Technical Support

Subject

Temperature Probe Diagnosis and Troubleshooting

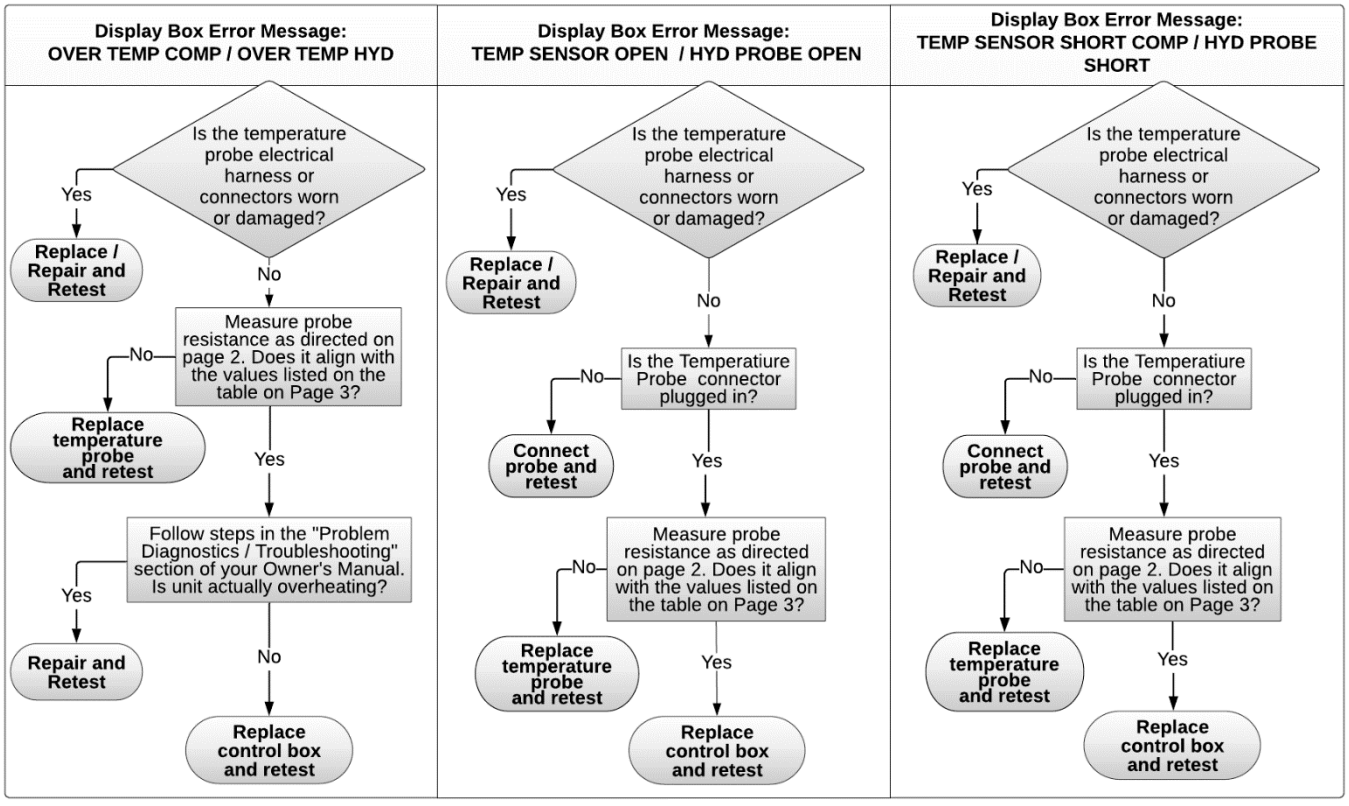
System or Parts affected

UNDERHOOD™40 / 70 / 150 / G" DTM / OEM	Diesel Drive60 / Multifunction Power System / OEM	Hydraulic Drive 40 / 60
• Thermistor (Temp Probe) P/N# 3550682	• Thermistor (Temp Probe) P/N# 3550794	• Thermistor (Temp Probe) P/N# 3550719

Overview

To monitor system temperatures, the VMAC system sends a specific voltage to a thermistor (temperature probe). Thermistor resistance decreases as temperature rises. Thermistor resistance increases as temperature falls. The resulting voltage returning to the control box from a temperature probe is referenced to ensure the system operates normally and safely. Example; The control box stops the system from operating if the temperature is too high, or may restrict operation if the system is too cold. Following are steps to troubleshoot temperature probes if a problem is suspected.

