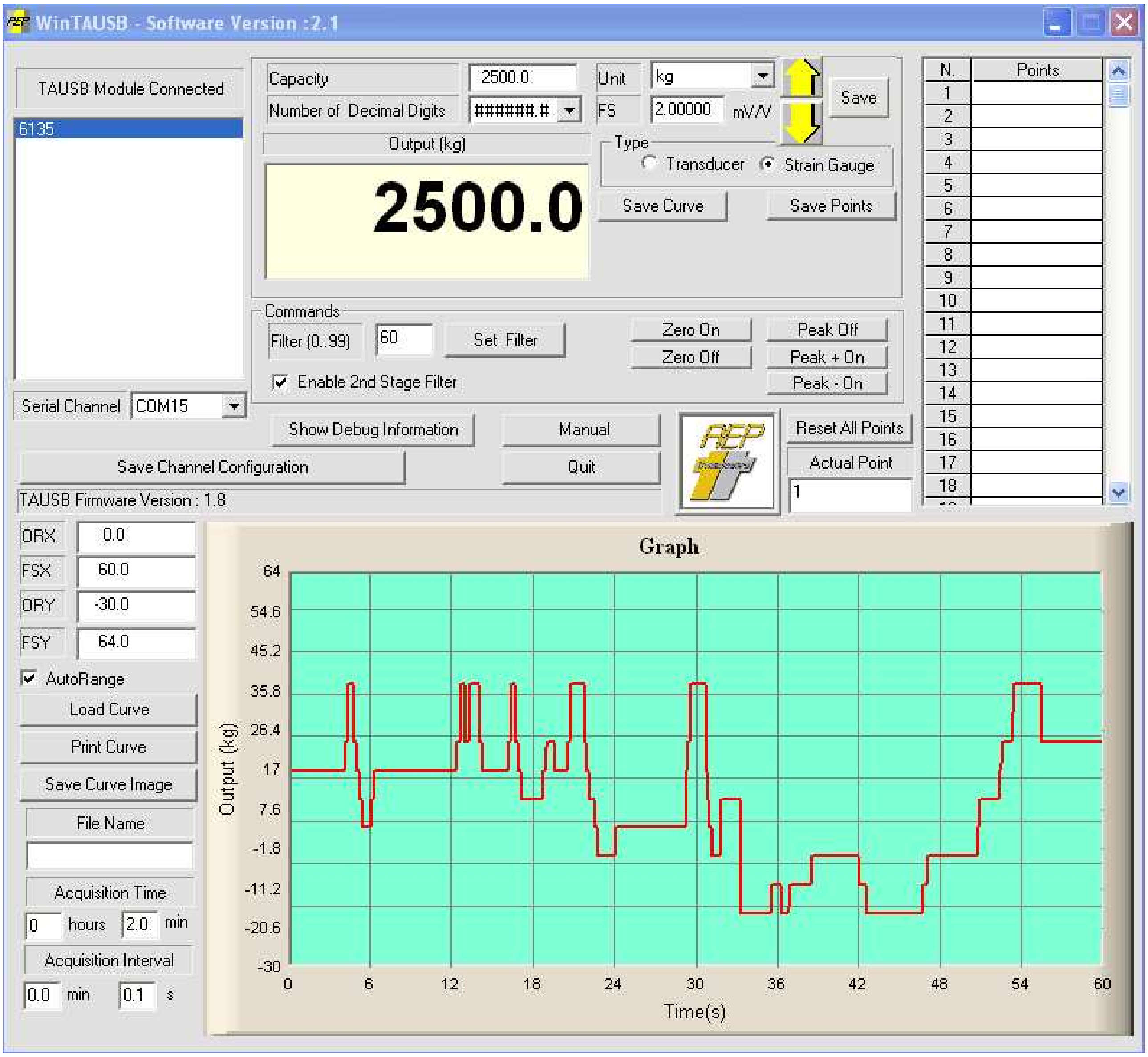
# WinTAUSB Program : Operating Manual

The WinTAUSB Program allows to communicates to the TAUSB board and its main purpose is to take effect on the operation with the board. Anyway it perform most of the main functions of some data acquisition software like create a test curve, saving data, exporting etc…




The WinTAUSB software can communicate with just one TAUSB a time.

If you have more than one TAUSB connected on your PC please select the right one from the “TAUSB Module Connected” list verifying the serial number printed on each module.

To configure your TAUSB you have to fill just a few fields according to your TAUSB type.

