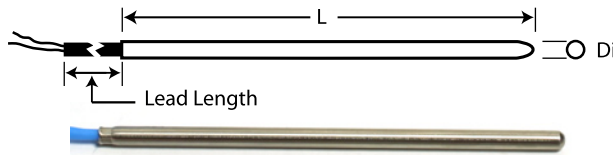




# Type 1 Probes



#20007

These probes are 2- wire 500 ohm RTDs (Resistive Temperature Detector). Primarily used for sensing air temperature. These sensors can be inserted into a drilled hole, but are not well suited for surface sensing. The response curve of the sensor is defined as an alpha of 0.00390. Aluminum probes respond faster while stainless steel probes are more durable. When the lead wire is extended, the wire must have shielding with an over braid and preferably covered with an outer layer of Teflon. The only limitation regarding splicing of the wire is a positive temperature error of 0.1 degree for every 0.2 ohms of resistance added in the path. The shield wire is intended to be hooked to ground at only one end (not connected at probe end). If the ground is inadequate or unattached you may see fluctuations in the temperature reading. There is no polarity to the probe's signal. Typically sensor wires are (1)black or red and (1) white. The uninsulated or green wire is the ground wire for the probe shield.

Probe Type	Part Number	Temp Ranges	Probe Size Inches	Length of Leads Inches	Material	Notes (previous names/designations)
1	20003	-100 to +200C	4.5 X .188	48	Al	Tubular for air or drilled holes (P1-500A)
1	20004	-100 to +200C	4.5 X .188	108	Al	Tubular for air or drilled holes (P1-500A)
1	20005	-100 to +200C	4.5 X .188	48	SS	Tubular for air or drilled holes (P1-500)
1	20006	-100 to +200C	4.5 X .188	108	SS	Tubular for air or drilled holes (P1-500)
1	20007	-100 to +200C	1.5 X .188 with .3 x .35 Flag	48	Al	Tubular for air or drilled holes (P1-500A) with .3x .35 Flag with hold down hole
1	20009	-100 to +400C	4.5 X .188	108 w/transition	SS	Extra High temp tubular (400° P1-500)
1	20010	-100 to +500C	4.5 X .188	48 w/transition	SS	For 500 C applications with special Sigma controller ONLY
1	20015	-100 to +200C	1.5 X .188	108	Al	Tubular for air or drilled holes
1	20016	-200 to +200C	4.5 X .188	48	SS	Low temp Tubular for air or drilled holes (low temp P1-500)
1	20017	-100 to +200C	1.5 X .188	108	SS	Tubular for air or drilled holes
1	20019	-100 to +200C	4.5 X .125	48	SS	Tubular for air or drilled holes (P5-500)
1	20021	-100 to +200C	4.5 X .125	48	Al	Tubular for air or drilled holes (P5-500A)
1	20020	-100 to +200C	2 X .125	48	SS	Tubular for air or drilled holes (P5-500)
1	20022	-100 to +200C	2 X .125	48	Al	Tubular for air or drilled holes (P5-500A)
1	20026	-200 to +400C	4.5 X .188	108 w/transition	SS	Tubular for air or drilled holes
1	20027	-200 to +500C	4.5 X .188	108 w/transition	SS	Tubular for air or drilled holes - 425 Ohms @ 0°C
1	20029	-100 to +200C	1.75 X .125	48	Al	Tubular for air or drilled holes
1	20030	-100 to +200C	1.75 X .125	48	SS	Tubular for air or drilled holes
1	20031	-100 to +200C	4.5 X .188	108	Al	Tubular for air or drilled holes (P1-500A) comes with vacuum compatible grease
1	20032	-200 to +200C	1.5 X .188 with .3 x .35 Flag	48	Al	Tubular for air or drilled holes (P1-500A) with .3x .35 Flag with hold down hole



## Type 1 Probes - Notes

#20003 and #20004 are recommended for installation in thermal platforms because of their fast response.

#20007 is a 1.5 long aluminum unit that has a 0.3x0.35 flag with 0.1 dia. hole for hold down for modified surface sensing. This probe suffers a lag in temperature sensing, but is more durable than models such as 20023 (see Type 2 probes).

#20009 is stainless steel sheathed and for sensing temperatures from -100°C to +400°C.

