SparkFun SerAccel V3
Short Introduction

Dipl.-Ing. Andreas Riener

Univ. Prof. Alois Ferscha
Universität Linz, Institut für Pervasive Computing
Altenberger Straße 69, A-4040 Linz
www.pervasive.jku.at

SparkFun SerAccel V3

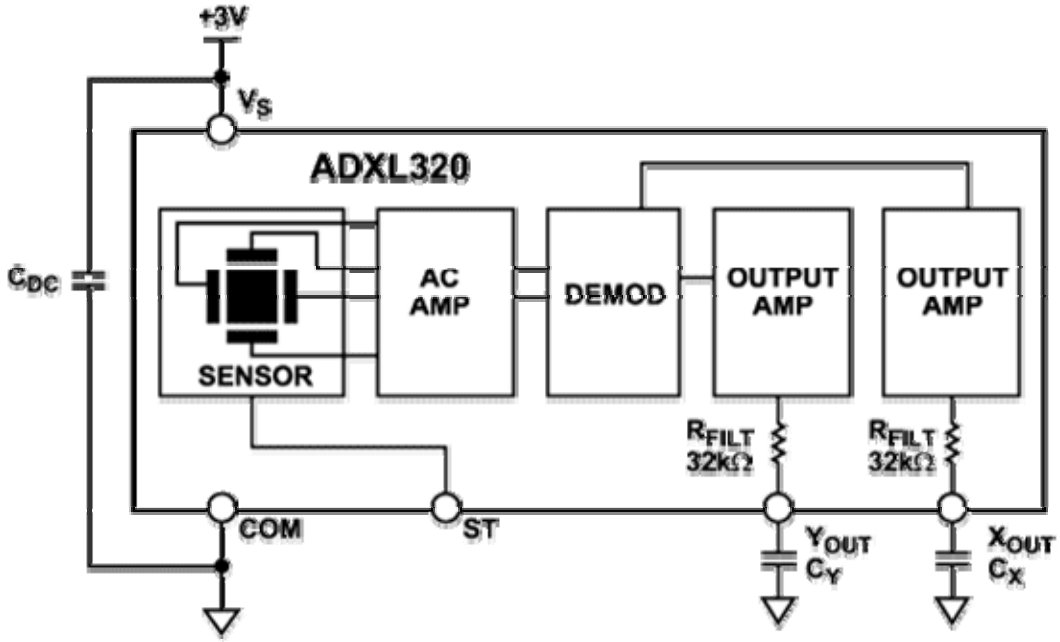
Technical Details

- Cost: ~ $ 50,00 / piece
- Dual-Axis accelerometer +/- 5g (ADXL320)
- Serial interface
- 20MHz PIC (16F88) → Max. output frequeny of 1220Hz
- Three types of output
  - Calculated
  - Binary
  - RAW-mode
- Configuration
  - Calibration (min X, max X), (min Y, max Y)
  - Sensing range (0 - 2g, 0 - 5g, auto)
  - Measurement frequency (0 - 1220Hz)
- Basic communication via HyperTerminal (Configuration, Calibration, etc.)

ADXL320 - Dual Axis Accelerometer

Technical Details

- Axis: 2
- Range: +/- 5g
- Sensitivity:174 mV/g
- Sensitivity Accuracy: ±10
- Output Type: Analog
- Bandwidth: 2.5kHz
- Noise Density: 250
- Supply Voltage: 2.4 to 6
- Supply Current: 0.5mA
- Temp Range: -20 to 70°C
- Package: CP-16

