

Multi-Point Temperature & Humidity Calibration

Atmosfär **AT**^{*ip*}
I300

Introduction

Calibrating at 9 points with individual sensors for temperature (15 on 2000 Litre systems and larger) and 4 points for humidity, with the addition of further 5th point verification utilising a chilled mirror hygrometer for a highly stable and accurate measurement of humidity.



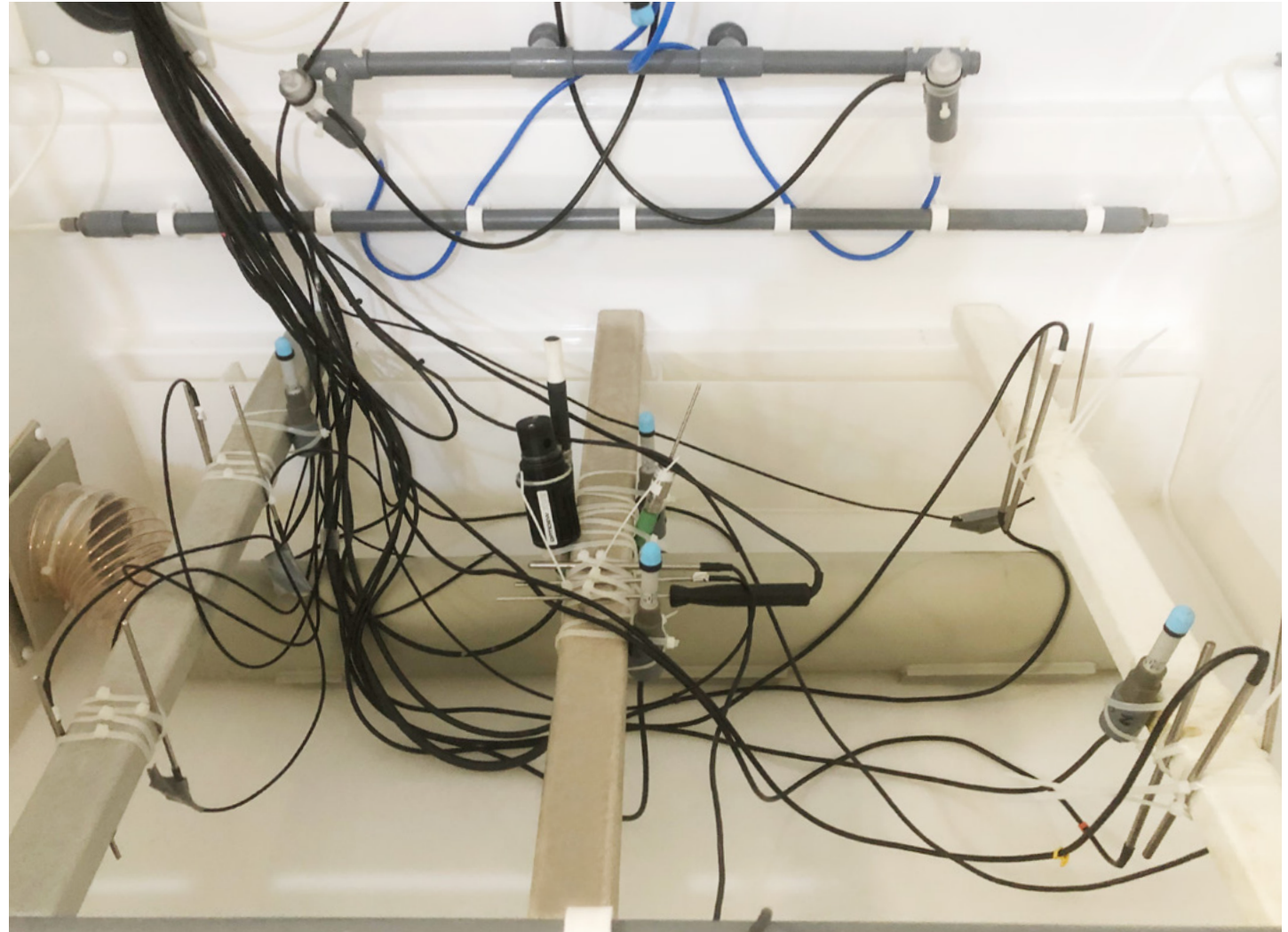
1 Chilled mirror hygrometer



2 Humidity sensor



3 Temperature sensor



25°C 90%RH - Test 1

Sample Time	Independent Temperature Reference (°C)								
	1	2	3	4	5	6	7	8	9
90:08:00	25	24.9	24.9	25	24.9	25	24.9	25	24.8
90:10:00	25	25	24.9	25	24.9	25	24.9	25	24.8
90:12:00	25	25	24.9	25.1	25	25	25	25.1	24.8
90:14:00	25	25	24.9	25.1	25	25	24.9	25.1	24.8
90:16:00	25	25	24.9	25	25	25	24.9	25	24.8
90:18:00	25	25	24.9	25	25	25	24.9	25	24.8
90:20:00	25	25	24.9	25.1	25	25	25	25.1	24.9
90:22:00	25	25	24.9	25.1	25	25	24.9	25.1	24.8
90:24:00	25	25	24.9	25.1	25	25	24.9	25.1	24.9
90:26:00	25	25	24.9	25.1	25	25	25	25.1	24.9
90:28:00	25	25	24.9	25.1	25	25.1	25	25.1	24.9
90:30:00	25	25	24.9	25.1	25	25.1	25	25.1	24.9
90:32:00	25	25	24.9	25.1	25	25.1	25	25.1	24.9
90:34:00	25	25	24.9	25.1	25	25.1	25	25.1	24.9
90:36:00	25	25	24.9	25.1	25	25.1	25	25.1	24.9
Average	25.00	25.00	24.90	25.08	24.99	25.04	24.96	25.08	24.99

Independent Humidity Reference (%RH)				
1	2	3	4	
91	92.1	91.8	88.7	
92.1	92.4	91.4	88.9	
91.7	91.7	91.1	89.7	
