

Applied Current

The current applied is highly dependent on the application and leads to self-heating effects. Depending on the thermal transfer from the sensor into the application, the current can be increased. There is no bottom current limit for platinum thin-film sensors. The maximum current for sensors between 750 °C and 1000 °C (7W, 8W, 10W) should not exceed 1 mA.

Recommended current supplies:

100 Ω	500 Ω	1000 Ω	2000 Ω	10000 Ω
1 mA	0.5 mA	0.3 mA	0.2 mA	0.1 mA

Self Heating

The electric current generates self-heating resulting in errors of measurement. To minimize the error, the testing current should be kept as low as possible. The measurement error caused by self-heating is dependent on temperature error $\Delta t = R \times I^2 / E$.

E = self-heating coefficient in mW/K, R = resistance in kΩ, I = measuring current in mA

Response Time

The response time is defined as the time in seconds the sensor needs to detect the change in temperature. $t_{0.63}$ describes the time in seconds the sensor needs to measure 63 % of the temperature change. The response time is depending on the sensor dimensions, the thermal contact resistance and the surrounding medium.

Dimensions number	Sensor size L x W x T/H in mm	Response time in seconds						Self-heating			
		Water (v = 0.4 m/s)			Air (v = 1 m/s)			Water (v = 0 m/s)		Air (v = 0 m/s)	
		$t_{0.5}$	$t_{0.63}$	$t_{0.9}$	$t_{0.5}$	$t_{0.63}$	$t_{0.9}$	E in mW/K	Δt in [mK]*	E in mW/K	Δt in [mK]*
161	1.6 x 1.2 x 0.25/0.8	0.05	0.08	0.18	1	1.2	2.5	12	8.3	1.8	56
308	3.0 x 0.8 x 0.25/0.6	0.08	0.1	0.25	1.2	1.5	3.5	15	6.7	2.2	46
232	2.3 x 2.0 x 0.25/0.9	0.09	0.12	0.33	2.7	3.6	7.5	40	2.5	4	25
202	2.0 x 2.0 x 0.65/1.3	0.11	0.16	0.38	3.6	4.9	10.2	32	3.1	3.2	31
216	2.5 x 1.6 x 0.65/1.3	0.12	0.18	0.42	4	5.4	11	36	2.8	3.6	28
232	2.3 x 2.0 x 0.65/1.3	0.15	0.2	0.55	4.5	6	12	40	2.5	4	25
325	3.0 x 2.5 x 0.65/1.3	0.25	0.3	0.7	5.5	7.5	16	90	1.1	8	13
516	5.0 x 1.6 x 0.65/1.3	0.25	0.3	0.7	5.5	7.5	16	80	1.3	7	14
520	5.0 x 2.0 x 0.65/1.3	0.25	0.3	0.75	6	8.5	18	80	1.3	7	14
525	5.0 x 2.5 x 0.65/1.3	0.33	0.4	0.85	6.5	9	19	90	1.1	8	13
538	5.0 x 3.8 x 0.65/1.3	0.35	0.4	0.90	7.5	10	20	140	0.7	10	10
505	5.0 x 5.0 x 0.65/1.3	0.4	0.5	1.1	8	11	21	150	0.7	11	9
102	10.0 x 2.0 x 0.65/1.3	0.33	0.4	0.85	7.5	10.5	20	140	0.7	10	10
281	13 x Ø 2.8	2.5	4.5	8	10	15	28	60	1.7	5.5	18
281 ¹⁾	13 x Ø 2.8	2	2.5	5.5	10	12	22	45	2.2	4	25
451	13 x Ø 4.5	8	10	22	12	22	40	85	1.2	8	13
451 ¹⁾	13 x Ø 4.5	5	6	14	16	18	37	60	1.7	6.5	15
SMD 1206	3.2 x 1.6 x 0.4	0.15	0.25	0.45	3.5	4.2	10	55	1.8	7	14
SMD 0805	2.0 x 1.2 x 0.4	0.1	0.12	0.33	2.5	3	8	38	2.6	4	25
FC 0603	1.5 x 0.75 x 0.4	0.08	0.1	0.25	1.8	2.2	5.5	25	4	2.5	40

1) Two sensing elements in the same round ceramic housing