If you have a Strain Gauge type (output in mV/V) please insert

- The Capacity
- The Measurement Unit
- The number of decimal digits you want to display
- FS : is the Strain Gauge sensibility (nominal value is 2mV/V)

If you have a Transducer type (output 0..10V) please insert

- The Capacity
- The Measurement Unit
- The number of decimal digits you want to display
- The Input type (among 0..10V – 0..5V – 4..20mA)

## Attention

After you have set your configuration parameters please save them in the TAUSB memory using the **Save Channel Configuration** button (see dedicated paragraph below) this because when you run the software it reload automatically last data saved in the TAUSB memory-

## Note about Measurement Unit

The measurement unit is just a free text. No unit conversion is performed when you change from a value to another.

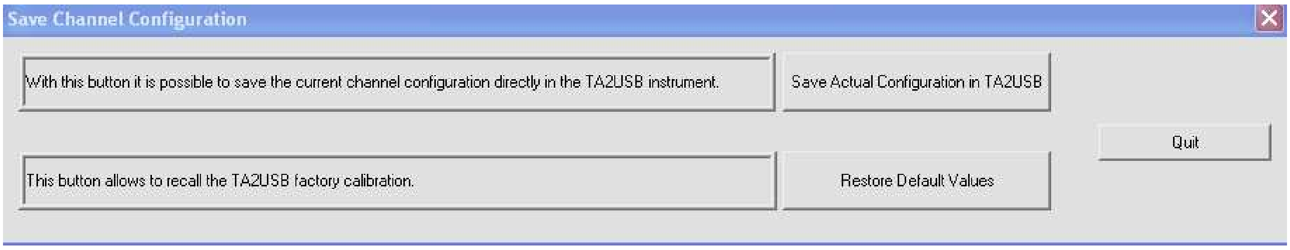
If you don't find the unit you want in the proposed list please operates as following

- Quit from the WinTAUSB program
- Double click the file Unit.Txt inside the application folder (normally C:\WinTAUSB)
- Goes at the end of the file and add the measurement unit you want as a text
- Save and quit
- Restart the WinTAUSB program. Now you will see your measurement unit in the proposed list

## Save Channel Configuration

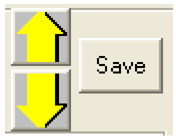
Inside this page it is possible to perform 2 main functions:

1. Saving the actual configuration values set for each channels directly in the TAUSB memory.
2. Recall the Factory Calibration. This is important if you have done some modifications and you want to return to the original setting




## Straing Gauge : How to modify the TAUSB calibration

In case of strain gauge transducers it is possible to change the load cell calibration by modifying the FS (sensibility) parameter.




Normally the load cell has a 2mV/V sensibility. This is only a nominal value. A more accurate value can be read from a calibration report of the load cell. If this is the case please insert the value in the dedicated window.

Any way by using two Up/ Down buttons it is possible to adjust the load cell output value through an experimental procedure when the load cell is installed in the plant.

a. Discharge any load from the load cell and make the Zero. The display indicates 0.0
b. Load the load cell with a reference load (known value).
c. If the display indicates a different value use the Up/Down keys to adjust its value . (Up key increases the indication, down key decreases the indication). When the value is the desired value press **Save**

Any way the FS (sensibility) value can be inserted directly in the dedicated window. Remember : to increase the value the sensibility must be reduced. To decrease the value the sensibility must be incremented.

# Create a Test and  Exporting data in Microsoft Excel

To setup a test you are required to  define only two test-parameters.

- **Acquisition Time :** defines the time the test will last. The test can be stopped any way by pressing the **Stop** Button

- **Acquisition Interval :** defines the time between two acquisition points.

By pressing the **Save Curve** button  **WinTausb**  start to record all the acquisition points creating raw data.

By **Stopping** the data recording the data will be stored in the text file "Prova.txt"  in the program installation folder and if you fill the **File Name** window a dedicated file, with this name, is created in the folder **Data** present inside the installation folder.

**Note:** if the acquisition time is greater than 1 hour and the **File Name** is filled with a valid file name, all the acquisition points are saved during the test so no lost data are possible if something wrong happens during the test.

An example of the format of the file is the following: the first value is the measured value in the selected unit and, the second is the  acquisition time (in seconds)

```
-8181,0.0
-8182,0.3
-8180,0.4
-8185,0.5
-8182,0.6
-8182,0.7
-8177,0.8
```

The graphics window allows the setting of the parameters of real-time graphic. The X-axis is the time while the Y axis is the output of the instrument .

