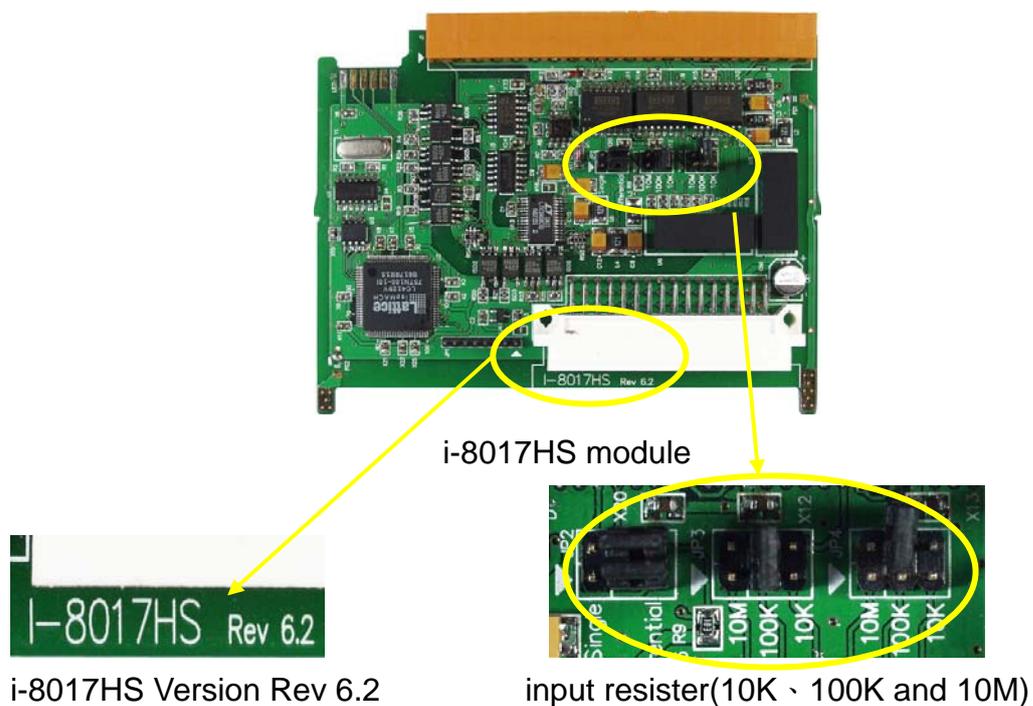
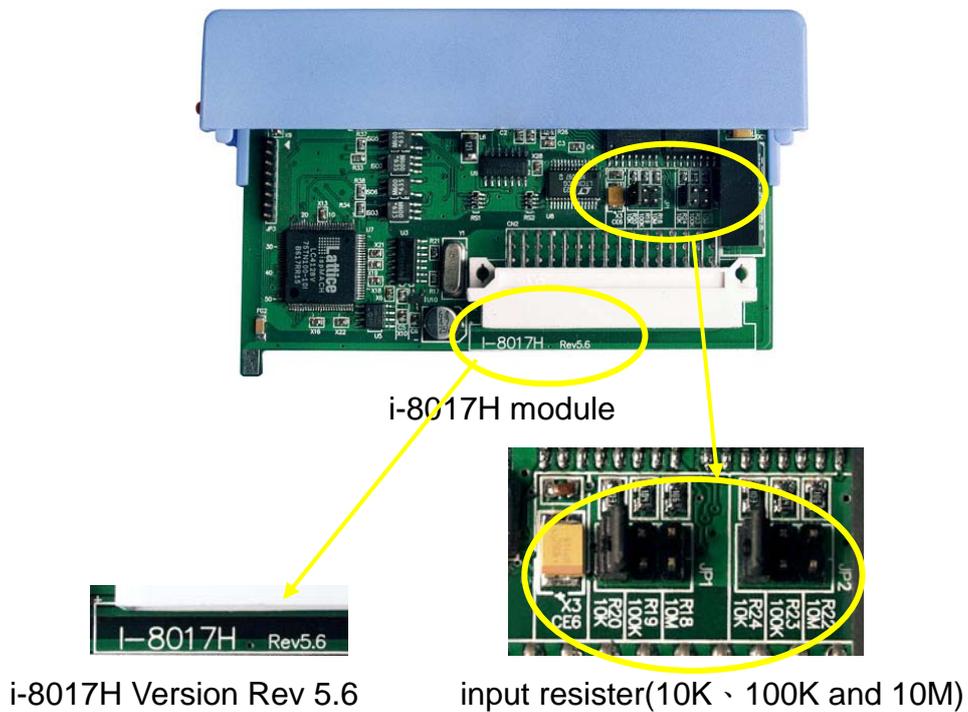