#20010 has a different response curve and for temperatures up to 500°C, and is ONLY to be used with Sigma controllers specially configured for 500°C. This probe is 425 ohms @ 0°C

#20009, #20010, #20026, #20027 all have 20 inches of stainless steel high temperature wire and then a transition connection to a more durability, flexible, lower heat tolerant, and solderable lead wire.

#20016 is an aluminum sheathed -200°C to +200°C range model.

#20017 (SS) and #20015 (Aluminum) are 1.5 long versions of models #20005 and #20003.

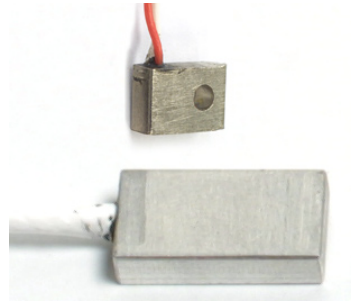
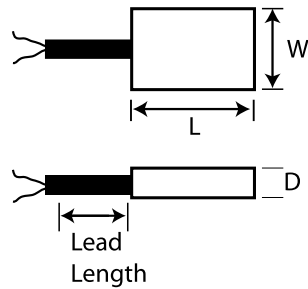
#20031 comes with vacuum compatible grease

#20032 is a 1.5 long aluminum unit that has a 0.3x0.35 flag with 0.1 dia. hole for hold down for modified surface sensing. This probe suffers a lag in temperature sensing, but is more durable than models such as 20023 (see Type 2 probes).

*All of these sensors are tested and certified to be accurate within +/-0.1%, Traceable to NIST*



# Type 2 Probes



These probes are 2- wire 500 ohm RTDs (Resistive Temperature Detector). The response curve of the sensor is defined as an alpha of 0.00390. When the lead wire is extended, the wire must have shielding, foil or over braid and preferably be covered with an outer layer of Teflon. The shield wire is intended to be hooked to ground at only one end (not at the probe end). We recommend a maximum of about 6 inches of unshielded run on probe signal wires. If the ground is inadequate or unattached you may see fluctuations in the temperature reading. There is no polarity to the probe's signal. Typically sensor wires are (1) black or red and (1) white. The uninsulated or green wire is the ground wire for the probe shield. The only limitation regarding splicing of the wire is a positive temperature error of 0.1 degree for every 0.2 ohms of resistance added in the path.

This sensor was formerly known as P2-500 and some of the older versions had very slightly different dimensions. It is an aluminum block probe that is designed for surface temperature sensing and is more rugged than the Kapton Type 3 probes - 20013 and 20014 surface sensors. It is also more massive and therefore slower responding. It can also be used to measure air temperatures but is not optimized for such. It is sensitive on all sides. It can be clamped or held in place with adhesive or thermal paste. 20011 and 20012 are not designed to be drilled through.

Probe Type	Part Number	Temp Ranges	Probe Size W x L x D - Inches	Length of Leads - Inches	Material	Notes (previous names/designations)
2	20011	-100 to +200C	.375 X .75 X .187	48	Al	Surface sensor ( P2-500)
2	20012	-100 to +400C	.375 X .75 X .187	48	SS	Surface sensor (High Temp P2-500)
2	20023	-100 to +200C	.25 X .375 X .125 .110 Diam hole	48	Ni plated Al	Surface sensor with #4 thru hole (P6)

*All of these sensors are tested and certified to be accurate within +/-0.1%, Traceable to NIST*

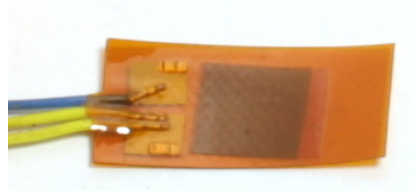
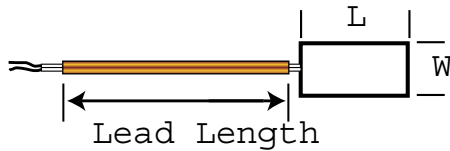
#20011 is aluminum and has a range of -100°C to +200°C.

#20012 is stainless steel and has a temperature range of -100°C to 400°C. #20012 has a transition in the leads allowing high temperature wire in the hot zone and more rugged, lower temperature tolerant wire to be used outside the temperature test area.