**XOR** : defines the starting point of the X axis
**FSX** : defines the full scale of the axis X (in  seconds) . FSX should be greater than ORX
**ORY** : defines the starting point of the axis Y in the selected unit. This can also be a negative number
**FSY** : defines the full scale of the axis Y in the selected unit. Can also be a negative number.

Obviously the only condition is that FSY > ORY in absolute value

If you set the selection **Autorange** the chart will auto size during the test by comparing the actual values as specified. During the test parameters ORX, ORY, FSX, FSY are allowed to select portions of the graph of interest.

Graphs saved can be re-analyzed by using the "**Load Curve**" button. More than a chart can be selected to make comparisons between different tests. Curves are displayed with different colors.
The scale will automatically adapt to the maximum values recorded in the tests if the active function Autorange.

It is always active  the zoom function. To activate, simply click on the chart with the left mouse button and define the portion of the chart concerned.
To return to the initial condition is sufficient to confirm the value in one of the 4 parameters ORX, ORY, FSX, FSY.

The image of the graph can be saved as .Bmp file  through the **Save Graph** key, or printed directly via the **Print Graph** button.

It is  also possible to perform an export of data collected in a Microsoft Excel file with the button Export to Excel. This feature is only available when Microsoft Excel is installed on your computer.
**NOTE   : To Export data in Microsoft Excel you must have this program installed on your PC**

## Saving  Points and  Exporting Points in Microsoft Excel

By pressing the **Save Points** button you can store a value each time the Spacebar is pressed. Up to 100 points can be stored. Each time a value is taken the point index is incremented. You can modify the point index in the window Actual Point. To reset all values please use the button **"Reset all Values".** By **Stopping** the data recording the data will be stored in the text file "Prova.txt"  in the program installation folder.
An example of the format of the file is the following:

-8181
-8182
-8180
-8185
-8182
-8182

These data can be exported in a Microsoft Excel file by pressing the "**Export Last Saved Data in Excel as xls file**" or "**Export Last Saved Data in Excel as csv file**"  buttons. These buttons are enabled if a valid recording test has been performed.

**NOTE   : To Export data in Microsoft Excel as xls file you must have this program installed on your PC**

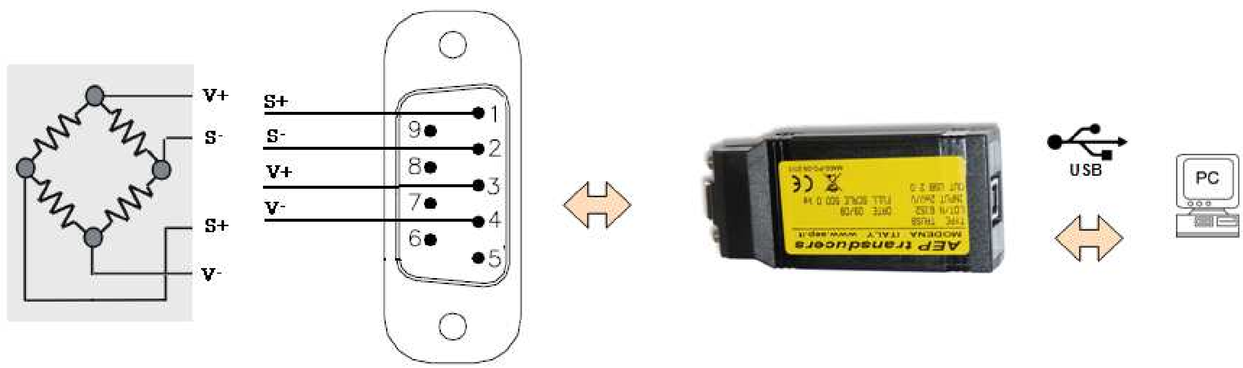
# TAUSB Connections

The TAUSB board is constantly transmitting data and send a measure when it has new value. The data transmission values are in division unit.
The TAUSB board is tuned to have +/-20000 divisions full scale in case of 2mV/V strain gauge input while for amplified signal it is tuned to have 10000 divisions for the signal range .