The new version 8017H (high profile 8017HS Rev 6.2 or later and low profile 8017H Rev 5.6 or later) has a switch jumper, which can select one of 3 type input resistors (10K、100k and 10M). The default value is 100k. Old version modules only have one type -- 100k. They are already calibrated before shipment. When it is not accuracy or changes to another input resistor, it needs to re-calibrate, If not, the module will lose its accuracy.



Necessary equipment of calibration

1. module : 8017H or 8017HS
2. controller : 8411 、8431 and etc which can plug in 8017 module
3. source : stable source , example , power supply 、battery and etc
But do not use unstable source
4. meter : 4 1/2 DIMM (15 bit resolution) or more better meter
note: Higher resolution meter and stable source can make the calibration better
5. calibration program : 8017cal.exe , the execute file

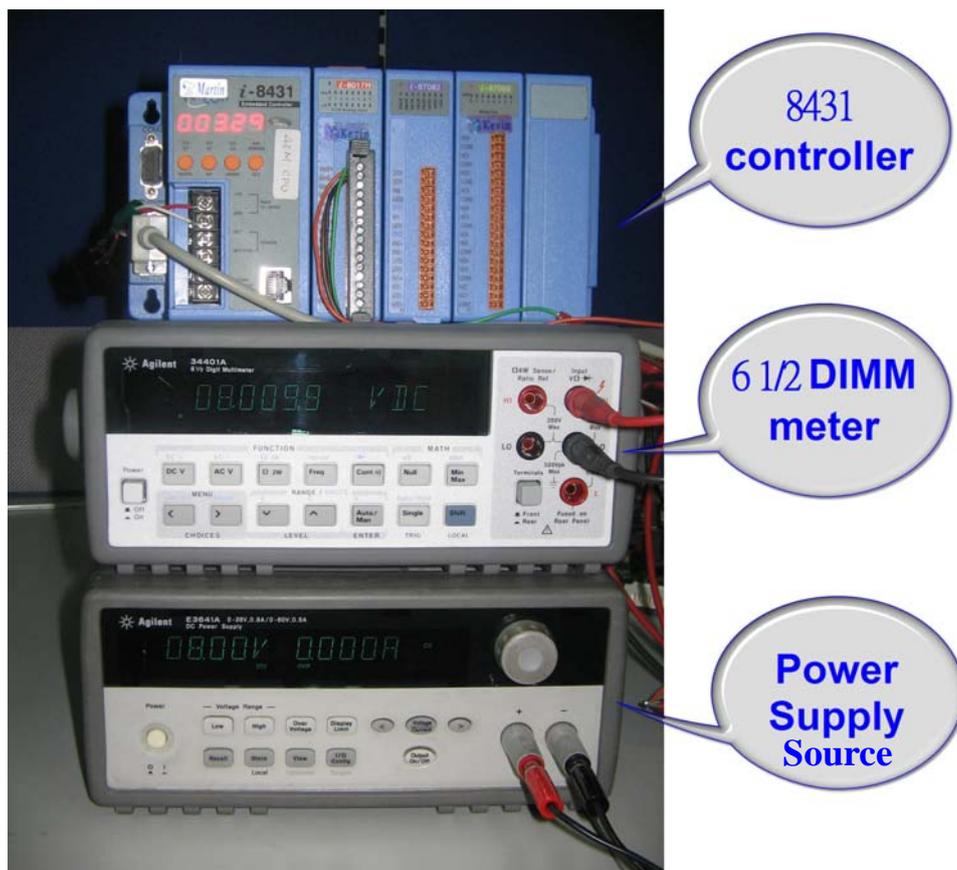
FTP :