90.4	91.4	89	89.9	
89.7	91.3	89.1	90.4	
88	91.7	88.6	90.1	
88.7	91.5	88.9	89.4	
89.9	91	90.1	89.6	
90.7	90.4	92.1	89.1	
91.2	90	91.7	88.9	
91.4	90.1	91.2	88.7	
91.5	88.2	91.7	89.6	
90.2	87.6	90.8	89.9	
89.7	87.9	90.2	90.2	
89.1	88.4	89.7	90.3	
Average	90.31	90.26	90.40	89.62

Chamber Set Temperature	25°C
Chamber Set Humidity	90%RH
Chilled Mirror Temperature Reference (Located in centre of chamber)	24.9°C
Chilled Mirror Humidity Reference (Located in centre of chamber)	88.9%RH

25°C 90%RH - Test 2

Sample Time	Independent Temperature Reference (°C)								
	1	2	3	4	5	6	7	8	9
65:52:00	25.3	25.4	25.1	25.3	25.5	25.4	25.3	25.3	25
65:54:00	25.3	25.4	25.1	25.3	25.5	25.4	25.3	25.3	25
65:56:00	25.3	25.4	25.1	25.3	25.4	25.3	25.2	25.3	25
65:58:00	25.3	25.4	25.1	25.3	25.4	25.3	25.2	25.2	25
66:00:00	25.3	25.3	25.1	25.3	25.4	25.3	25.2	25.2	25
66:02:00	25.3	25.3	25	25.3	25.3	25.3	25.2	25.2	24.9
66:04:00	25.2	25.3	25	25.3	25.2	25.3	25.2	25.2	24.9
66:06:00	25.2	25.3	25	25.2	25.2	25.3	25.2	25.2	24.8
66:08:00	25.2	25.3	25	25.2	25.2	25.3	25.2	25.2	24.9
66:10:00	25.2	25.3	25.1	25.3	25.3	25.3	25.2	25.2	25
66:12:00	25.2	25.3	25.1	25.3	25.3	25.3	25.2	25.2	25
66:14:00	25.2	25.3	25	25.2	25.2	25.3	25.1	25.2	25
66:16:00	25.2	25.3	25	25.2	25.3	25.3	25.1	25.2	25
66:18:00	25.2	25.3	25	25.2	25.3	25.2	25.1	25.2	25
66:20:00	25.2	25.2	25	25.2	25.3	25.2	25.1	25.1	24.9
Average	25.24	25.32	25.05	25.26	25.32	25.30	25.19	25.21	24.96

