

Calibrating a HI-Q118 3-Channel Meter

I. Introduction

The 118 can have up to 3 analog input channels. These analog inputs have 2 sets of calibration data, factory calibration and user calibration, if either one of these is incorrect then the unit will not display the correct information. Both factory and user calibration use the following linear equation to scale and offset the reading.

$$Y = (m * X) + b$$

In this equation X is your input, m is the scale factor, b is the offset and Y is the output. So the equation would then look like this to more closely correspond to the HI-Q command terminology.

$$(\text{Value Displayed}) = ((\text{Scale}) * (\text{input})) + \text{Offset}$$

For example if you have a 4-20mA input and you want this to equal 0-100% then:

$$\text{Scale} = 6.25$$

$$\text{Offset} = -25$$

$$(4 * 6.25) - 25 = 0$$

$$(20 * 6.25) - 25 = 100$$

The included excel spread sheet will help you to easily calculate the scale and offset values needed.

To communicate with the HI-Q you will need a computer with a terminal emulation program. Windows comes standard with HyperTerminal but there are many programs available. The communication settings for the HI-Q are 9600 baud, 8 data bits, no parity bit, 1 stop bit and no flow control. Usually if you are connecting to the DB-9 in the back of the computer this is Com Port 1.

Before we begin it is a good idea to write down the old calibration so we have a known point we can get back too. The following 2 commands display the calibration information.

```
s01showcal //shows factory calibration
```

```
s01showin //shows user calibration
```

II. Checking Factory Calibration

To check the factory calibration we will need to clear out the old user calibration settings. In the following examples I will be using channel 1 but this will need to be done for each channel. The syntax for commands issued to the HI-Q is as follows.

```
S<address><command><channel><value>
```

The following 2 commands will clear out the user calibration data for channel 1.

```
s01scale1 1 //sets user scale factor for stream 1 to 1
s01offset1 0 //sets user offset for stream 1 to 0
```

We now need to check the factory calibration. Apply an input to channel 1, in this example our input is 4-20mA. At 4mA the HI-Q should display 4 and at 20mA the HI-Q should display 20. If these values are accurate you can skip to the next step “Setting User Calibration” otherwise we will need to do a factory calibration which is covered in the following section.

III. Setting Factory Calibration

Before we begin calibrating the HI-Q we need to turn off the Watch Dog Timer so that the unit does not reset when we are saving the new calibration data. It is assumed that the address of the HI-Q is 01. This is accomplished with the following command:

```
S01WDOFF
```

Cycle power and the Watch Dog will be disabled. To check this use the SHOWSTAT command.

The following 2 commands will clear out the factory calibration data for channel 1.

```
s01gaco1 1 //sets factory scale factor for stream 1 to 1
s01ofco1 0 //sets factory offset for stream 1 to 0
```

Using the excel spread sheet we will use the value at 4mA and the value at 20mA to calibrate the unit. The command S01STR1 can be used to get a reading over the serial port that has more precision than that on the display.

- 1) apply a 4mA signal to the HI-Q
- 2) type in the command s01str1 you should get a reading around 0.1000 enter this into the spread sheet under Initial Calibration, Reading 1, Reading from unit
- 3) under desired output enter in 4
- 4) apply a 20mA signal to the HI-Q
- 5) type in the command s01str1 you should get a reading around 0.4000 enter this into the spread sheet under Initial Calibration, Reading 2, Reading from unit
- 6) under desired output enter in 20mA

The factory calibration values are now displayed under gaco and ofco. Use the following commands to enter in these values.

```
s01gaco1 <gaco value from spread sheet>
s01ofco1 <ofco value from spread sheet>
```

If you now apply a 4-20mA signal the HI-Q should display 4-20 if it doesn't the factory calibration will need to be repeated.

We now need to save the current calibration, this is done using the write command.

```
s01write
```

The message “writing eeprom.....” will appear and then done. The new calibration data is now saved.

IV. Setting User Calibration

Before we begin the user calibrating of the HI-Q we need to turn off the Watch Dog Timer so that the unit does not reset when we are saving the new calibration data. This only needs to be done one time so if you have done this previously while doing the factory calibration this step can be skipped. It is assumed that the address of the HI-Q is 01. The following command disables the Watch Dog:

```
S01WDOFF
```

Cycle power and the Watch Dog will be disabled. To check this use the SHOWSTAT command.

Using the excel spread sheet we will use the value at 4mA and the value at 20mA to calibrate the unit. The command S01STR1 can be used to get a reading over the serial port that has more precision than that on the display.

- 1) apply a 4mA signal to the HI-Q
- 2) type in the command s01str1 you should get a reading around 4.0000 enter this into the spread sheet under Final Calibration, Reading 1, Reading from unit
- 3) under desired output enter in 0 or your desired reading at 4mA
- 4) apply a 20mA signal to the HI-Q
- 5) type in the command s01str1 you should get a reading around 20.0000 enter this into the spread sheet under Final Calibration, Reading 2, Reading from unit
- 6) under desired output enter in 100 or your desired reading at 20mA

The user calibration values are now displayed under scale and offset. Use the following commands to enter in these values.

```
s01scale1 <scale value from spread sheet>  
s01offset1 <offset value from spread sheet>
```

If you now apply a 4-20mA signal the HI-Q should display 0-100 or your desired reading. If the HI-Q doesn't read correctly the user calibration will need to be repeated.

We now need to save the current calibration, this is done using the write command.

```
s01write
```

The message “writing eeprom.....” will appear and then done. The new calibration data is now saved.

The last step is to turn the Watch Dog Timer back on.

```
s01wdon
```