http://ftp.icpdas.com/pub/cd/8000cd/napdos/8000/841x881x/demo/io_in_slot/8017h/calibration/8017cal.exe

CD ROM :

CD\8000\Napdos\8000\841x881x\demo\IO_in_Slot\8017h\calibration\

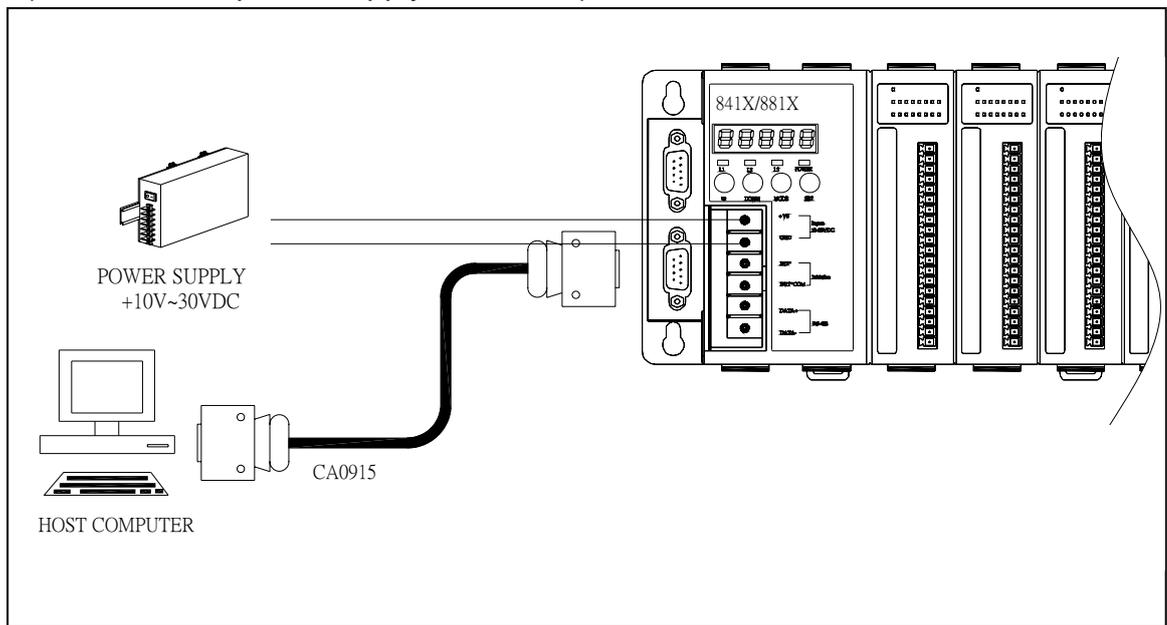
6. utility : MiniOS7 Utility (<http://www.icpdas.com/download/minios7.htm>) ,
can help us put the execute file into controller and run