Flow Chart



Click or scan the QR Code to link to VMAC's Owner's Manuals

Document	Version	Department	Revision Details	Revised by	Tech	Engineering	Implemented
EXT-ALL-003	C	Tech	Add UH40 + DTM	BDJ	BDJ	N/A	26 Apr 2022

Technical Support

Subject

Temperature Probe Diagnosis and Troubleshooting

Testing

Control Box Voltage

Unplug the temperature probe from the control box. Confirm that the voltage coming out of the Control Box is 5V.

Temperature Probe Testing

Perform this test with system at ambient temperature. Make a note of the ambient temperature.

Ambient Temperature: _____

Using an Multimeter, measure and record the resistance on the wires as shown in Figure 1 or Figure 2.

Refer to the chart on Page 3 and confirm that the recorded resistance aligns with your ambient temperature.

Alternative/Additional Test

If it is suspected that the probe may be reading correctly at ambient temperature but is failing at higher temperature, remove the temp probe and dip the tip into water that has been brought to a boil. Water boils at 100°C (212°F). The resistance at that temperature should be 679Ω.

For 2-wire probes (Figure 1):

White to White: _____

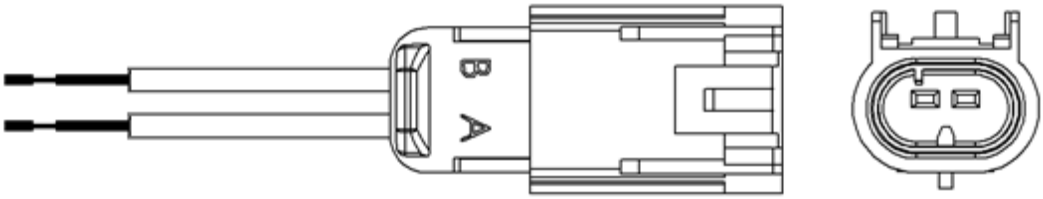


Figure 1

For 4-wire probes (Figure 2):

White to Red:_____ White to Green: _____
Black to Red: _____ Black to Green: _____

(White to Black and Red to Green should be 0 ohms.

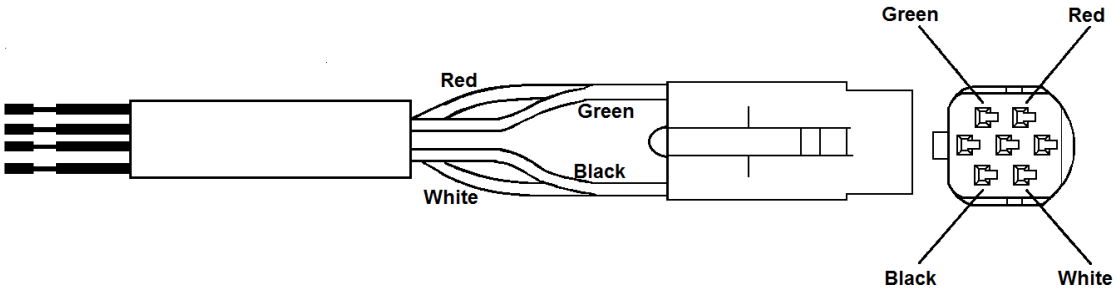


Figure 2

Document	Version	Department	Revision Details	Revised by	Tech	Engineering	Implemented
EXT-ALL-003	C	Tech	Add UH40 + DTM	BDJ	BDJ	N/A	26 Apr 2022