Independent Humidity Reference (%RH)			
1	2	3	4
92.7	88.7	88.1	91.2
92.1	88.9	88.9	89.6
91.4	89.7	89.4	89.3
90.1	87.9	89.9	88.4
90.4	88.6	91.2	88.7
90.8	90.1	91.8	88.9
90.1	89.4	91.4	89.4
88.7	89.6	90.7	88.1
88.5	89.7	90.3	90.2
88.9	88.4	90	90.7
88.7	90.1	87.9	90.4
88.6	90.4	89.7	91.9
87.5	89.2	89.4	91.2
87.9	90.1	89.6	90.4
90.1	90.5	88.8	92.6
89.77	89.42	89.81	90.07

Chamber Set Temperature	25°C
Chamber Set Humidity	90%RH
Chilled Mirror Temperature Reference (Located in centre of chamber)	25.1°C
Chilled Mirror Humidity Reference (Located in centre of chamber)	89.8%RH

40°C 70%RH - Test 1

Sample Time	Independent Temperature Reference (°C)								
	1	2	3	4	5	6	7	8	9
82:30:00	40.1	40.2	39.6	39.8	40.1	40.2	39.8	39.7	39.8
82:32:00	40.1	40.2	39.7	39.8	40.1	40.2	39.9	39.7	39.7
82:34:00	40.1	40.2	39.8	39.9	40	40.2	40	39.8	39.9
82:36:00	40.2	40.1	39.8	39.9	40	40.3	40	39.8	39.9
82:38:00	40.2	40.1	39.8	39.9	40	40.3	39.9	39.8	39.9
82:40:00	40.1	40.2	39.7	39.9	39.9	40.3	40	39.8	39.8
82:42:00	40.1	40.8	39.7	39.9	39.8	40.3	40	39.8	39.9
82:44:00	40	40.1	39.7	39.9	39.9	40.3	39.9	39.7	40
82:46:00	40	40.1	39.7	39.8	39.8	40.3	39.9	39.7	40
82:48:00	40	40.1	39.8	39.9	39.7	40.2	40	39.8	40
82:50:00	40.1	40.2	39.9	40	39.8	40.2	40.1	39.9	40
82:52:00	40.1	40.2	39.7	39.9	39.8	40.2	39.9	39.8	39.9
82:54:00	40.1	40	39.7	39.8	39.9	40.1	39.9	39.7	39.9
82:56:00	40	40	39.7	39.8	39.9	40.1	39.9	39.7	39.8
82:58:00	40	39.8	39.7	39.8	40	40.1	39.9	39.7	39.8
Average	40.08	40.15	39.73	39.87	39.91	40.22	39.94	39.76	39.89

Independent Humidity Reference (%RH)			
1	2	3	4
72.3	71.2	67.9	68.1
71.8	70.9	68.9	69.7
71.4	70.4	69.4	70.2
71	70.1	69.8	70.9
71	69.4	71.1	72.1
71	68.9	71.4	71
70.5	68.9	72.5	70.8
70.6	70.2	70	70.1
70.8	71.3	69.8	68.7
71.5	71.9	69.1	68.1
72.1	70.8	68.5	67.9
71.9	71.4	68.9	69.7
71.4	70.6	69.6	70.3
70.1	70.1	69.9	71.5
70	70	70	72.3
71.16	70.41	69.79	70.09

Chamber Set Temperature	40°C
Chamber Set Humidity	70%RH
Chilled Mirror Temperature Reference (Located in centre of chamber)	39.9°C
Chilled Mirror Humidity Reference (Located in centre of chamber)	69.8%RH