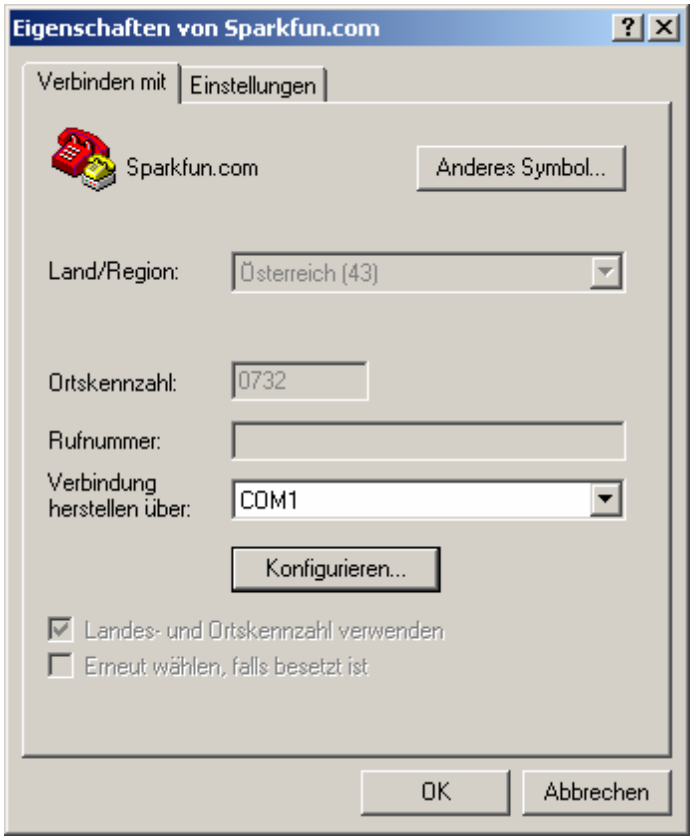


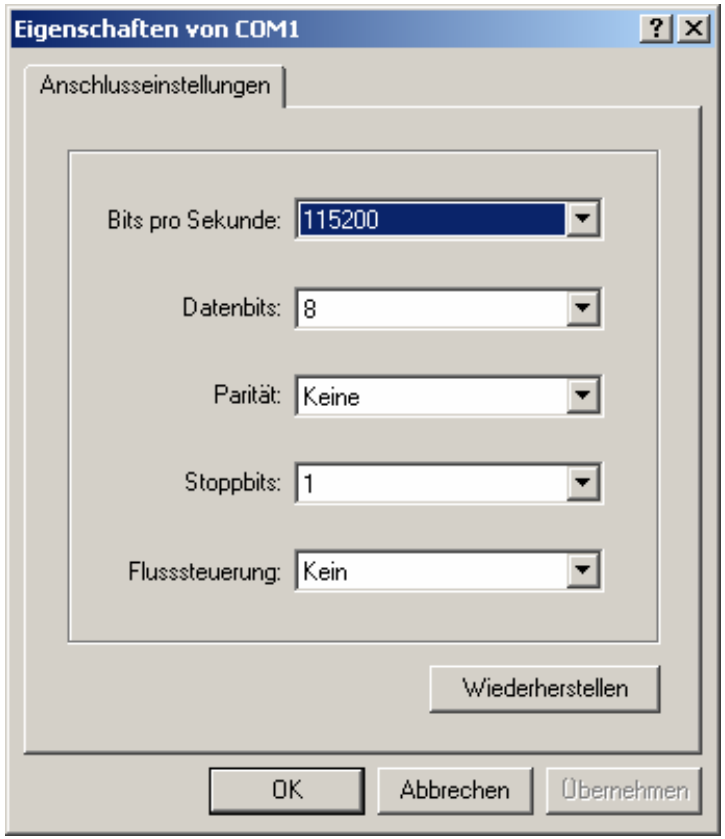
Hyperterminal - Configuration

HyperTerminal transmissions are always at:

- 115.200 bps, 8 data bits, 1 stop bit, no parity, disable flow control

➔ Shortly: 115299 8-N-1



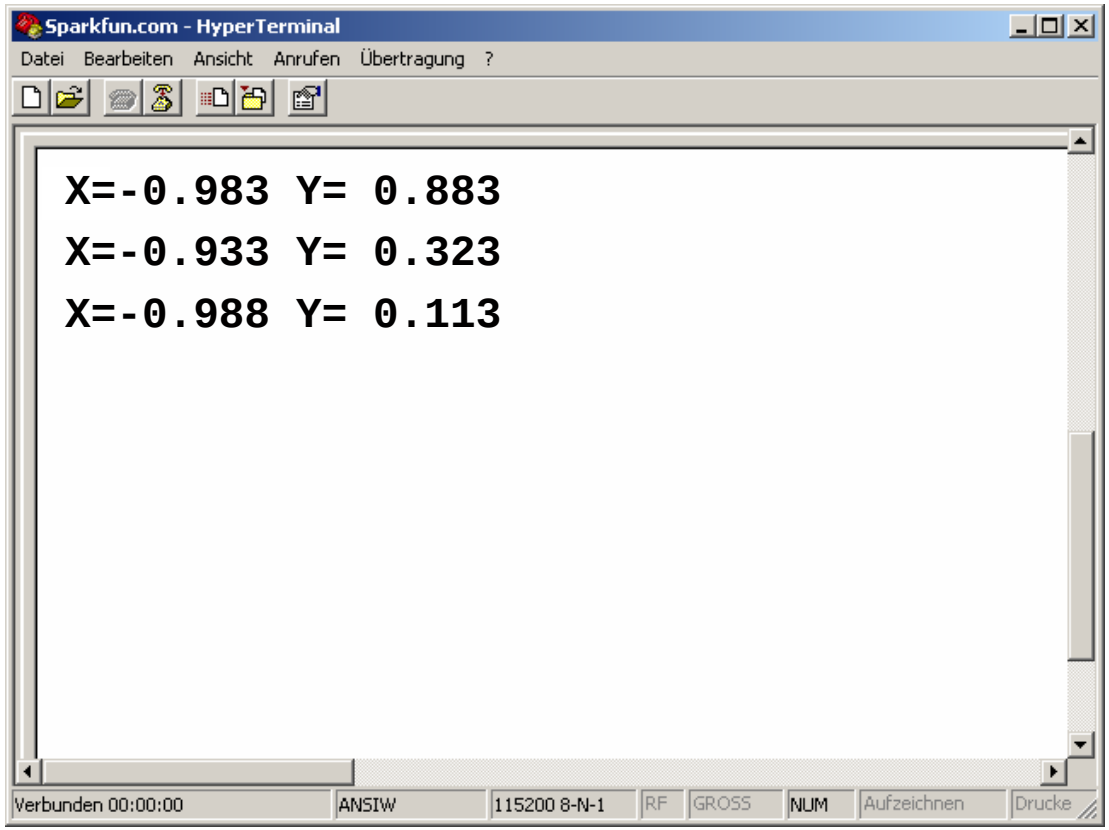


Hyperterminal – Calculated accelerator readings

Detach/Reconnect the SerAccel

Receive a continous ASCII-String (depending on configurated frequency) ,

Format: X=[/-] [0.000...1.000] Y=[/-][0.000...1.000]