Technical Support

Subject

Temperature Probe Diagnosis and Troubleshooting

Temperature		Resistance
°C	°F	
-50°	**-58°**	**670 kΩ**
-49°	-56°	624 kΩ
-48°	-54°	582 kΩ
-47°	-52°	542 kΩ
-46°	-50°	506 kΩ
-45°	-49°	472 kΩ
-44°	-47°	441 kΩ
-43°	-45°	412 kΩ
-42°	-43°	385 kΩ
-41°	-41°	360 kΩ
-40°	**-40°**	**336 kΩ**
-39°	-38°	315 kΩ
-38°	-36°	295 kΩ
-37°	-34°	276 kΩ
-36°	-32°	259 kΩ
-35°	-31°	243 kΩ
-34°	-29°	228 kΩ
-33°	-27°	214 kΩ
-32°	-25°	201 kΩ
-31°	-23°	188 kΩ
-30°	**-22°**	**177 kΩ**
-29°	-20°	166 kΩ
-28°	-18°	156 kΩ
-27°	-16°	147 kΩ
-26°	-14°	139 kΩ
-25°	-13°	130 kΩ
-24°	-11°	123 kΩ
-23°	-9°	116 kΩ
-22°	-7°	109 kΩ
-21°	-5°	103 kΩ
-20°	**-4°**	**97.1 kΩ**
-19°	-2°	91.6 kΩ
-18°	-0°	86.5 kΩ
-17°	1°	81.7 kΩ
-16°	3°	77.2 kΩ
-15°	5°	73.0 kΩ
-14°	6°	69.0 kΩ
-13°	8°	65.2 kΩ
-12°	10°	61.7 kΩ
-11°	12°	58.4 kΩ
-10°	**14°**	**55.3 kΩ**
-9°	15°	52.4 kΩ
-8°	17°	49.7 kΩ
-7°	19°	47.1 kΩ
-6°	21°	44.6 kΩ
-5°	23°	42.3 kΩ
-4°	24°	40.2 kΩ
-3°	26°	38.1 kΩ
-2°	28°	36.2 kΩ
-1°	30°	34.4 kΩ

Temperature		Resistance
°C	°F	
0°	**32°**	**32.7 kΩ**
1°	33°	31.0 kΩ
2°	35°	29.5 kΩ
3°	37°	28.1 kΩ
4°	39°	26.7 kΩ
5°	41°	25.4 kΩ
6°	42°	24.2 kΩ
7°	44°	23.0 kΩ
8°	46°	21.9 kΩ
9°	48°	20.9 kΩ
10°	**50°**	**19.9 kΩ**
11°	51°	19.0 kΩ
12°	53°	18.1 kΩ
13°	55°	17.3 kΩ
14°	57°	16.5 kΩ
15°	59°	15.7 kΩ
16°	60°	15.0 kΩ
17°	62°	14.3 kΩ
18°	64°	13.7 kΩ
19°	66°	13.1 kΩ
20°	**68°**	**12.5 kΩ**
21°	69°	11.9 kΩ
22°	71°	11.4 kΩ
23°	73°	10.9 kΩ
24°	75°	10.5 kΩ
25°	77°	10.0 kΩ
26°	78°	9.57 kΩ
27°	80°	9.17 kΩ
28°	82°	8.78 kΩ
29°	84°	8.41 kΩ
30°	**86°**	**8.06 kΩ**
31°	87°	7.72 kΩ
32°	89°	7.40 kΩ
33°	91°	7.10 kΩ
34°	93°	6.81 kΩ
35°	95°	6.53 kΩ
36°	96°	6.27 kΩ
37°	98°	6.02 kΩ
38°	100°	5.78 kΩ
39°	102°	5.55 kΩ
40°	**104°**	**5.33 kΩ**
41°	105°	5.12 kΩ
42°	107°	4.92 kΩ
43°	109°	4.73 kΩ
44°	111°	4.54 kΩ
45°	113°	4.37 kΩ
46°	114°	4.20 kΩ
47°	116°	4.04 kΩ
48°	118°	3.89 kΩ
49°	120°	3.74 kΩ