The input connector is a standard 9 pin SUB-D female connector.
For the 2mVV strain gauge input version the pin assignment is the following:

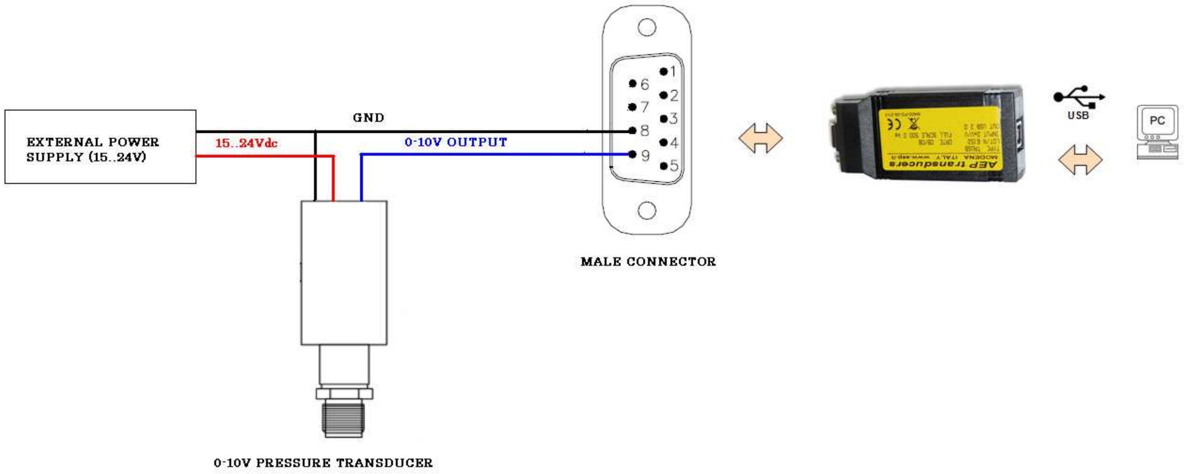
| Pin Number | Description | AEP Color |
|---|---|---|
| 1 | Signal + | white |
| 2 | Signal - | yellow |
| 3 | V+ | red |
| 4 | V- | black |

STRAIN GAUGE MALE CONNECTOR



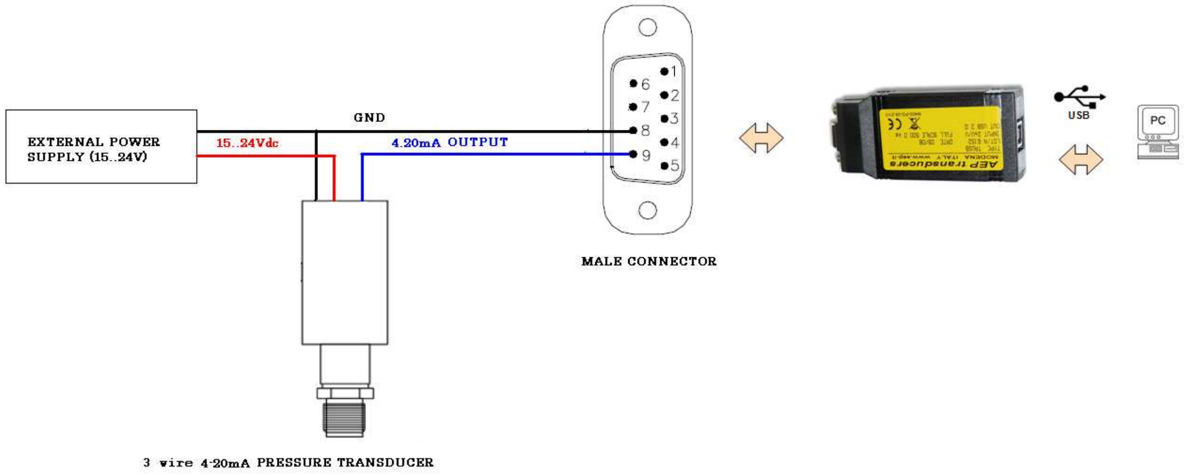

For the 0-10V or 0-5V amplified transducers the pin assignment is the following

| Pin Number | Description |
|---|---|
| 8 | GND |
| 9 | 0-10V Signal from transducer |