40°C 70%RH - Test 2

Sample Time	Independent Temperature Reference (°C)								
	1	2	3	4	5	6	7	8	9
70:00:00	40.3	40.4	39.7	39.8	40.2	40.4	40	39.8	39.9
70:02:00	40.4	40.5	39.7	39.8	40.2	40.4	40	39.8	39.9
70:04:00	40.4	40.3	39.7	39.9	40.3	40.4	40	39.8	39.9
70:06:00	40.2	40.2	39.5	39.7	40.2	40.2	39.7	39.6	40
70:08:00	40.2	40.1	39.5	39.7	40.1	40.2	39.9	39.6	40
70:10:00	40.4	40	39.7	39.8	40.1	40.4	40.1	39.8	40
70:12:00	40.4	40	39.7	39.9	40.1	40.4	39.9	39.8	40
70:14:00	40.2	40	39.5	39.7	40	40.2	39.7	39.6	40
70:16:00	40.2	40	39.6	39.7	40	40.2	39.9	39.7	40.1
70:18:00	40.3	39.9	39.7	39.8	40	40.4	40	39.8	40.1
70:20:00	40.3	39.9	39.6	39.8	40	40.3	39.9	39.7	40.1
70:22:00	40.2	39.8	39.6	39.7	40	40.3	39.8	39.7	40.1
70:24:00	40.3	39.7	39.7	39.8	40.1	40.3	40	39.8	40.2
70:26:00	40.4	39.8	39.7	39.9	40.1	40.4	40	39.8	40.1
70:28:00	40.3	39.8	39.6	39.8	40	40.3	39.8	39.7	40.1
Average	40.30	40.03	39.63	39.79	40.09	40.32	39.91	39.73	40.09

Independent Humidity Reference (%RH)			
1	2	3	4
70.7	71.5	72	69.8
70.9	71.1	69.4	68.7
70.1	70.4	68.1	69.4
70.2	69.8	69.7	70.8
70	71	71.4	71.9
69.2	69.9	71.5	72.1
70.5	71.6	72.1	71.4
69	69.8	68.7	69.1
69.7	72.1	71.4	70.2
72.4	71.4	71.5	72.1
68.1	68.7	69.2	69.1
71.2	70.4	71.4	70.1
70.1	68.5	68.4	69.8
68.7	69.2	69.8	69.8
71.2	72.3	71.5	70.3
70.13	70.51	70.41	70.31

Chamber Set Temperature	40°C
Chamber Set Humidity	70%RH
Chilled Mirror Temperature Reference (Located in centre of chamber)	40.1°C
Chilled Mirror Humidity Reference (Located in centre of chamber)	69.8%RH

50°C 70%RH - Test 1

Sample Time	Independent Temperature Reference (°C)								
	1	2	3	4	5	6	7	8	9
90:08:00	50	49.9	49.7	50.4	49.8	49.5	50	49.7	50
90:10:00	50	49.9	49.7	50.4	49.8	49.5	50	49.7	50.1
90:12:00	50	49.9	49.7	50.4	49.8	49.5	50	49.7	50.1
90:14:00	50	50	49.7	50.4	49.8	49.5	50	49.8	50.1
90:16:00	50	50	49.8	50.4	49.8	49.5	50	49.8	50.1
90:18:00	50	50	49.8	50.4	49.8	49.6	50.1	49.9	50.2
90:20:00	50	50	49.8	50.4	49.8	49.5	50.1	49.9	50.2
90:22:00	50	49.9	49.7	50.4	49.8	49.5	50.1	49.8	50.2
90:24:00	50	49.9	49.7	50.4	49.8	49.5	50.1	49.8	50.1
90:26:00	50	49.9	49.7	50.4	49.8	49.5	50.1	49.8	50.2
90:28:00	50	49.9	49.7	50.4	49.8	49.5	50.1	49.9	50.2
90:30:00	50.1	50	49.8	50.4	49.8	49.6	50.1	50	50.2
90:32:00	50.1	50	49.8	50.5	49.9	49.6	50.1	50	50.2
90:34:00	50	49.9	49.8	50.4	49.8	49.6	50.1	49.9	50.2
90:36:00	50	49.9	49.8	50.4	49.8	49.5	50.1	49.9	50.2
Average	50.01	49.94	49.75	50.41	49.81	49.53	50.07	49.85	49.81