Temperature		Resistance
°C	°F	
50°	**122°**	**3.60 kΩ**
51°	123°	3.47 kΩ
52°	125°	3.34 kΩ
53°	127°	3.22 kΩ
54°	129°	3.10 kΩ
55°	131°	2.99 kΩ
56°	132°	2.88 kΩ
57°	134°	2.77 kΩ
58°	136°	2.68 kΩ
59°	138°	2.58 kΩ
60°	**140°**	**2.49 kΩ**
61°	141°	2.40 kΩ
62°	143°	2.32 kΩ
63°	145°	2.24 kΩ
64°	147°	2.16 kΩ
65°	149°	2.08 kΩ
66°	150°	2.01 kΩ
67°	152°	1.94 kΩ
68°	154°	1.88 kΩ
69°	156°	1.81 kΩ
70°	**158°**	**1.75 kΩ**
71°	159°	1.69 kΩ
72°	161°	1.64 kΩ
73°	163°	1.58 kΩ
74°	165°	1.53 kΩ
75°	167°	1.48 kΩ
76°	168°	1.43 kΩ
77°	170°	1.39 kΩ
78°	172°	1.34 kΩ
79°	174°	1.30 kΩ
80°	**176°**	**1.26 kΩ**
81°	177°	1.22 kΩ
82°	179°	1.18 kΩ
83°	181°	1.14 kΩ
84°	183°	1.10 kΩ
85°	185°	1.07 kΩ
86°	186°	1.04 kΩ
87°	188°	1.01 kΩ
88°	190°	974 Ω
89°	192°	944 Ω
90°	**194°**	**916 Ω**
91°	195°	888 Ω
92°	197°	861 Ω
93°	199°	835 Ω
94°	201°	811 Ω
95°	203°	787 Ω
96°	204°	764 Ω
97°	206°	741 Ω
98°	208°	720 Ω
99°	210°	699 Ω

Temperature		Resistance
°C	°F	
100°	**212°**	**679 Ω**
101°	213°	659 Ω
102°	215°	640 Ω
103°	217°	622 Ω
104°	219°	605 Ω
105°	221°	588 Ω
106°	222°	571 Ω
107°	224°	555 Ω
108°	226°	540 Ω
109°	228°	525 Ω
110°	**230°**	**511 Ω**
111°	231°	497 Ω
112°	233°	483 Ω
113°	235°	470 Ω
114°	237°	458 Ω
115°	239°	445 Ω
116°	240°	433 Ω
117°	242°	422 Ω
118°	244°	411 Ω
119°	246°	400 Ω
120°	**248°**	**390 Ω**
121°	249°	379 Ω
122°	251°	370 Ω
123°	253°	360 Ω
124°	255°	351 Ω
125°	257°	342 Ω
126°	258°	333 Ω
127°	260°	325 Ω
128°	262°	317 Ω
129°	264°	309 Ω
130°	**266°**	**301 Ω**
131°	267°	294 Ω
132°	269°	286 Ω
133°	271°	279 Ω
134°	273°	272 Ω
135°	275°	266 Ω
136°	276°	259 Ω
137°	278°	253 Ω
138°	280°	247 Ω
139°	282°	241 Ω
140°	**284°**	**235 Ω**
141°	285°	230 Ω
142°	287°	224 Ω
143°	289°	219 Ω
144°	291°	214 Ω
145°	293°	209 Ω
146°	294°	204 Ω
147°	296°	199 Ω
148°	298°	195 Ω
149°	300°	190 Ω
150°	**302°**	**186 Ω**

Notes:
Accuracy at 140°C/280°F = +/- 11°C/20°F
Maximum operating temp 150°C/300°F
Brass 1/8" NPT Body

Document	Version	Department	Revision Details	Revised by	Tech	Engineering	Implemented
EXT-ALL-003	C	Tech	Add UH40 + DTM	BDJ	BDJ	N/A	26 Apr 2022