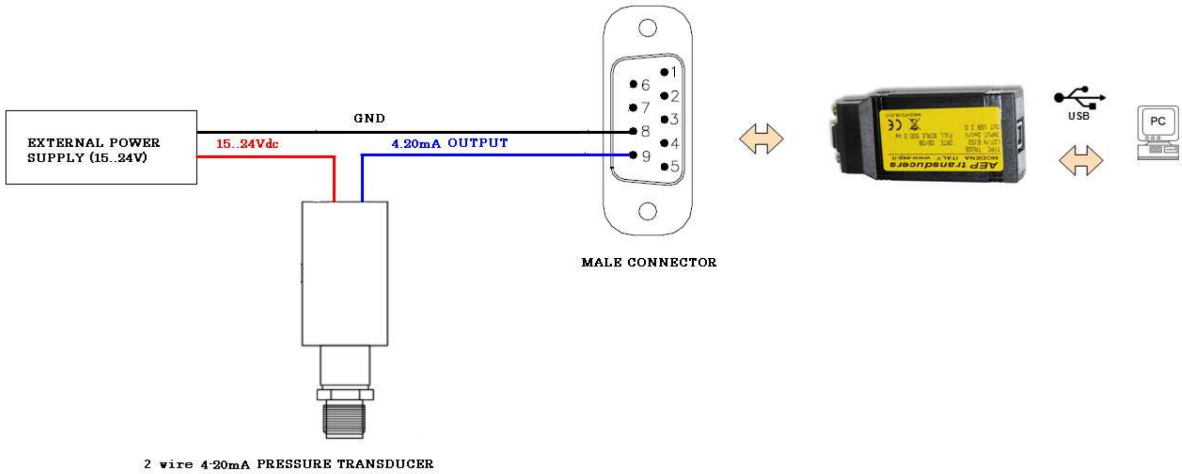

For the 3 wires 4-20mA input the pin assignment is the following

| Pin Number | Description |
|---|---|
| 8 | GND |
| 9 | 4-20mA Signal from transducer |




For the 2 wires 4-20mA input the pin assignment is the following

| Pin Number | Description |
|---|---|
| 8 | GND Power Supply |
| 9 | 4-20mA Signal from transducer |




For the potentiometer input the pin assignment is the following

| Pin Number | Description |
|---|---|
| 7 | V+ (3V) |
| 8 | GND |
| 9 | Potentiometer Output |

**Note:**
The V+(3V) power supply for the potentiometer can manage up to 10mA so the TAUSB board can manage potentiometer resistance as low as 500 ohm.

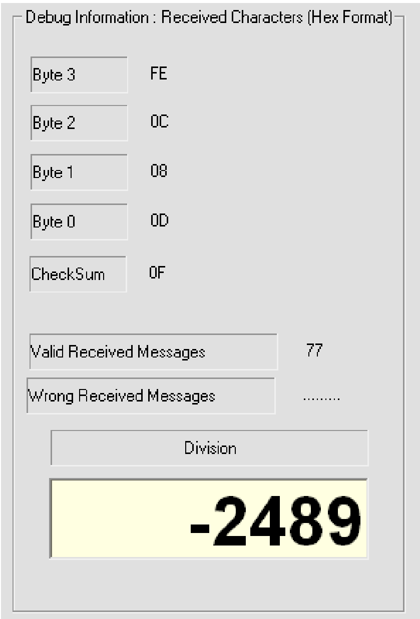
## *Communication Protocol*

Although the communication is via the USB interface application software sees the board like a virtual serial channel with the following parameters

Baud rate : 38400
Parity : NO
Data bit :8
Stop bit :1

The TAUSB board transmits a data packet at a frequency that can vary from 400Hz to 40Hz depending to the selected digital filter (see the discussion in the chapter dedicated to the digital filter).
Each data packet is composed of 5 bytes in bynary format.
To synchronize the incoming data the application software must check the pattern 1 1 1 1 on the most significant nibble of a received character.
Decoding the next four received bytes it is possible to get the TAUSB data

| BYTE N. | B7 | B6 | B5 | B4 | B3 | B2 | B1 | B0 | Comment |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 1 | 1 | 1 | 1 | HMSB | | | | First 4 bits are the SYNC for the incoming data packet |
| 2 | 0 | 0 | 0 | 0 | LMSB | | | | |
| 3 | 0 | 0 | 0 | 0 | HLSB | | | | |
| 4 | 0 | 0 | 0 | 0 | LLSB | | | | |
| 5 | 0 | 0 | 0 | 0 | CheckSum | | | | |




The data is transmitted is a 16bit 2' complement binary format. The high bit of HMSB nibble specify the sign.

To compute the transmitted data please use the following formula.

DIVISION = HMSB*4096+LSMB*256+HLSB*16+ LLSB

If bit B3 of HMSB=1 DIVISION = -(65536-DIVISION)

To guarantee the integrity of the computed value the 5° byte is a checksum.