Hardware equipment

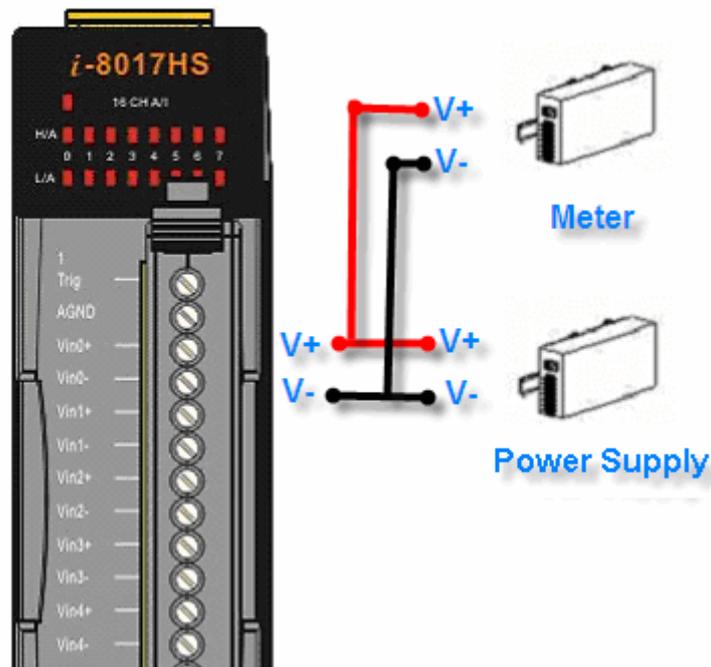
Steps by steps

Step 1. Install hardware ready by RS-232 Interface
(include wire 、 power supply and meter)



Controller wiring

Calibration needs to wire 4 lines at 8017H module, 2 lines for power supply and the others for meter

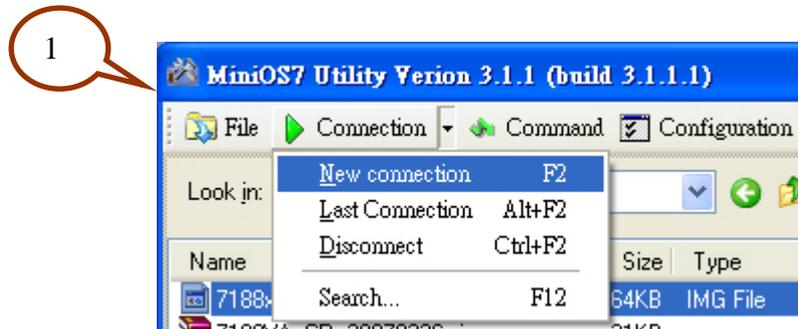


8017HS wiring

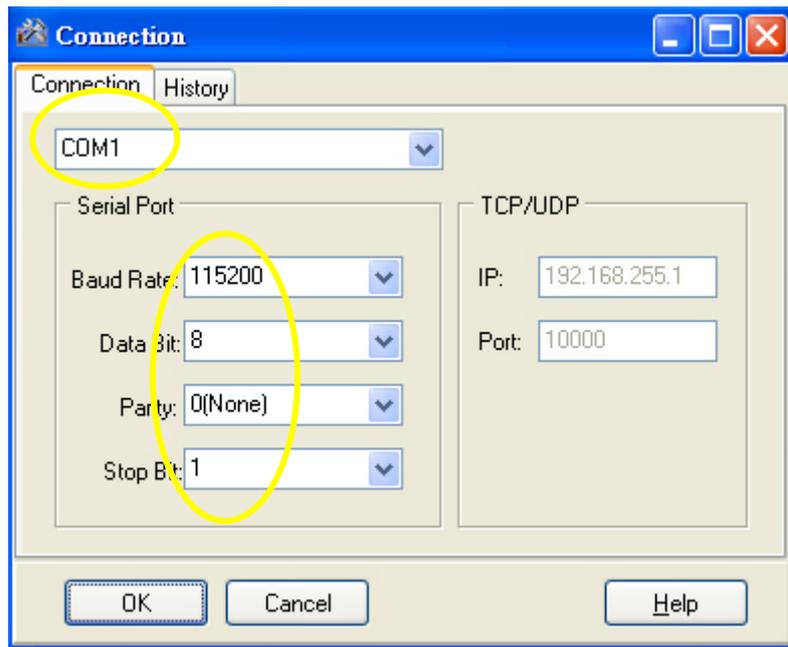
Note: Power Supply and Meter need to connect with module's Channel 0

