Sensor Ratiometric Correction

Information Sheet Rev 1.0







Pressure Sensors

Overview

A sensors analog output is always proportional (ratiometric) to its supply voltage. The lower the supply voltage, the lower the sensor output voltage. The ECU can correct for this variation in supply voltage and improve sensor performance by applying a ratiometric correction; this is a ratio of the actual sensor supply to the calibrated/ideal sensor supply(5.0V). To do this the ECU must know what supply has been wired to the sensor.

There are currently 4 options:

- 1. OFF (ECU applies no sensor ratiometric correction)
- 2. ECU 5V Ref (Pin D21 on a KV Series ECU OR Pin B2 on SL series ECU)
- 3. ECU 5V Ref2 (Pin D22 on a KV Series ECU)
- 4. 5V Ref Ext Supply

The sensor reference supply can be selected from Emtune by opening the Setup panel of a selected Input Channel.

Input Setup												
Engine Vehicle Switches VV	T Speed	DBW/Servo Lamb	da Cyls EGT	User	Motorsport	Turbo Dynamics	OEM					
Channel Name	Abrv	Input	Analog Input S	etun				THE TWO	-	-		
Manifold Pressure	МАР	ANV 1	Analog Input 3	etup								
Manifold Pressure - Bank 1	MAP-B1	OFF	Channel						1	2	3	4
Manifold Pressure - Bank 2	MAP-B2	OFF	Name		Manifold Press	ure				2		
Boost Pressure	BoostPres	OFF	Input Cours				•	Volts	0.500	4.485	0.000	0.000
Boost Pressure - Bank 1	BoostPres1	OFF	Input Source	e	ANVI		•	kPa	32.5	284.1	0.0	0.0
Boost Pressure - Bank 2	BoostPres2	OFF	<u>F</u> ilter		25	Pull Up						
Throttle Position 1	TPS1	OFF			[•				
Throttle Position 2	TPS2	OFF	Sensor V. R	eference	5.0V Ref Ext Su	ipply	·····					
Engine Temperature	Engine Temperature ET ANV 7											
Inlet Air Temperature	IAT	ANV 11						250 -				
Lambda 1	LA1	CAN ELC #1 Ch-A						1				
Lambda 2	LA2	OFF						200 -				
O2 Narrow 1	02-1	OFF	Calibration					E 150				
O2 Narrow 2	O2-2	OFF	Calibration	Туре	Custom		•	¥ 150				
Mass Air Flow Meter 1	MAF1	ANV 4	Units		kPa		•	100-				
Mass Air Flow Meter 2	MAF2	OFF										
Mass Air Flow Meter Bank 1	MAF-B1	OFF FC	Predefined	Calibratio	MPX6300A 3	.0Bar	.	50 -		_		

NOTE 5V Ref Ext Supply: Some sensors may be supplied from an external voltage/supply source. For the ECU to apply ratiometric correction to a sensor the ECU needs to know this voltage so it must be wired into the ECU for measurement. Setup as follows:

 Connect to the ECU with Emtune. Config View -> Channels -> Calculated runtime -> Main. Select the "5V Ref Ext Supply" setting and pick an input source from the list.

Main		
Efficiency Calculation	MAP Modelled/BAP % MAP	
5V Ref Ext Supply	ANV 2	

 This runtime can now be viewed from the Runtime menu(F3) -> ECU Internal tab. This runtime will be used for the "5V Ref Ext Supply" ratiometric correction so it must accuracy represent the sensor supply voltage.

ECU	Runtime Values					
	DBW 1/2 DBW 3/4 Use	r Channels Moto	orsport 1 Motorsport 2	Calculated Switch S	Status Output Stat	s ECU Internal Ra
l t	Internal		Arming		Injector Voltage	
	ECU Temperature	51.1 °C	Arming Crk Index	0.310 V	Inj 1 Voltage	12.430 V
Ē	Internal 1.2V	1.192 V	Arming Sync Sensor	1.990 V	Inj 2 Voltage	12.430 V
l t	Internal 2.5V	2.492 V	Arming Threshold DI 1	2.010 V	Inj 3 Voltage	12.410 V
a l	Internal 3.3V	3.313 V	Arming Threshold DI 2	2.010 V	Inj 4 Voltage	12.430 V
	Internal 10V Supply	0.000 V	Arming Threshold DI 3	2.010 V	Inj 5 Voltage	12.430 V
1	Internal 16/12V Supply	12.540 V	Arming Threshold DI 4	2.010 V	Inj 6 Voltage	12.430 V
	Ignition Circuit Supply	12.634 V	Arming Threshold DI 5	2.010 V	Inj 7 Voltage	0.000 V
t	Aux 1-8 Flyback Supply	13.930 V	Arming Threshold DI 6	1.990 V	Inj 8 Voltage	12.430 V
1	Aux 9-12 Supply	13.940 V	Arming Threshold DI 7	2.010 V		
<u> </u>	Injector Flyback Supply	13.930 V	Arming Threshold DI 8	2.010 V		
	Ignition Sw (dedicated)	13.969 V				
	Battery Constant	0.000 V				
	CPU Load	57 %				
			Aux Volt		Ignition Voltage	
	Sensor Supply		Aux 1 Voltage	12.270 V	Ign 1 Voltage	0.000 V
	5V Ref1 Supply	4.967 V	Aux 2 Voltage	12.270 V	Ign 2 Voltage	0.000 V
	5V Ref2 Supply	4.961 V	Aux 3 Voltage	12.270 V	Ign 3 Voltage	0.000 V
	CAS Supply	7.963 V	Aux 4 Voltage	12.250 V	Ign 4 Voltage	0.000 V
	5V Ref Ext Supply	4.946 V	Aux 5 v Itage	12.270 V	Ign 5 Voltage	0.000 V
	FCII Score		ux o voltage	12.270 V	Ign 6 Voltage	0.000 V
	ECU Scope Size	0.0 %	Aux 7 Voltage	12.270 V	Ign 7 Voltage	0.000 V
	Leo scope size	0.0 %	Aux 8 Voltage	12.270 V	Ign 8 Voltage	0.000 V

Example

The following test was completed using a 3.0-Bar MAP sensor operating at barometric pressure. A comparison is shown in Table 1.0 between the Ratiometric Correction OFF and ON. With the Ratiometric Correction ON the ECU is able to generate a consistent output for variations in the sensor supply voltage.

5V Ref Supply (V)	MAP (Vref Correction OFF)	MAP (Vref Correction ON)
5.000V	99.9 kPa	99.9 kPa
4.996V	99.8 kPa	99.9 kPa
4.975V	99.4 kPa	99.9 kPa
4.950V	98.8 kPa	99.8 kPa
4.900V	98.0 kPa	99.8 kPa
4.850V	96.8 kPa	99.8 kPa
4.700V	93.7 kPa	99.8 kPa

Table 1.0 MAP Sensor output Ratiometric OFF/ON Comparison

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(See the www for contact information)

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