McLaren ELECTRONIC SYSTEMS

THERMOCOUPLE TRANSMITTER

The system consists of a thermocouple transmitter which transmits temperature measurements from a K type thermocouple to the tyre pressure receiver box.

The transmitter allows a K-type thermocouple to be connected externally via a hermetically sealed connector. The thermocouple output is then transmitted over a wireless link to a standard tyre pressure sensor receiver unit. The sensor housing has been designed so that it can be fitted to a standard tyre pressure sensor rim housing.

Electrical

- Supply voltage 2.5-3.6V (Internal Lithium Thionyl Chloride battery)
- Life 280 hours of transmissions
- Sensor only transmits if thermocouple connected
- Measurement range 20 to 450°C (using K-type thermocouple)
- Thermocouple resolution >0.2°C/bit
- Internal KTY-13 Positive TC sensor for board temperature measurement

Nominal rate per sensor (Hz)		Number of sensors	Mode
Tx	Rx		
0	0	-	Thermocouple disconnected
0.42	0.42	1	Thermocouple connected
	0.41	2	
	0.40	3	
	0.39	4	

Collisions between messages cause the reception rate to reduce as more sensors are used.

Receiver CAN specification

- Reception requires receiver type O 030 330 046 024
- Refer to tyre pressure user interface manual for details of CAN message specification and the scalings required to obtain the necessary voltages

  All thermocouple related voltages are available in CAN_OBJECT_Raw.

  Set Vref = Raw (internal) sensor temperature
  Vthermo = Raw tyre pressure
  Then calculate :
  $Vcomp = U0 + U1*Vref + U2*Vref^2$
  $Vcorr = (Vthermo - k) / m + Vcomp$
  Measured thermocouple temp T is given by:
  $T = C0 + C1*Vcorr + C2*Vcorr^2$

Application

- Monitoring temperature

RF Specification

- Modulation FM (FSK) encoded serial data
- Nominal frequency 433.920MHz
- Transmission range 15m (typ)
- Each sensor transmits a unique serial number
- All transmitted data is encrypted
- Transmitted data format as follows:

Message content
Message Type 1 (20.4msec duration)
<Serial No>
<Board Temp raw ADC 11-bit>
<Thermocouple raw ADC 12-bit>
<Txcount>

Message Type 2 (20.4msec duration)
<Serial No>
<Vbatt raw ADC 10-bit>
<Thermocouple raw ADC 12-bit>
<Txcount>

Message Type 3 (20.4msec duration)
<Serial No>
<TX Life count 10-bit>
<Thermocouple raw ADC 12-bit>
<Txcount>

Calibration

- Each sensor is provided with 5 cal constants: U0, U1, U2, m, k which are unique to the sensor
- A further 3 constants@ C0, C1, C2 are provided but these are the same for all sensors of this design.

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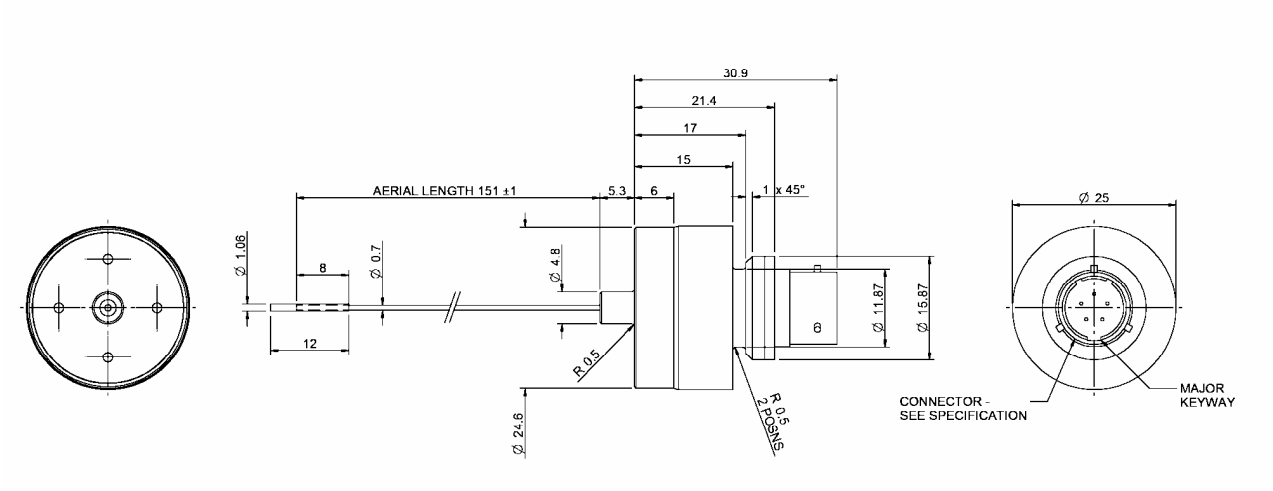
Mechanical

- Sensor weight <25g
- Sensor housing and lid 6AL4V titanium
- AS4H06-05PN-HET hermetically sealed titanium connector. Contact pins gold plated nickel iron.
- Connection details:

Pin 1	Thermocouple +
Pin 2	Thermocouple –
Pin 3	NC
Pin 4	NC
Pin 5	NC

Environmental

- Resistant to standard Motorsport fluids
- Operating temperature +10 to +135°C
- Vibration 50 to 2500Hz @ 40g 8hrs per axis
- Shock 50g(max), 1/2sine for 11ms



Description	Order Code
Thermocouple Transmitter	O 030 330 046 021

22/10/08

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