74	71	67	64	61	58	55	52
94	96	93	89	85	81	78	75	71	68	65	62	59	56	53
96	96	93	89	85	82	78	75	72	68	65	62	59	57	54
98	96	93	89	84	82	79	76	73	69	66	63	60	57	54
100	96	93	89	84	82	79	76	73	70	67	64	61	58	55
102	96	93	90	86	83	80	77	73	70	67	65	62	59	56
104	96	93	90	86	83	80	77	74	71	68	65	62	59	57
106	97	93	90	87	84	81	78	75	72	69	66	63	61	58
108	97	93	90	87	84	81	78	75	72	69	67	64	61	59
110	97	93	90	87	84	81	78	75	72	69	67	64	61	59
112	97	94	90	87	84	81	78	75	73	70	67	65	62	59
114	98	94	90	87	84	81	79	76	73	70	68	65	63	60
116	97	94	90	87	84	82	79	76	73	71	68	65	63	61
118	97	94	91	88	85	82	79	76	74	71	69	66	63	61
120	97	94	91	88	85	82	79	77	74	72	69	67	64	63

Dry Bulb	DEPRESSION OF WET BULB °F														Dry Bulb
°F.	15	16	17	18	19	20	21	22	23	24	25	26	°F.		
30															30
32															32
34															34
36															36
38															38
40															40
42															42
44															44
46															46
48															48
50	2														50
52	4														52
54	10	5													54
56	13	8	3												56
58	17	12	7	2											58
60	20	15	11	6	2										60
62	23	18	14	10	5										62
64	25	21	17	13	9	5									64
66	28	23	20	16	12	8	4								66
68	30	26	22	18	15	11	7	3							68
70	32	28	24	21	17	14	10	7	3						70
72	34	31	27	23	20	16	13	9	6	3					72
74	36	33	29	26	22	19	15	12	9	6	3				74
76	38	34	31	28	24	21	18	15	11	8	5	2			76
78	40	36	33	30	26	23	20	17	14	11	8	5	2		78
80	41	38	35	31	28	25	22	19	16	13	10	8	5		80
82	43	40	36	33	30	27	24	21	18	16	13	10	8		82
84	44	41	38	35	32	29	26	23	20	18	15	12	9		84
86	45	42	39	36	33	31	28	25	22	19	17	14	11		86
88	47	44	41	38	35	32	29	27	24	21	19	16	13		88
90	48	45	42	39	36	34	31	28	26	23	21	18	15		90
92	49	46	43	40	38	35	32	30	27	25	22	20	18		92
94	50	47	44	42	39	36	34	31	29	26	24	22	19		94
96	51	48	45	43	40	38	35	33	30	28	26	23	20		96
98	52	49	46	44	41	39	36	34	31	29	27	25	22		98
100	53	50	47	45	42	40	37	35	33	31	28	26	23		100
102	54	51	48	46	43	41	39	36	34	32	30	28	25		102
104	54	52	49	47	44	42	40	37	35	33	31	29	27		104
106	55	52	50	48	45	43	41	39	36	34	32	30	28		106
108	56	53	51	49	46	44	42	40	37	35	33	31	29		108
110	56	54	51	49	47	45	42	40	38	36	34	32	30		110
112	57	55	52	50	48	46	43	41	39	37	35	33	31		112
114	58	55	53	51	48	46	44	42	40	38	36	34	32		114
116	58	56	54	51	49	47	45	43	41	39	37	35	33		116
118	59	56	54	52	50	48	46	44	42	40	38	36	34		118
120	59	57	55	53	51	48	46	44	42	40	38	36	34		120