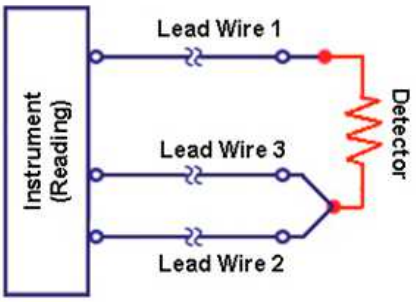
3 wire Pt100 connection

Sterling Pumps submersible motors can be fitted with RTD's or Pt100.
The submersible motor can be fitted with one RTD or three, one on each phase winding head.

The principle of operation is to measure the resistance of the platinum element (Pt = platinum)
The most common type, a Pt100 has a resistance of 100 ohms at 0°C and 138.4 ohms at 100°C.

3 wire RTD's are the most commonly used RTD sensors in general industry with 4-wire RTDs normally used in scientific applications offering more accuracy. For 3-wire, assuming all three leads are the same, the third wire calculates the average lead wire resistance throughout the circuit and removes it from the sensor measurement. This makes the 3-wire RTDs more accurate that their 2-wire counterparts but less accurate than 4-wire configurations, however in circuits with long lead wires where there are long distances between the detector and the readout device, significant savings can be made using a 3-wire construction.



The Pt100/RTD cables can be PTFE or H07RNF rubber, depending on the brand and application.
While some suppliers claim a cable length limit of up to 100 metres, Sterling Pumps has successfully manufactured RTD cables of up to 300 metre lengths without signal boosting.

The RTD needs to have a display unit mounted in the control panel. This may also have an associated audible alarm or warning light.

As a guide, setup of the Pt100/RTD is based from the ambient water temperature being pumped.
Normal monitoring up to approx. 30°C above the ambient water temperature with a warning setting at 40°C and a trip at 45°C above ambient.