Step 2. Put the calibration program (8017cal.exe) into controller and run
(Please refer to MiniOS7 Utility online help to do it)

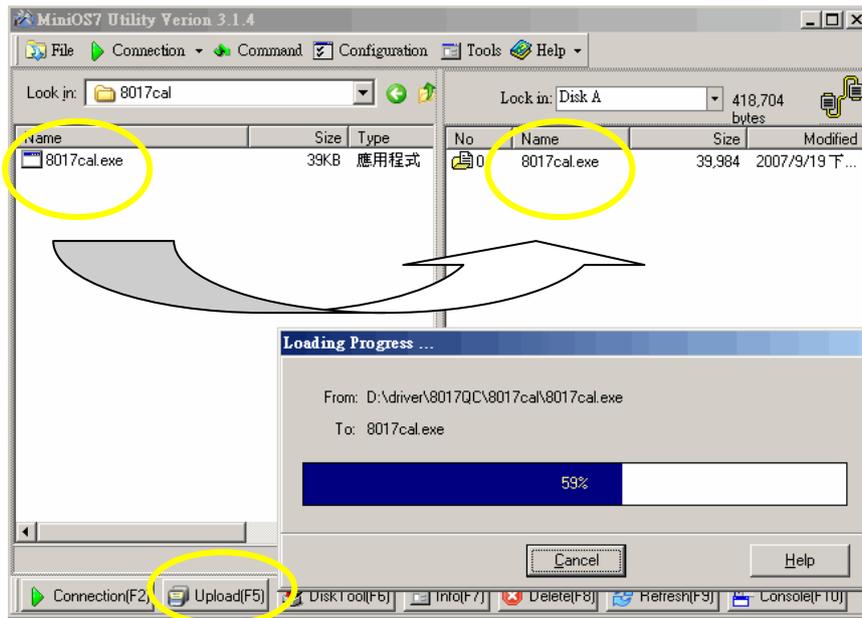
- I. Open MiniOS7 Utility and Select Connection → “New connection”



- II. Choose the right COM port and set other parameters. Click **OK** button
To connect with controller

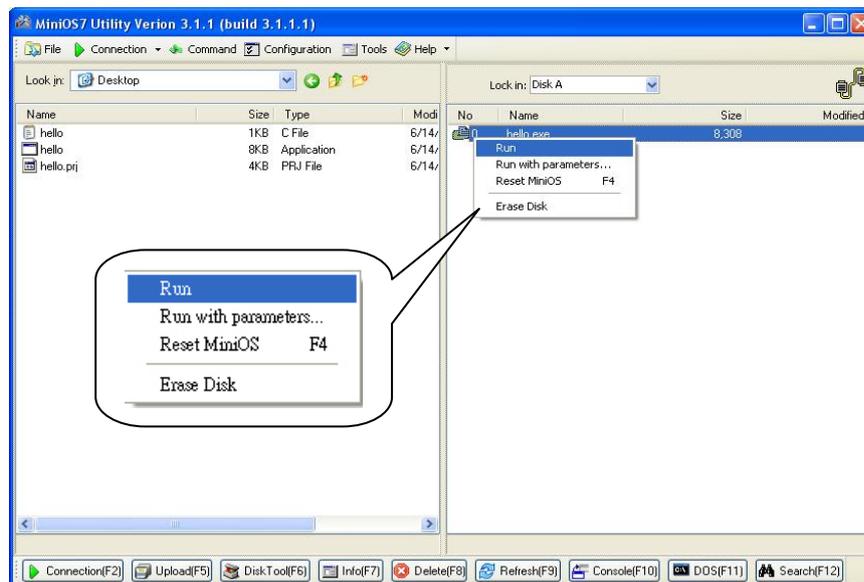


- III. Select the execute file and press “Upload” button , it can upload the file into controller



Upload file into controller

IV. Click right mouse button to choose “ Run “



Run program

Step 3. Calibration :