#20023 is Nickel plated Aluminum and has a hole to be used for hold down.



# Type 3 Probes



These probes are 2- wire 500 ohm RTDs (Resistive Temperature Detector). The response curve of the sensor is defined as an alpha of 0.00390. When the lead wire is extended, the wire will have shielding with an over braid and covered with an outer layer of Teflon. We recommend a maximum of about 6 inches of unshielded wire run on probe signal wires to prevent errors due to external influences. The shield wire is intended to be hooked to ground at only one end (not at the probe end). If the ground is inadequate or unattached you may see fluctuations in the temperature reading. There is no polarity to the probe's signal. Typically sensor wires are black and white, or yellow and blue. If there is more than one wire of any color, they are common at the probe and the second wire of the same color may be cut off or hooked in parallel. The uninsulated or green wire is the ground wire for the probe shield. The only limitation regarding splicing of the wire is a positive temperature error of 0.1 degree for every 0.2 ohms of resistance added in the path.

This Kapton tape probe formerly known as P3-500 is designed to have very low mass and is well suited for measuring temperatures of flat surfaces. It is more fragile than other sensors but very fast responding due to its low mass. It is sensitive to temperature on both sides. It is somewhat flexible and able to conform to minor surface irregularities. There are no restrictions to using this sensor for air or surface temperature sensing other than to protect the element and lead wires from excessive or repetitive flexing.

Probe Type	Part Number	Temp Ranges	Probe Size W x L x D - Inches	Length of Leads - Inches	Material	Notes (previous names/designations)
3	20013	-100 to +200C	0.5 X 1.0 X flat	48 - shielded	Kapton	Surface sensor (P3-500) Flexible
3	20014	-100 to +200C	0.5 X 1.0 X flat	12 - unshield	Kapton	Surface sensor (P3-500) Flexible

*All of these sensors are tested and certified to be accurate within +/-0.1%, Traceable to NIST*

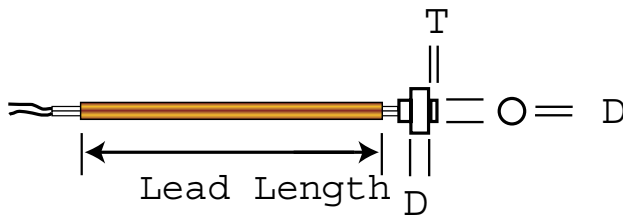
#20013 has 48" shielded leads

#20014 has 12" unshielded leads



# Type 4 Probes

Sigma Systems Corp  
 1817 John Towers Ave  
 El Cajon, CA 92020  
 619/258.3700



The probe is a 2- wire 500 ohm RTD (Resistive Temperature Detector). The response curve of the sensor is defined as an alpha of 0.00390. When the lead wire is extended, the wire will have shielding, over braid and preferably covered with an outer layer of Teflon. We recommend a maximum of about 6 inches of unshielded run on probe signal wires. The shield wire is intended to be hooked to ground at only one end (not at the probe end). If the ground is inadequate or unattached you may see fluctuations in the temperature reading. There is no polarity to the probe's signal. Typically sensor wires are (1) black or red and (1) white. The uninsulated or green wire is the ground wire for the probe shield. The only limitation regarding splicing of the wire is a positive temperature error of 0.1 degree for every 0.2 ohms of resistance added in the path. Standard shielded lead length is 48 inches.

This button probe, formerly known as P4-500 is designed to have low mass and is well suited for measuring temperatures of flat surfaces. It is sensitive only on one side making it a good choice for surface sensing. It is moderately fragile and fairly fast due to its low mass. It can easily be clamped to a surface using its flange or mounted with adhesive or thermal grease.

