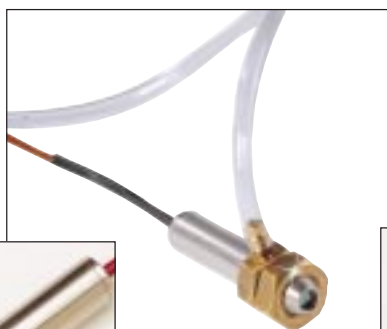


# Infrared Thermocouples, Extended Temperature Ranges



Infrared thermocouples can be used with most thermocouple meters or controller over a specified temperature range. For example, the OS36-J-50F would have a 2% accuracy over the range of -18 to 27°C (0 to 80°F).

The following table shows the series of equations that permit a determination of measured temperature by measuring the IR-TC's output voltage. If desired, the cold junction (CJ) correction can be set at any known constant temperature, *e.g.*, 25°C. If the CJ temperature is not known and constant, it is suggested you use an OMEGA CJ connection device like a TRC IIIA or CJ-K. This will correct to 0°C and allow use of a standard voltmeter without other cold junction compensation. The CJT term can then be dropped in the following polynomial table.



# Polynomial Table for OS36, 37 and 38 Signal Output

$$TT = A \cdot (mV)^6 + B \cdot (mV)^5 + C \cdot (mV)^4 + D \cdot (mV)^3 + E \cdot (mV)^2 + F \cdot (mV) + CJT$$

	A	B	C	D	E	F
OS36-J-50F/10C	-6.14473E-09	2.08199E-06	-2.72953E-04	1.75317E-02	-5.84883E-01	1.53003E+01
OS36-J-80F/27C	-2.83996E-08	7.41635E-06	-7.54046E-04	3.79224E-02	-1.00406E+00	2.06592E+01
OS36-J-140F/60C	-4.31591E-08	1.06077E-05	-1.01002E-03	4.72155E-02	-1.14872E+00	2.20397E+01
OS36-J-180F/90C	-7.03138E-08	1.59337E-05	-1.39844E-03	6.02655E-02	-1.35167E+00	2.39075E+01
OS36-J-240F/120C	-1.05707E-07	2.23776E-05	-1.83521E-03	7.38926E-02	-1.54843E+00	2.55885E+01
OS36-J-280F/140C	-1.89514E-07	3.63996E-05	-2.70839E-03	9.89395E-02	-1.88106E+00	2.82034E+01
OS36-J-340F/170C	-2.99852E-07	5.33519E-05	-3.67751E-03	1.24452E-01	-2.19192E+00	3.04447E+01
OS36-J-440F/220C	-5.20472E-07	8.44263E-05	-5.30444E-03	1.63572E-01	-2.62438E+00	3.31770E+01
OS36-K-50F/10C	-1.59875E-08	4.63673E-06	-5.20959E-04	2.87368E-02	-8.24991E-01	1.86777E+01
OS36-K-80F/27C	-6.09875E-08	1.41502E-05	-1.27187E-03	5.61266E-02	-1.28905E+00	2.33472E+01
OS36-K-140F/60C	-1.42546E-07	2.87094E-05	-2.24003E-03	8.58077E-02	-1.71070E+00	2.68960E+01
OS36-K-180F/90C	-3.22615E-07	5.67063E-05	-3.86135E-03	1.29089E-01	-2.24604E+00	3.08183E+01
OS36-K-240F/120C	-5.08511E-07	8.28536E-05	-5.22978E-03	1.62069E-01	-2.61390E+00	3.32464E+01
OS36-K-280F/140C	-9.34497E-07	1.37576E-04	-7.84637E-03	2.19704E-01	-3.20171E+00	3.67952E+01
OS36-K-340F/170C	-1.62369E-06	2.18012E-04	-1.13401E-02	2.89601E-01	-3.84908E+00	4.03439E+01
OS36-K-440F/220C	-2.90564E-06	3.54076E-04	-1.67152E-02	3.87409E-01	-4.67308E+00	4.44530E+01
OS37-K	-7.13085E-08	2.30925E-05	-2.88585E-03	1.75033E-01	-5.35670E+00	8.58605E+01
OS38-K	-2.17588E+04	7.42505E+04	-9.73319E+04	6.14482E+04	-1.92711E+04	2.97242E+03
OS38-K	-3.01228E-08	9.50466E-06	-1.17636E-03	7.27752E-02	-2.41603E+00	4.88735E+01
OS38-K	Alternative: Power Law Fit=298.0514(mV) <sup>0</sup> 2864					

	Maximum Range		Minimum Range		Test Conditions		
	mV	TT	mV	TT	mV	TT	CJT
OS36-J-50F/10C	70	466	-4	-47	5	89	25
OS36-J-80F/27C	70	577	-3	-47	5	107	25
OS36-J-140F/60C	70	634	-3	-47	5	112	25
OS36-J-180F/90C	70	674	-3	-47	5	117	25
OS36-J-240F/120C	65	671	-2	-46	5	122	25
OS36-J-280F/140C	60	678	-2	-47	5	130	25
OS36-J-340F/170C	55	674	-2	-46	5	136	25
OS36-J-440F/220C	50	667	-2	-49	5	143	25
OS36-K-50F/10C	70	551	-3	-47	5	101	25
OS36-K-80F/27C	70	664	-3	-45	5	116	25
OS36-K-140F/60C	65	685	-2	-47	5	126	25
OS36-K-180F/90C	55	678	-2	-47	5	137	25
OS36-K-240F/120C	50	671	-2	-49	5	143	25
OS36-K-280F/140C	45	670	-2	-48	5	152	25
OS36-K-340F/170C	45	681	-2	-45	5	160	25
OS36-K-440F/220C	40	685	-1	-48	5	169	25
OS37-K	70	957	0	0	5	341	25
OS38-K	1	334	0	0	1	334	25
OS38-K	80	1035	1	309	80	1035	262
OS38xxx-K Power Law	80	1046	0	0	5	473	25

Notes: TT = Target Temperature

CJT = Cold junction temperature at input added via the input Device (controller, indicator, PLC, etc.).

A controlled constant 25°C is assumed here for most polynomials. It can be changed.

mV = Signal produced by infrared thermocouple in millivolts.

All temperatures in °C.

Assumed target emissivity is 0.9 for all models except OS38 which has assumed emissivity 0.2.