- The begin of this program will be as below picture

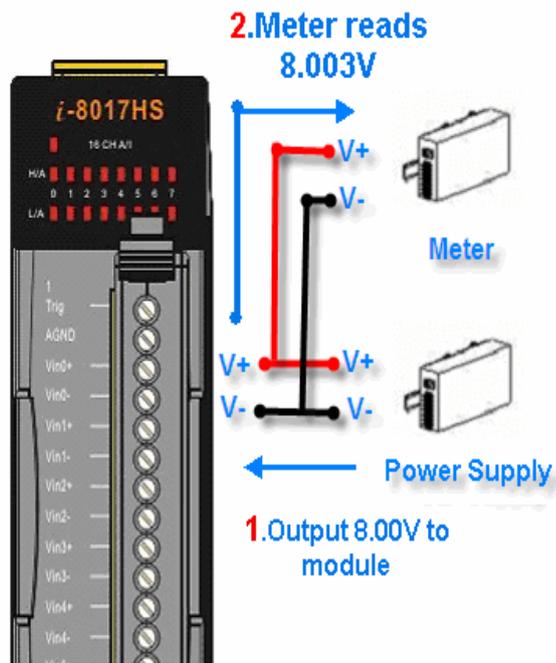
```
7188XW 1.31 [COM1:115200,N,8,1],FC-0,CTS-1, DIR-D:\temp
now baudrate = 115200!

i8K_UDP>run #1
8017 Found in slot2
*****
* Calibration program for 8017H/8017HS *
* *
* Lattice Firmware Version = 4 *
* Please connect a voltage signal *
* to ch0 of the 8017H/8017HS first. *
* ver 1.0.1 _ Oct 08 2007 by Martin *
*****

*****
* (0)Calibrate Gain_0 -10.00V to +10.00V *
* (1)Calibrate Gain_1 - 5.00V to + 5.00V *
* (2)Calibrate Gain_2 - 2.50V to + 2.50V *
* (3)Calibrate Gain_3 - 1.25V to + 1.25V *
* (r)Recover default calibration settings *
* (t)Read calibrated AI value of Ch0 *
* (s)Show calibrated Gain/Offset parameters *
* (q)quit *
*****
Please choose (0~3,r,t,s,q):
```

Note 1 : This program only can read the AI value at module's channel 0 , please refer to PIN Assignment of hardware for wire.

- Choose meter range and give 2 values to Calibration program
Example: range -10V ~ +10V, and give 8.0V and -8.0V to program
 - I. When we use this calibration program, it needs to use more accuracy voltage source and meter to Calibrate. We can use 3 1/2 DIMM (or more better) Power supply to output 8.00 V for 8017H's channel 0 then watch meter to read its real voltages.



Power Supply outputs 8V to module



6 1/2 DIMM meter reads the real voltage : 8.003 V

- II. Input the voltage value 8.003V that read from meter into calibration program. Repeat I to output another value (example : -8V) for 8017H. And input the value that read from meter into calibration program. After finished it, the program will calculate the new Gain and offset. Save it to EEPROM. It is like below picture

```

7188XW 1.31 [COM1:115200,N,8,1],FC=0,CTS=1, DIR=D:\temp
* <0>Calibrate   Gain_0  -10.00V to +10.00V *
* <1>Calibrate   Gain_1   - 5.00V to + 5.00V *
* <2>Calibrate   Gain_2   - 2.50V to + 2.50V *
* <3>Calibrate   Gain_3   - 1.25V to + 1.25V *
* <r>Recover default calibration settings *
* <t>Read calibrated AI value of Ch0      *
* <s>Show calibrated Gain/Offset parameters *
* <q>quit                                     *
*****
Please choose <0~3,r,t,s,q>:0
Original Gain_0=34074 Offset_0=-74
Please input 1st voltage <0.0~+10.0>:8.003
Point 1=<0517 Hex>
Please input 2nd voltage <0.0~-10.0>:-8.003
Point 2=<FB00 Hex>
New Gain= 36110 ,Offset=-366 ,Save to EEPROM ? <y/n>:y
Gain0 is calibrated.
  