Probe Type	Part Number	Temp Ranges	Probe Size Di x D x T - Inches	Length of Leads - Inches	Material	Notes (previous names/designations)
4	20018	-100 to +200C	.375 dia. X .25 X .030	48	Epoxy-Teflon	Surface sensor (P4-500) Single Sided Sensor

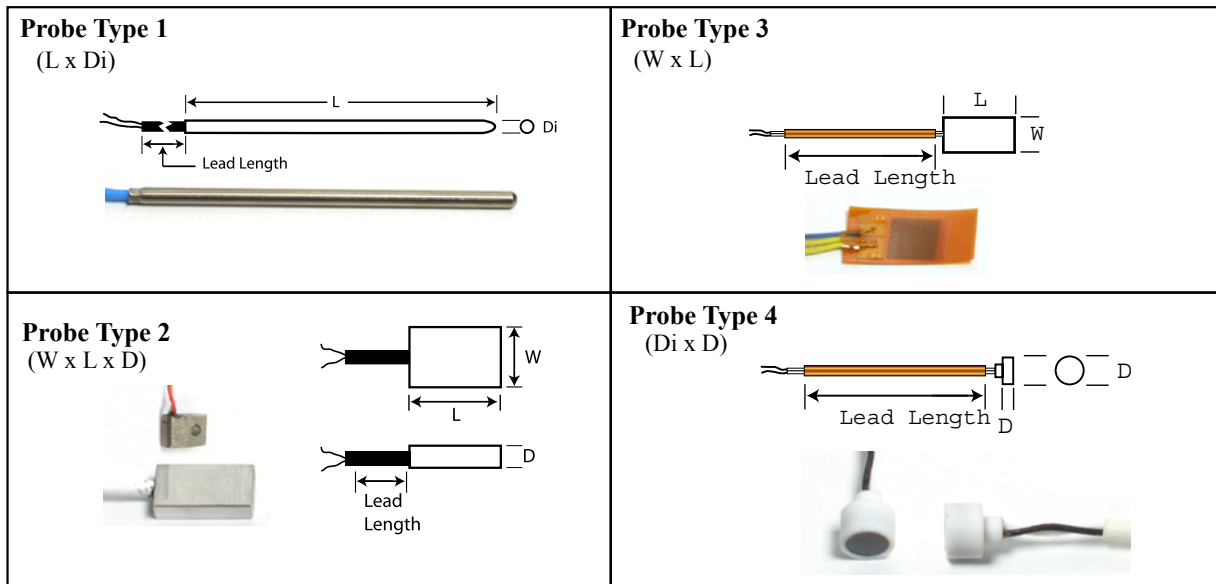
*All of these sensors are tested and certified to be accurate within +/-0.1%, Traceable to NIST*



# Probe Selection Chart for Sigma Systems Controllers

Sigma Systems Corp  
1817 John Towers Ave  
El Cajon, CA 92020  
619/258.3700

Probe Type	Part Number	Temp Ranges	Probe Size Inches	Length of Leads Inches	Material	Notes (previous names/designations)
1	20003	-100 to +200C	4.5 X .188	48	Al	Tubular for air or drilled holes (P1-500A)
1	20004	-100 to +200C	4.5 X .188	108	Al	Tubular for air or drilled holes (P1-500A)
1	20005	-100 to +200C	4.5 X .188	48	SS	Tubular for air or drilled holes (P1-500)
1	20006	-100 to +200C	4.5 X .188	108	SS	Tubular for air or drilled holes (P1-500)
1	20007	-100 to +200C	1.5 X .188 with .3 x .35 Flag	48	Al	Tubular for air or drilled holes (P1-500A) with .3x .35 Flag with hold down hole
1	20009	-100 to +400C	4.5 X .188	108 w/transition	SS	Extra High temp tubular (400° P1-500)
1	20010	-100 to +500C	4.5 X .188	48 w/transition	SS	For 500 C applications with special Sigma controler ONLY
1	20015	-100 to +200C	1.5 X .188	108	Al	Tubular for air or drilled holes
1	20016	-200 to +200C	4.5 X .188	48	SS	Low temp Tubular for air or drilled holes (low temp P1-500)
1	20017	-100 to +200C	1.5 X .188	108	SS	Tubular for air or drilled holes
1	20019	-100 to +200C	4.5 X .125	48	SS	Tubular for air or drilled holes (P5-500)
1	20021	-100 to +200C	4.5 X .125	48	Al	Tubular for air or drilled holes (P5-500A)
1	20020	-100 to +200C	2 X .125	48	SS	Tubular for air or drilled holes (P5-500)
1	20022	-100 to +200C	2 X .125	48	Al	Tubular for air or drilled holes (P5-500A)
1	20026	-200 to +400C	4.5 X .188	108 w/transition	SS	Tubular for air or drilled holes
1	20027	-200 to +500C	4.5 X .188	108 w/transition	SS	Tubular for air or drilled holes - 425 Ohms @ 0°C
1	20029	-100 to +200C	1.75 X .125	48	Al	Tubular for air or drilled holes
1	20030	-100 to +200C	1.75 X .125	48	SS	Tubular for air or drilled holes
2	20011	-100 to +200C	.375 X .75 X .187	48	Al	Surface sensor ( P2-500)
2	20012	-100 to +400C	.375 X .75 X .187	48	SS	Surface sensor (High Temp P2-500)
2	20023	-100 to +200C	.25 X .375 X .125	48	Ni plated Al	Surface sensor with thru hole (P6)
3	20013	-100 to +200C	0.5 X 1.0 X flat	48 - shielded	Kapton	Surface sensor (P3-500) Flexible
3	20014	-100 to +200C	0.5 X 1.0 X flat	12 - no shield	Kapton	Surface sensor (P3-500) Flexible
4	20018	-100 to +200C	.375 dia. X .25	48	Epoxy-Teflon	Surface sensor (P4-500) Single Sided Sensor





