



SLC PP2/DIY2 Serial Data Format

Serial Port Settings:

SLC PP2/DIY2 enumerates as a USB-Serial device. For USB-Serial devices, Baud Rate, parity, data bits and stop bit settings have no effect, you do not have to worry about them.

Device ID, Hardware Version, Firmware Version:

PC sends a "1" to SLC PP2/DIY2, SLC PP2/DIY2 replies with a single 3 Byte Packet.

[Byte2][Byte1][Byte0]

Byte0 is the first byte sent, Byte2 is the last byte.

Each byte is 8 bits.

Device ID = Byte0, 6= SLC PP2, 5=SLC DIY2

Hardware Version = Byte1

Firmware Version = Byte2

Hardware Compensation:

PC sends a "4" to SLC PP2/DIY2, SLC PP2/DIY2 replies with a single 16 Byte Packet.

[Byte15][Byte14]...[Byte0]

Byte0 is the first byte sent, Byte15 is the last byte.

Each byte is 8 bits.

Offset Compensation:

Offset Compensation is a 32bit IEEE 754 formatted floating point number.

[Byte3][Byte2][Byte1][Byte0]=[Bit31 Bit30 ... Bit24][Bit23 Bit22 ... Bit16] [Bit15 Bit14 ... Bit8][Bit7 Bit6 ... Bit0]

Sign Bit = Bit31

Exponent = Bit30 ... Bit23

Significand = Bit22...Bit0

Gain Error Compensation:

Gain Error Compensation is a 32bit IEEE 754 formatted floating point number.

[Byte7][Byte6][Byte5][Byte4]=[Bit31 Bit30 ... Bit24][Bit23 Bit22 ... Bit16] [Bit15 Bit14 ... Bit8][Bit7 Bit6 ... Bit0]

Sign Bit = Bit31

Exponent = Bit30 ... Bit23

Significand = Bit22...Bit0

Vref Compensation:

Vref Compensation is a 32bit IEEE 754 formatted floating point number.

[Byte11][Byte10][Byte9][Byte8]=[Bit31 Bit30 ... Bit24][Bit23 Bit22 ... Bit16] [Bit15 Bit14 ... Bit8][Bit7 Bit6 ... Bit0]

Sign Bit = Bit31

Exponent = Bit30 ... Bit23

Significand = Bit22...Bit0

Vout Compensation:

Vout Compensation is a 32bit IEEE 754 formatted floating point number.

[Byte15][Byte14][Byte13][Byte12]=[Bit31 Bit30 ... Bit24][Bit23 Bit22 ... Bit16] [Bit15 Bit14 ... Bit8][Bit7 Bit6 ... Bit0]

Sign Bit = Bit31

Exponent = Bit30 ... Bit23

Significand = Bit22...Bit0

Datalog Packet:

PC Sends a "7" to SLC PP2/DIY2, SLC PP2/DIY2 replies with a single datalog packet, each packet is 21 bytes.

Datalog Packet Format:

[Byte20][Byte19].....[Byte1][Byte0]

Byte0 is the first byte sent, Byte20 is the last byte.

Each byte is 8 bits.

Pump Current=[Byte3][Byte2][Byte1][Byte0]

LSU Temperature = [Byte8]

Thermistor Temperature=[Byte9]

Voltage Input 1 = [Byte10]

Voltage Input 2 = [Byte11]

Fluid Temperature = [Byte12]

Air Intake Temperature = [Byte13]

Fuel Pressure = [Byte14]

Oil Pressure = [Byte15]

Voltage Input 7 = [Byte16]

Boost = [Byte17]

EGT = [Byte18]

RPM = [Byte20][Byte19]

Pump Current:

Lambda is calculated from pump current. Pump Current is a 32bit IEEE 754 formatted floating point number.

[Byte3][Byte2][Byte1][Byte0]=[Bit31 Bit30 ... Bit24][Bit23 Bit22 ... Bit16] [Bit15 Bit14 ... Bit8][Bit7 Bit6 ... Bit0]

Sign Bit = Bit31

Exponent = Bit30 ... Bit23

Significand = Bit22...Bit0

Pump Current to Lambda Conversion:

```
if (Pump_Current<-57)
{
    Pump_Current=-57;
}
if (Pump_Current>0) //lean
{
    O2=-3.59e-006*Pump_Current^2+0.002976*Pump_Current-0.0001117; //O2 concentration
    if (O2>0.209)
    {
        O2=0.209;
    }
    Lambda = (O2/3+1)/(1-4.76*O2);
}
else //rich
{
    Lambda=2.692e-005*Pump_Current^2+0.006872*Pump_Current+0.9966;
}
```



CUTTING EDGE IN MOTION

LSU Temperature:

a1 = 1.8E+17

b1 = -1320

c1 = 231.9

a2 = 12200

b2 = -7284

c2 = 4375

LSU Temperature [C] = a1 * Exp(-((Byte8 - b1) / c1) ^ 2) + a2 * Exp(-((Byte8 - b2) / c2) ^ 2)

Exp = exponential function, e^

Thermistor Temperature:

Thermistor Temperature is a proxy to the temperature of SLC PP2/DIY2

Thermistor Temperature [C] = 0.115 * Exp(0.05 * Byte9)

Exp = exponential function, e^

Voltage Input 1 and 2:

Voltage Input 1 [V] = Byte10*1.01504*5 / 256

Voltage Input 2 [V] = Byte11*1.01504*5 / 256

Fluid Temperature:

Fluid Temperature[C] = 0.0008177*Byte12^2 - 0.8323*Byte12 + 172.8

Air Intake Temperature:

Air Intake Temperature[C] = -2.741e-009*Byte13^5 + 1.826e-006*Byte13^4 - 0.00046668*Byte13^3 + 0.05729*Byte13^2 - 3.841*Byte13 + 184.8

Fuel Pressure:

Fuel Pressure [PSI] = 0.0001042*Byte14^3 - 0.008121*Byte14^2 + 1.248*Byte14 - 4.009

Oil Pressure:

Oil Pressure [PSI] = 0.0001042*Byte15^3 - 0.008121*Byte15^2 + 1.248*Byte15 - 4.009

Battery Voltage:

Battery Voltage [V] = (26.049*Byte16)/256 + 0.7

Boost:

Boost [PSI] = 0.28431*Byte17-14.5

EGT:

EGT[C] = 9.923*Byte18 - 1272 + Thermistor_Temperature



CUTTING EDGE IN MOTION

RPM:

Engine Frequency [Hz] = $79450 / (\text{Byte19} * 256 + \text{Byte20})$

RPM is calculated from Engine Frequency based on your particular engine configuration.

Distributor:

$\text{RPM} = \text{Engine_Freq} * 60 * 2 / \#_of_Cylinders$

Coil on Plug:

$\text{RPM} = \text{Engine_Freq} * 60 * 2$

Wasted Spark:

$\text{RPM} = \text{Engine_Freq} * 60$