```

Note : If there are no any more accuracy voltage sources, it can use some stable voltage sources (example battery). Don't use unstable sources

to calibrate or it will not be correctly calibrated.

- If it need calibrate another range , please repeat steps 3

Step 4. Check the calibration: Use Power Supply to input another voltage for 8017H. Read the value by program (choose option "t") and compare its value with metered value by meter, we will know correctly calibrate or not.
EX: Ouput **-2 voltage** using Power Supply for 8017H, compare the AI value that reads back from program and meter



Read AI from meter

```
7188XW 1.31 [COM1:115200,N,8,1],FC=0,CTS=1, DIR=D:\temp
*****
Please choose (0~3,r,t,s,q):t
*****
* (0)Read Gain_0 -10.00U to +10.00U *
* (1)Read Gain_1 - 5.00U to + 5.00U *
* (2)Read Gain_2 - 2.50U to + 2.50U *
* (3)Read Gain_3 - 1.25U to + 1.25U *
* (q)quit *
*****
Please choose (0~3,q):0
Please input voltage source (-10.0~+10.0)
Press any key continue,'q' quit.....
AI value=-2.0027
AI value=-2.0028
AI value=-2.0028
AI value=-2.0030
```

Read AI from program

The 8017H Accuracy is $\pm 0.1\%$ of FSR which equals 0.02V ($\pm 0.1\% * 20V$) .The

AI values that read back from program need at the range -2.0311 to -1.9911 (-2.0111±0.02). If so, the calibration is correct. If one of AI values that read back from program is out of this range, the calibration is not accuracy. It is need re-calibration

Step 5. After 8017H correctly calibrated at type range ±10V, please repeat step 3 to calibrate the other type ranges (±5V、±2.5V and ±1.5V) and repeat step 4 to check the calibration. When all type ranges calibrated correctly, this module can be used to read AI values more accuracy at this input resistor

Note : If don't know how to calibration or need to recover default calibration values in the 100K input resistor , it can use the option "r" to recover the default values at this program (only 100K input resistor can recover the default calibration values, the others can't do it)

```

7188XW 1.31 [COM1-115200,N,8,1,FC-0,CTS-1, DIR-C,Program
+/- 10U      Gain =34074 Offset =-74
+/- 5U       Gain =34072 Offset =-76
+/- 2.5U     Gain =34069 Offset =-84
+/- 1.25U    Gain =34054 Offset =-79
+/- 20mA     Gain =34069 Offset =-84

Gain/Offset parameters which in using
+/- 10U      Gain =31383 Offset =-64
+/- 5U       Gain =31359 Offset =-68
+/- 2.5U     Gain =34069 Offset =-84
+/- 1.25U    Gain =34054 Offset =-79
+/- 20mA     Gain =34069 Offset =-84

*****
* <0>Calibrate   Gain_0  -10.00U to +10.00U *
* <1>Calibrate   Gain_1   -5.00U to +5.00U *
* <2>Calibrate   Gain_2   -2.50U to +2.50U *
* <3>Calibrate   Gain_3   -1.25U to +1.25U *
* <r>Recover default calibration settings *
* <t>Read calibrated AI value of Ch0 *
* <s>Show calibrated Gain/Offset parameters *
* <q>quit *
*****
Please choose <0~3,r,t,s,q>:r

Backup default Gain/Offset parameters settings for 100K
+/- 10U      Gain =34074 Offset =-74
+/- 5U       Gain =34072 Offset =-76
+/- 2.5U     Gain =34069 Offset =-84
+/- 1.25U    Gain =34054 Offset =-79
+/- 20mA     Gain =34069 Offset =-84

Gain/Offset parameters which in using
+/- 10U      Gain =34074 Offset =-74
+/- 5U       Gain =34072 Offset =-76
+/- 2.5U     Gain =34069 Offset =-84
+/- 1.25U    Gain =34054 Offset =-79
  
```

Recover default calibration values