Sigma Systems Corp  
 1817 John Towers Ave  
 El Cajon, CA 92020  
 619/258.3700

**SIGMA SYSTEMS**  
**NORMALIZED RESISTANCE VALUES**  
**FOR 500 OHM PLATINUM (T4) PROBE**  
**(DEGREES CELSIUS)**

- 195	97.372	- 129	238.435	- 63	373.983	3	505.937	69	635.189	135	761.838
- 194	99.544	- 128	240.525	- 62	376.006	4	507.915	70	637.127	136	763.737
- 193	101.715	- 127	242.612	- 61	378.027	5	509.892	71	639.065	137	765.636
- 192	103.886	- 126	244.699	- 60	380.048	6	511.869	72	641.002	138	767.533
- 191	106.657	- 125	246.784	- 59	382.068	7	513.845	73	642.939	139	769.430
- 190	108.228	- 124	248.869	- 58	384.088	8	515.820	74	644.875	140	771.327
- 189	110.413	- 123	250.952	- 57	386.106	9	517.795	75	646.810	141	773.223
- 188	112.596	- 122	253.033	- 56	388.124	10	519.769	76	648.745	142	775.118
- 187	114.777	- 121	255.114	- 55	390.141	11	521.743	77	650.679	143	777.013
- 186	116.957	- 120	257.193	- 54	392.157	12	523.716	78	652.613	144	778.907
- 185	119.134	- 119	259.271	- 53	394.172	13	525.688	79	654.546	145	780.801
- 184	121.310	- 118	261.348	- 52	396.187	14	527.660	80	656.478	146	782.693
- 183	123.483	- 117	263.424	- 51	398.201	15	529.631	81	658.410	147	784.586
- 182	125.655	- 116	265.499	- 50	400.214	16	531.602	82	660.341	148	786.478
- 181	127.825	- 115	267.572	- 49	402.226	17	533.572	83	662.272	149	788.369
- 180	129.994	- 114	269.645	- 48	404.238	18	535.541	84	664.202	150	790.259
- 179	132.160	- 113	271.716	- 47	406.249	19	537.510	85	666.131	151	792.149
- 178	134.325	- 112	273.786	- 46	408.259	20	539.478	86	668.060	152	794.039
- 177	136.488	- 111	275.855	- 45	410.269	21	541.446	87	669.988	153	795.927
- 176	138.649	- 110	277.923	- 44	412.277	22	543.413	88	671.916	154	797.815
- 175	140.808	- 109	279.989	- 43	414.285	23	545.379	89	673.843	155	799.703
- 174	142.966	- 108	282.055	- 42	416.293	24	547.345	90	675.769	156	801.590
- 173	145.122	- 107	284.119	- 41	418.299	25	549.310	91	677.695	157	803.476
- 172	147.276	- 106	286.183	- 40	420.305	26	551.275	92	679.620	158	805.362
- 171	149.428	- 105	288.245	- 39	422.310	27	553.239	93	681.545	159	807.247
- 170	151.579	- 104	290.306	- 38	424.315	28	555.202	94	683.469	160	809.132
- 169	153.728	- 103	292.367	- 37	426.319	29	557.165	95	685.392	161	811.016
- 168	155.876	- 102	294.426	- 36	428.322	30	559.127	96	687.315	162	812.899
- 167	158.021	- 101	296.484	- 35	430.324	31	561.089	97	689.237	163	814.782
- 166	160.165	- 100	298.541	- 34	432.326	32	563.050	98	691.159	164	816.664
- 165	162.308	- 99	300.597	- 33	434.327	33	565.011	99	693.080	165	818.546
- 164	164.449	- 98	302.652	- 32	436.328	34	566.970	100	695.000	166	820.427