February 2020

RTD Temperature vs. Resistance Table

For European Curve, Alpha = .00385, ITS-90 **1° Celsius Increments**

°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.	°C	Ohms	Diff.
-200	18.52		-140	43.88	0.42	-80	68.33	0.41	-20	92.16	0.39	±0	100.00	0.39	+60	123.24	0.38
199	18.96	0.44	139	44.29	0.41	79	68.73	0.40	19	92.55	0.39	+1	100.39	0.39	61	123.62	0.38
198	19.39	0.43	138	44.71	0.42	78	69.13	0.40	18	92.95	0.40	2	100.78	0.39	62	124.01	0.39
197	19.82	0.43	137	45.12	0.41	77	69.53	0.40	17	93.34	0.39	3	101.17	0.39	63	124.39	0.38
196	20.25	0.43	136	45.53	0.41	76	69.93	0.40	16	93.73	0.39	4	101.56	0.39	64	124.77	0.38
195	20.68	0.43	135	45.95	0.42	75	70.33	0.40	15	94.12	0.39	5	101.95	0.39	65	125.17	0.40
194	21.11	0.43	134	46.35	0.40	74	70.73	0.40	14	94.52	0.40	6	102.34	0.39	66	125.55	0.38
193	21.54	0.43	133	46.76	0.41	73	71.13	0.40	13	94.91	0.39	7	102.73	0.39	67	125.93	0.38
192	21.97	0.43	132	47.18	0.42	72	71.53	0.40	12	95.30	0.39	8	103.12	0.39	68	126.32	0.39
191	22.40	0.43	131	47.59	0.41	71	71.93	0.40	11	95.69	0.39	9	103.51	0.39	69	126.70	0.38
190	22.83	0.43	130	48.00	0.41	70	72.33	0.40	10	96.09	0.40	10	103.90	0.39	70	127.08	0.38
189	23.26	0.43	129	48.41	0.41	69	72.73	0.40	9	96.48	0.39	11	104.29	0.39	71	127.46	0.38
188	23.69	0.43	128	48.82	0.41	68	73.13	0.40	8	96.87	0.39	12	104.68	0.39	72	127.85	0.39
187	24.12	0.43	127	49.23	0.41	67	73.53	0.40	7	97.26	0.39	13	105.07	0.39	73	128.23	0.38
186	24.55	0.43	126	49.64	0.41	66	73.93	0.40	6	97.65	0.39	14	105.46	0.39	74	128.61	0.38
185	24.97	0.42	125	50.06	0.42	65	74.33	0.40	5	98.04	0.39	15	105.85	0.39	75	128.99	0.38
184	25.39	0.42	124	50.47	0.41	64	74.73	0.40	4	98.44	0.40	16	106.24	0.39	76	129.38	0.39
183	25.82	0.43	123	50.88	0.41	63	75.13	0.40	3	98.83	0.39	17	106.63	0.39	77	129.76	0.38
182	26.25	0.43	122	51.29	0.41	62	75.53	0.40	2	99.22	0.39	18	107.02	0.39	78	130.14	0.38
181	26.67	0.42	121	51.70	0.41	61	75.93	0.40	1	99.61	0.39	19	107.40	0.38	79	130.52	0.38
180	27.10	0.43	120	52.11	0.41	60	76.33	0.40				20	107.79	0.39	80	130.90	0.38
179	27.52	0.42	119	52.52	0.41	59	76.73	0.40				21	108.18	0.39	81	131.28	0.38
178	27.95	0.43	118	52.92	0.40	58	77.13	0.40				22	108.57	0.39	82	131.67	0.39
177	28.37	0.42	117	53.33	0.41	57	77.52	0.39				23	108.96	0.39	83	132.05	0.38
176	28.80	0.43	116	53.74	0.41	56	77.92	0.40				24	109.35	0.39	84	132.43	0.38
175	29.22	0.42	115	54.15	0.41	55	78.32	0.40				25	109.73	0.38	85	132.81	0.38
174	29.65	0.43	114	54.56	0.41	54	78.72	0.40				26	110.12	0.39	86	133.19	0.38
173	30.07	0.42	113	54.97	0.41	53	79.11	0.39				27	110.51	0.39	87	133.57	0.38
172	30.49	0.42	112	55.38	0.41	52	79.51	0.40				28	110.90	0.39	88	133.95	0.38
171	30.92	0.43	111	55.78	0.40	51	79.91	0.40				29	111.28	0.38	89	134.33	0.38
170	31.34	0.42	110	56.19	0.41	50	80.31	0.40				30	111.67	0.39	90	134.71	0.38
169	31.76	0.42	109	56.60	0.41	49	80.70	0.39				31	112.06	0.39	91	135.09	0.38
168	32.18	0.42	108	57.00	0.40	48	81.10	0.40				32	112.45	0.39	92	135.47	0.38
167	32.61	0.43	107	57.41	0.41	47	81.50	0.40				33	112.83	0.38	93	135.85	0.38
166	33.03	0.42	106	57.82	0.41	46	81.89	0.39				34	113.22	0.39	94	136.23	0.38
165	33.45	0.42	105	58.22	0.40	45	82.29	0.40				35	113.61	0.39	95	136.61	0.38
164	33.86	0.41	104	58.63	0.41	44	82.69	0.40				36	113.99	0.38	96	136.99	0.38
163	34.28	0.42	103	59.04	0.41	43	83.08	0.39				37	114.38	0.39	97	137.37	0.38
162	34.70	0.42	102	59.44	0.40	42	83.48	0.40				38	114.77	0.39	98	137.75	0.38
161	35.12	0.42	101	59.85	0.41	41	83.88	0.40				39	115.15	0.38	99	138.13	0.38
160	35.54	0.42	100	60.26	0.41	40	84.27	0.39				40	115.54	0.39	100	138.51	0.38
159	35.96	0.42	99	60.67	0.41	39	84.67	0.40				41	115.93	0.39	101	138.89	0.38
158	36.38	0.42	98	61.07	0.40	38	85.06	0.39				42	116.31	0.38	102	139.27	0.38
157	36.80	0.42	97	61.48	0.41	37	85.46	0.40				43	116.70	0.39	103	139.65	0.38
156	37.22	0.42	96	61.87	0.41	36	85.85	0.39				44	117.08	0.38	104	140.03	0.38
155	37.63	0.41	95	62.29	0.42	35	86.25	0.40				45	117.47	0.39	105	140.39	0.36
154	38.05	0.42	94	62.69	0.40	34	86.64	0.39				46	117.85	0.38	106	140.77	0.38
153	38.47	0.42	93	63.10	0.41	33	87.04	0.40				47	118.24	0.39	107	141.15	0.38
152	38.89	0.42	92	63.50	0.40	32	87.43	0.39				48	118.62	0.38	108	141.53	0.38
151	39.31	0.42	91	63.91	0.41	31	87.83	0.40				49	119.01	0.39	109	141.91	0.38
150	39.72	0.41	90	64.30	0.39	30	88.22	0.39				50	119.40	0.39	110	142.29	0.38
149	40.14	0.42	89	64.70	0.40	29	88.62	0.40				51	119.78	0.38	111	142.66	0.37
148	40.56	0.42	88	65.11	0.41	28	89.01	0.39				52	120.16	0.38	112	143.04	0.38
147	40.97	0.41	87	65.51	0.40	27	89.40	0.39				53	120.55	0.39	113	143.42	0.38
146	41.39	0.42	86	65.91	0.40	26	89.80	0.40				54	120.93	0.38	114	143.80	0.38
145	41.80	0.41	85	66.31	0.40	25	90.19	0.39				55	121.32	0.39	115	144.18	0.38
144	42.22	0.42	84	66.72	0.41	24	90.59	0.40				56	121.70	0.38	116	144.56	0.38
143	42.64	0.42	83	67.12	0.40	23	90.98	0.39				57	122.09	0.39	117	144.94	0.38
142	43.05	0.41	82	67.52	0.40	22	91.37	0.39				58	122.47	0.38	118	145.32	0.38
141	43.46	0.41	81	67.92	0.40	21	91.77	0.40				59	122.86	0.39	119	145.69	0.37

Note: At 100°C, resistance is 138.50 ohms. **(DIN 43 760)**