Independent Humidity Reference (%RH)			
1	2	3	4
71	72.1	71.8	68.7
72.1	72.4	71.4	68.7
71.7	71.7	71.1	68.8
70.4	71.2	69	69.9
69.8	71	69.1	70.4
68	71	68.8	70.1
68.9	71.4	68.8	69.8
68.7	71	70.4	69.8
68.9	70.9	72.1	69.1
71.2	70.3	71.7	68.9
71.1	70.1	71.2	68.7
71.1	70	71.7	69.8
71.2	70.1	70.8	69.9
71.1	69.8	70.2	70.2
71	69.9	69.8	70.3
70.37	70.77	70.44	69.60

Chamber Set Temperature	50°C
Chamber Set Humidity	70%RH
Chilled Mirror Temperature Reference (Located in centre of chamber)	49.9°C
Chilled Mirror Humidity Reference (Located in centre of chamber)	70.6%RH

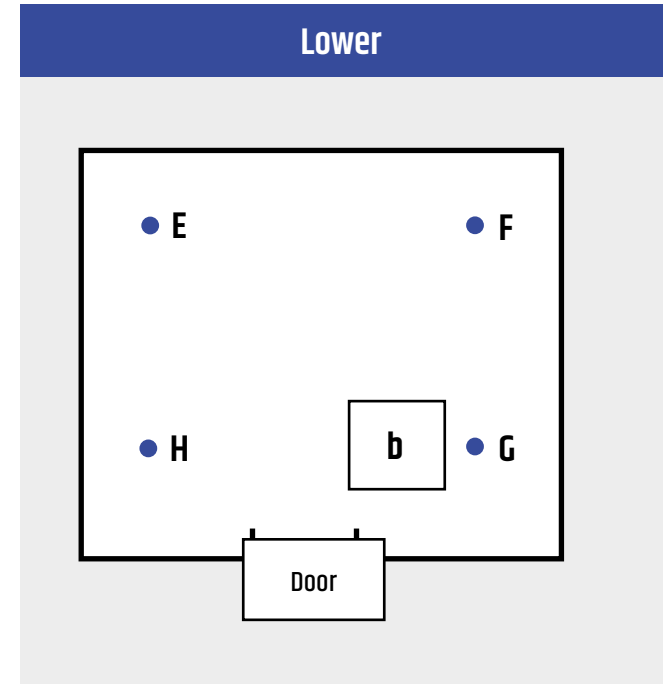
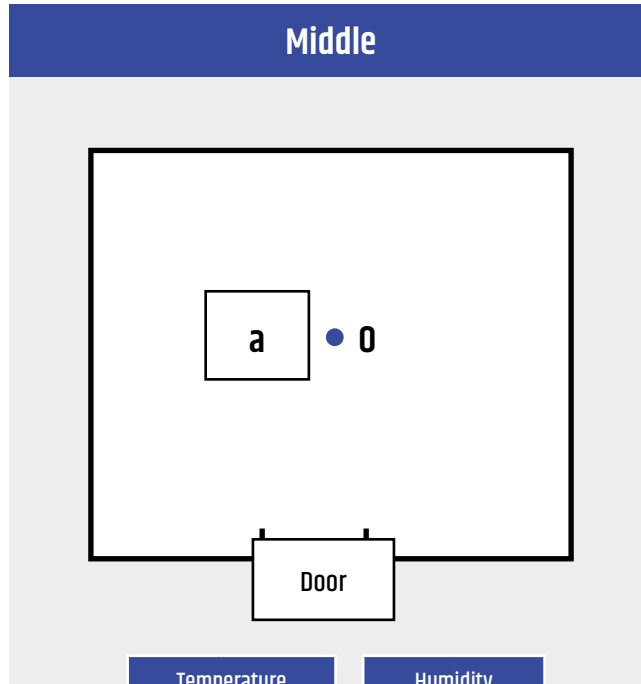
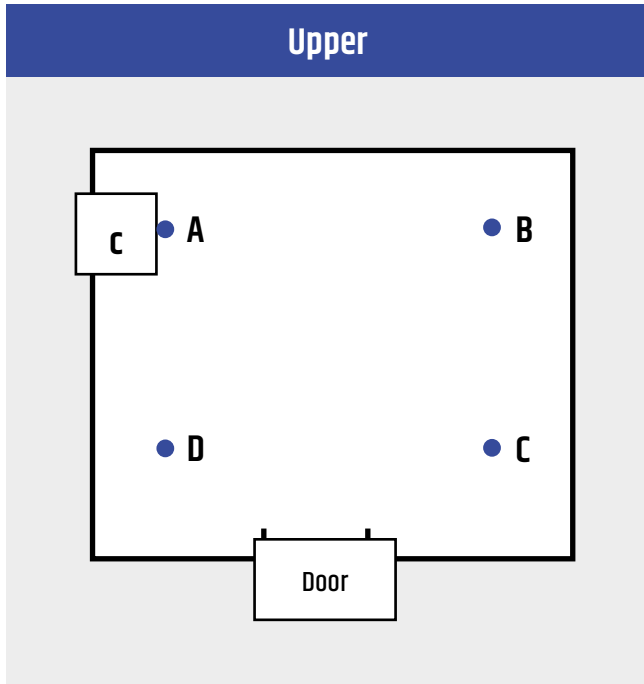
50°C 70%RH - Test 2