- 163	166.588	- 97	304.706	- 31	438.327	35	568.930	101	696.920	167	822.307
- 162	168.726	- 96	306.759	- 30	440.326	36	570.888	102	698.839	168	824.187
- 161	170.862	- 95	308.811	- 29	442.325	37	572.846	103	700.758	169	826.066
- 160	172.996	- 94	310.862	- 28	444.322	38	574.804	104	702.676	170	827.945
- 159	175.129	- 93	312.912	- 27	446.319	39	576.761	105	704.593	171	829.823
- 158	177.260	- 92	314.961	- 26	448.316	40	578.717	106	706.510	172	831.700
- 157	179.390	- 91	317.009	- 25	450.312	41	580.673	107	708.426	173	833.577
- 156	181.518	- 90	319.056	- 24	452.307	42	582.628	108	710.342	174	835.453
- 155	183.645	- 89	321.102	- 23	454.301	43	584.582	109	712.257	175	837.329
- 154	185.770	- 88	323.147	- 22	456.295	44	586.536	110	714.171	176	839.204
- 153	187.894	- 87	325.192	- 21	458.288	45	588.489	111	716.085	177	841.078
- 152	190.016	- 86	327.235	- 20	460.281	46	590.442	112	717.998	178	842.952
- 151	192.137	- 85	329.277	- 19	462.273	47	592.394	113	719.911	179	844.825
- 150	194.256	- 84	331.318	- 18	464.264	48	594.346	114	721.823	180	846.698
- 149	196.374	- 83	333.359	- 17	466.254	49	596.297	115	723.735	181	848.570
- 148	198.490	- 82	335.398	- 16	468.244	50	598.247	116	725.645	182	850.441
- 147	200.605	- 81	337.437	- 15	470.234	51	600.197	117	727.556	183	852.312
- 146	202.718	- 80	339.475	- 14	472.222	52	602.146	118	729.465	184	854.182
- 145	204.830	- 79	341.512	- 13	474.211	53	604.094	119	731.374	185	856.052
- 144	206.941	- 78	343.548	- 12	476.198	54	606.042	120	733.283	186	857.921
- 143	209.050	- 77	345.583	- 11	478.185	55	607.989	121	735.191	187	859.789
- 142	211.158	- 76	347.617	- 10	480.171	56	609.936	122	737.098	188	861.657
- 141	213.264	- 75	349.650	- 9	482.157	57	611.882	123	739.005	189	863.524
- 140	215.369	- 74	351.683	- 8	484.142	58	613.828	124	740.911	190	865.391
- 139	217.473	- 73	353.714	- 7	486.126	59	615.773	125	742.816	191	867.257
- 138	219.575	- 72	355.745	- 6	488.110	60	617.717	126	744.721	192	869.122
- 137	221.676	- 71	357.775	- 5	490.093	61	619.661	127	746.626	193	870.987
- 136	223.775	- 70	359.804	- 4	492.076	62	621.604	128	748.529	194	872.852
- 135	225.873	- 69	361.832	- 3	494.058	63	623.546	129	750.432	195	874.715
- 134	227.970	- 68	363.859	- 2	496.039	64	625.488	130	752.335	196	876.578
- 133	230.066	- 67	365.886	- 1	498.020	65	627.430	131	754.237	197	878.441
- 132	232.160	- 66	367.911	0	500.000	66	629.370	132	756.138	198	880.303
- 131	234.253	- 65	369.936	1	501.980	67	631.311	133	758.039	199	882.164
- 130	236.345	- 64	371.960	2	503.959	68	633.250	134	759.939	200	884.025

A chart covering 201°C - 500°C is available on request