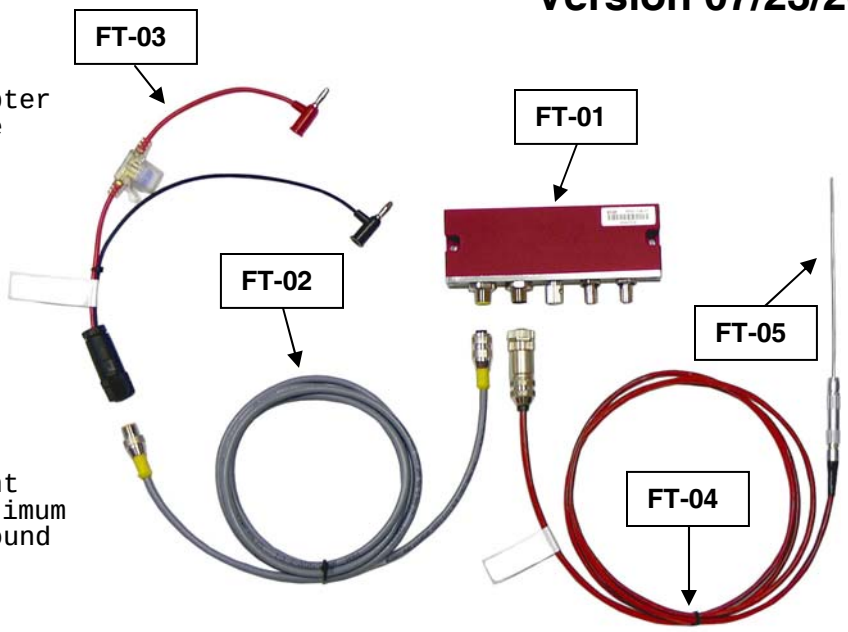
ECM ENGINE CONTROL AND MONITORING

FastTEMP
User's Manual
Version 07/23/20

FastTEMP KIT CONTENTS

FT-01 FastTEMP module
FT-02 2m power cable
FT-03 power cable banana plug adapter
FT-04 2m thermocouple sensor cable
FT-05 1/16"∅ x 6" K-type probe



SPECIFICATIONS

Range: -60 to 1370°C
Accuracy: STD: ± 4.0°C
FAST: ± 6.0°C
Outputs: 5mV/°C, 0°C=0V, female BNC
both outputs floating
500Ω output impedance
Response time: STD: sensor dependent
FAST: 10x faster minimum
Sensor: Grounded K-type, sensor ground
galvanically isolated from
power input
Power: 6 to 35VDC @ 2 Watts
Environmental: -55°C to +85°C, IP67

GETTING STARTED

1. Connect the K-type thermocouple sensor (FT-05) to the sensor cable (FT-04).
2. Connect the thermocouple sensor cable (FT-04) to the "SENSOR" connector on the front panel of the FastTEMP module.
3. Set the "TC" knob on the front panel of the FastTEMP module to the desired time constant or to a time constant that matches the sensor response of a 0.010" bead thermocouple. Another method is to start at the maximum time constant and reduce the setting until a step temperature change produces a FAST output response with no overshoot. Knob Setting range = 0.0 - 10.0sec (e.g. Knob Setting above = 3.24sec)
4. Connect the power cables (FT-02 and FT-03) to the "PWR IN" connector on the front panel of the FastTEMP module. The power supply must be rated for 5 Watts minimum with an output voltage between 6 and 35VDC.
5. As a general rule, set the knob to 3.24sec for 1/16"∅ tip thermocouples (FT-05, FT-06). Set the knob to 6.29sec for 3/32"∅ tip thermocouples (FT-08).
6. Connect BNC cables (not supplied) to the "STD" and "FAST" outputs. The gain of both outputs is 5mV/°C with 0V = 0°C. (e.g. -60°C = -0.300V, 1370°C = 6.850V)

NOTES

1. Use a tubing bender to bend the thermocouple element. Ensure the bend radius is greater than 2.5 times the element diameter.
2. Minimize the temperature gradient across the sensor cable (FT-04) for best accuracy.
3. Mechanical stress and vibration can strain the thermocouple wires in the sensor resulting in noise and reduced sensor life.