Sample Time	Independent Temperature Reference (°C)								
	1	2	3	4	5	6	7	8	9
90:08:00	49.6	49.5	50.1	49.7	50	49.8	50	49.8	49.8
90:10:00	49.6	49.6	50.1	49.7	50	49.8	50	49.8	49.8
90:12:00	49.6	49.5	50.1	49.7	50	49.8	50	49.9	49.6
90:14:00	49.7	49.6	50.1	49.7	50.1	49.8	50	49.8	49.9
90:16:00	49.7	49.6	50	49.8	50.1	49.9	50	49.9	49.8
90:18:00	49.8	49.6	50	49.8	50.1	49.9	50.1	49.8	50
90:20:00	49.7	49.6	50	49.8	50.1	49.9	50.1	49.9	50
90:22:00	49.7	49.6	50	49.8	50.2	49.9	50.1	49.9	50.1
90:24:00	49.7	49.5	50	49.7	50.2	49.9	50.2	50	50.1
90:26:00	49.7	49.5	50	49.7	50.1	49.9	50.2	50	50.2
90:28:00	49.7	49.6	49.9	49.7	50.1	49.8	50.1	50	50.2
90:30:00	49.8	49.7	49.9	49.7	50.1	49.8	50	50.1	50.2
90:32:00	49.8	49.7	49.9	49.8	50	49.8	50	50	50.3
90:34:00	49.7	49.6	49.8	49.8	50	49.7	50	50	50.3
90:36:00	49.8	49.6	49.8	49.8	50	49.7	50.1	49.9	50.1
Average	49.71	49.59	49.97	49.75	50.08	49.83	50.06	49.93	50.08

Independent Humidity Reference (%RH)			
1	2	3	4
71.3	71.3	69.9	69.6
71.3	71	69.6	69.8
71.3	71.2	69.6	69.5
71.3	71.2	69.7	69.6
71.2	71.2	69.7	69.5
71.2	71	69.6	69.9
71.2	71	69.7	69.9
71.1	71	69.6	69.5
71.2	70.8	69.6	69.5
71.1	70.7	69.9	69.5
71.1	70.9	69.8	69.9
71.3	70.7	69.8	69.7
71.3	70.8	69.8	69.7
71.3	70.8	69.9	69.8
71	70.4	69.8	69.7
71.21	70.91	69.72	69.68

Chamber Set Temperature	50°C
Chamber Set Humidity	70%RH
Chilled Mirror Temperature Reference (Located in centre of chamber)	49.7°C
Chilled Mirror Humidity Reference (Located in centre of chamber)	69.6%RH

Sensor Locations



Temperature		Humidity	
Sensor	Position	Sensor	Position
1	B	1	C
2	F	2	A
3	C	3	B
4	G		
5	A		
6	E		
7	D		
8	H		
9	O		

Humidity	
Chilled Mirror	A



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