The checksum is calculated with the following formula

Checksum= (HMSB+LMSB+ HLSB+LLSB) AND 15

Where "AND" is the logical operator AND used to clear the most significant nibble of the calculated checksum.

By pressing the "**Show Debug Information"** button you can verify on the WinTausb page the communication data flow

# C++ program example

```
bool LeggiTx()
{
DWORD cerror,nbytes;
DWORD Timer;
COMSTAT ComStat;
bool cont,result;

          Timer=GetTickCount();
          cont=true;
          result=false;
          do
          {
                    ClearCommError(hPort, &cerror, &ComStat);
                    if (ComStat.cbInQue>0)
                    {
                              ReadFile(hPort,RxBuffer, 1,&nbytes, NULL);
                              if ((RxBuffer[0] & 0xf0)== 0xf0)
                              {
                                        ClearCommError(hPort, &cerror, &ComStat);
                                        if (ComStat.cbInQue>=4)
                                        {
                                                  ReadFile(hPort,&RxBuffer[1], 4,&nbytes, NULL);
                                                  result=true;
                                                  cont=false;
                                                  PurgeComm(hPort,PURGE_RXCLEAR);

                                        }
                              }
                    }
                    else
                    {
                              if ((GetTickCount()-Timer)>200) cont=false;
                    }
          }while (cont);
          return result;
}


void xxxx::OnTimer(UINT nIDEvent)
{
BYTE CheckSum;
int i;
int Carico;
                    CheckSum=0;
                    for (i=0;i<4;i++)
                              CheckSum+=RxBuffer[i] & 0xf;

                    if (RxBuffer[4] == (CheckSum & 0xf))
                    {
                              if (RxBuffer[0] & 0x8)
                              {
                                        Carico=(RxBuffer[0] & 0xf)*4096;
                                        Carico+=(RxBuffer[1] & 0xf)*256;
                                        Carico+=(RxBuffer[2] & 0xf)*16;
                                        Carico+=RxBuffer[3] & 0xf;
                                        Carico=-(65536-Carico);
                              }
                              else
                              {
                                        Carico=(RxBuffer[0] & 0xf)*4096;
                                        Carico+=(RxBuffer[1] & 0xf)*256;
                                        Carico+=(RxBuffer[2] & 0xf)*16;
                                        Carico+=RxBuffer[3] & 0xf;
                              }
                    }
……………
…………
```

## *TAUSB Commands*

There are a few commands that allows to operates on the TAUSB board.

The commands are performed transmitting to the board a command code. It consists of just a character . No answer is sent back from the TAUSB board.

## *DIGITAL FILTER*

The TAUSB board filters the converted signal by using a two stage digital filter.

The first digital filter is just a pure average filter. Before to give a valid value the converted data are summed up and at the end divided by the number of data taken in account. So greater is the number of used samples longer is the time to output a valid value.

The number of samples for the average filter is programmable by software from 0 (no filter at all) to 99 (average on 100 samples).

In case of 0 it is possible to reach a 400Hz data rate for the transmitting data.

In case of 100 the transmitting rate is about 40Hz.

The output of the first average filter is the input for a moving average filter.

The moving average filter is a FIFO (First In First Out) buffer and it is possible to enable (to have a stabler value) or disable (to have a faster but a noisier value). In case it is enabled the first stage digital filter is performed using a fixed number of samples (100 samples). It is possible to define the length of the moving average filter from 1 to 100. In case of 1 the digital filter will be faster but noisier. In case of 100 the digital filter output will be stabler but slower.

**Digital Filter Commands**

Code 145 : Enable the second stage digital filter

Code 147 : Disable the second stage digital filter

Code from 0 to 99 : Filter parameter.

In case of the second stage digital filter is disabled rappresents the number of samples for the first stage filter

In case of the second stage digital filter is enable rappresents the length of moving average filter. The number of samples for the first stage filter is fix to 100.

**Zero On /Zero Off Commands**

Code 129 : perform the zero of the signal

Code 130 : clear the zero signal

**Peak +On / Peak-On / Peak Off Commands**

Code 132 : set the Peak+ Mode : The positive maximum value will be transmitted

Code 133 : set the Peak- Mode : The negative maximum value will be transmitted

Code 131 : Reset The Peak Mode.

## Calibration Factors

Inside this page it is possible to perform 2 main functions:

3. Saving the actual configuration values set for each channels directly in the TAUSB memory.
4. Recall the Factory Calibration. This is important if you have done some modifications and you want to return to the original setting