4. Keep in mind that heat transfer due to conduction and radiation between the sensor sheath and the wall of the vessel will influence the accuracy of the temperature measurement.
5. After prolonged use at higher temperatures (> 500°C), K-type thermocouples experience a calibration drift due to oxidation which causes changes in the thermocouple wire alloy composition.

SENSOR COMPENSATION

To compensate for the non-linearity of the K-type Seebeck coefficient use the formula:
Temperature (°C) = FastTEMP reading (°C) + DELTA (°C).
Example: The FastTEMP output reads 2.25V which corresponds to 450°C (2.25/.005 = 450).
Lookup the DELTA value at 450°C (-4.7), Temperature = 450 – 4.7 = 445.3°C

TEMP	DELTA	TEMP	DELTA	TEMP	DELTA	TEMP	DELTA	TEMP	DELTA	TEMP	DELTA	TEMP	DELTA
-60	-4.9	150	-0.7	360	-1.3	570	-10.2	780	-16.9	990	-13.9	1200	0.8
-50	-3.6	160	-0.6	370	-1.6	580	-10.7	790	-17.0	1000	-13.6	1210	1.8
-40	-2.5	170	-0.4	380	-1.9	590	-11.1	800	-17.1	1010	-13.1	1220	2.9
-30	-1.6	180	-0.2	390	-2.3	600	-11.6	810	-17.2	1020	-12.6	1230	4.0
-20	-0.9	190	0.0	400	-2.6	610	-12.0	820	-17.2	1030	-12.1	1240	5.2
-10	-0.4	200	0.2	410	-3.0	620	-12.4	830	-17.2	1040	-11.6	1250	6.4
0	0.0	210	0.3	420	-3.4	630	-12.8	840	-17.2	1050	-11.1	1260	7.7
10	0.3	220	0.5	430	-3.8	640	-13.2	850	-17.1	1060	-10.5	1270	9.0
20	0.4	230	0.6	440	-4.2	650	-13.6	860	-17.1	1070	-9.9	1280	10.3
30	0.5	240	0.7	450	-4.7	660	-14.0	870	-17.0	1080	-9.3	1290	11.6
40	0.4	250	0.7	460	-5.1	670	-14.3	880	-16.9	1090	-8.6	1300	13.0
50	0.3	260	0.7	470	-5.5	680	-14.6	890	-16.7	1100	-7.9	1310	14.5
60	0.2	270	0.6	480	-6.0	690	-15.0	900	-16.6	1110	-7.2	1320	16.0
70	0.0	280	0.5	490	-6.5	700	-15.3	910	-16.4	1120	-6.4	1330	17.5
80	-0.2	290	0.4	500	-6.9	710	-15.6	920	-16.2	1130	-5.7	1340	19.0
90	-0.4	300	0.2	510	-7.4	720	-15.8	930	-15.9	1140	-4.8	1350	20.6
100	-0.6	310	0.0	520	-7.9	730	-16.0	940	-15.6	1150	-4.0	1360	22.2
110	-0.7	320	-0.2	530	-8.4	740	-16.3	950	-15.4	1160	-3.1	1370	23.9
120	-0.8	330	-0.4	540	-8.8	750	-16.4	960	-15.0	1170	-2.2		
130	-0.8	340	-0.7	550	-9.3	760	-16.6	970	-14.7	1180	-1.2		
140	-0.8	350	-1.0	560	-9.8	770	-16.8	980	-14.3	1190	-0.3		

All values in degrees Celsius. Intermediate values can be interpolated linearly.
NIST 175 rev ITS-90/EN 60584-1 with a reference junction temperature of 0°C.

BLOCK DIAGRAM