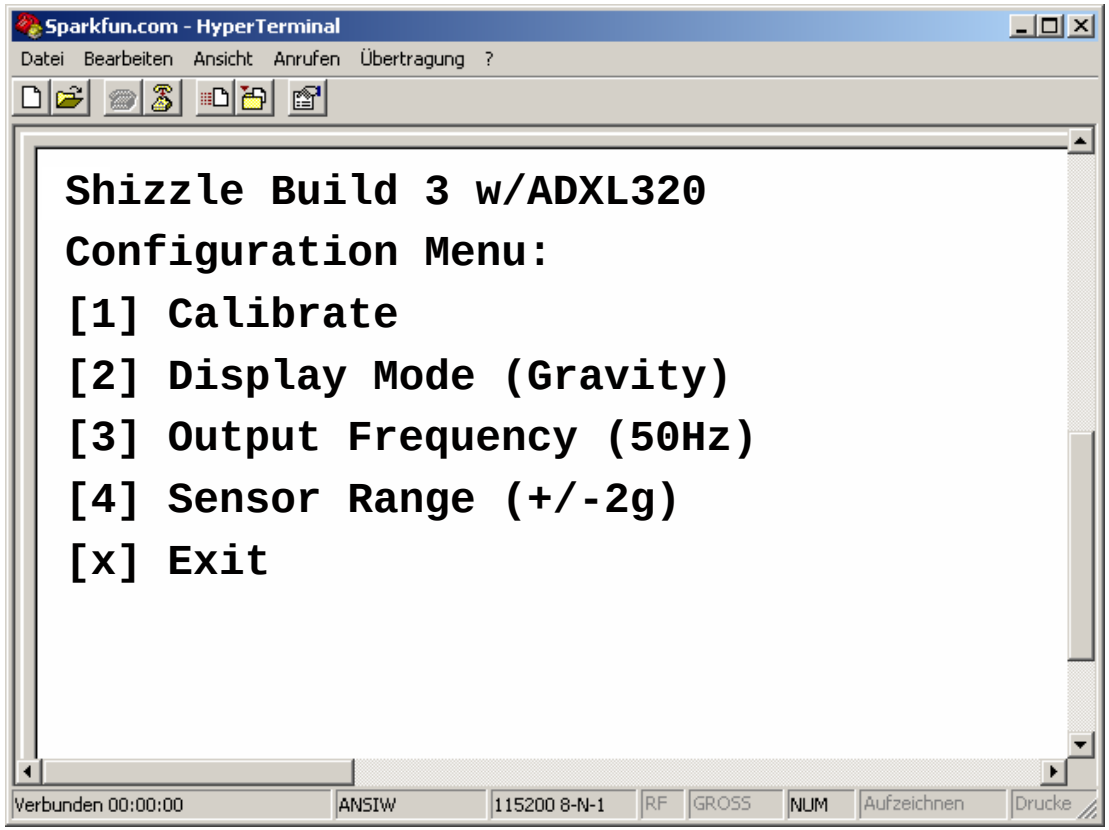


Hyperterminal –Configuration

Access the SerAccel configuration system

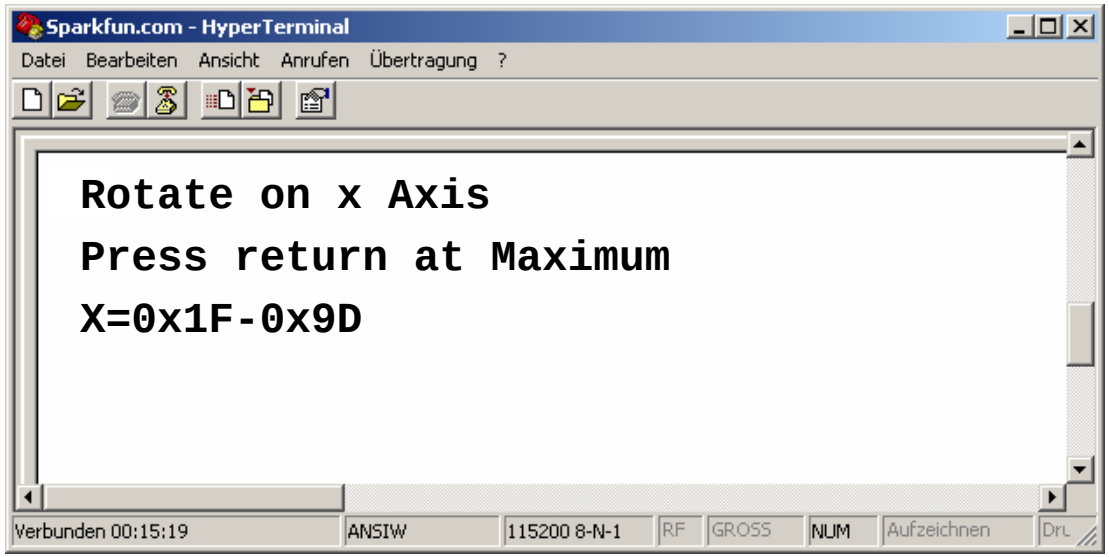
- Pressing „**CTRL+S**“ in the HyperTerminal

The following menu appears:



Hyperterminal –Calibration

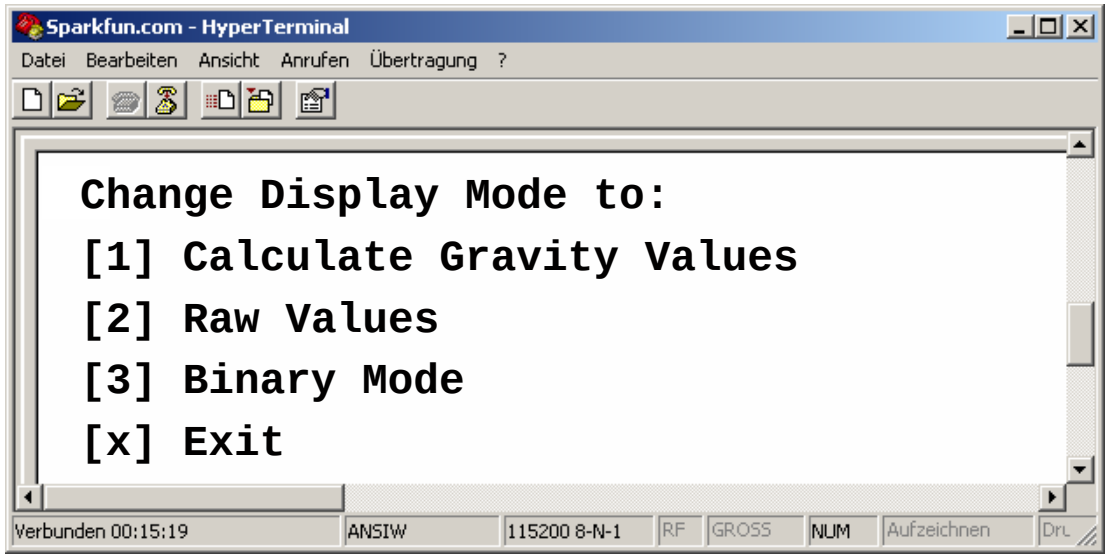
- Pressing „**1**“ in the config. menu starts the calibration routine
- Calibration procedure:
  1) Rotate to maximum x-value
  2) Press Enter
  3) Rotate to minimum x-value
  4) Press Enter
  5) Repeat step 1 to 4 for y-axis
- Calibration values are recorded to non-volatile EEPROM
- Re-calibration only in sensitve applications necessary (temperature variant)



Hyperterminal – Display Modes

- Pressing „**2**“ in the config. menu opens the display mode options

- Modes
  - Gravity Values
    - Example: **`X=-0.922 Y=0.7744`**
  - Raw Values
    - Example: **`X=0x1E-0xF2 Y=0x21-0xEF`**
    - 16 bit number representing by High Byte-Low Byte
  - Binary Mode

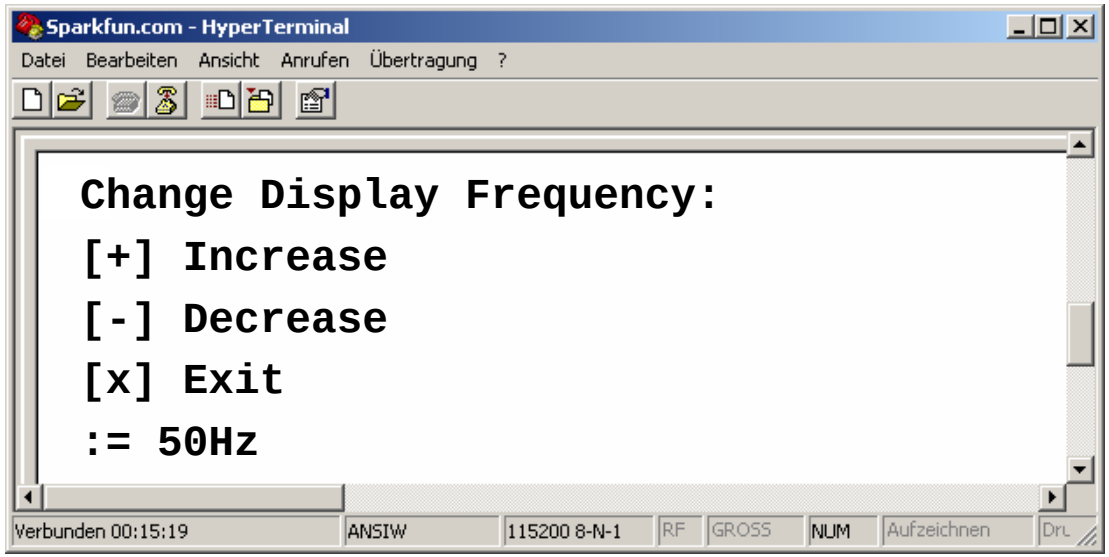


Hyperterminal – Output Frequency

- Pressing „**3**“ in the config. menu opens the menu for changing the output frequency

- Maximum frequency for
  - Calculated gravity output: 300Hz
  - Raw Values: 480Hz
  - Binary Mode: 1220Hz

- Default shipped value is 50Hz

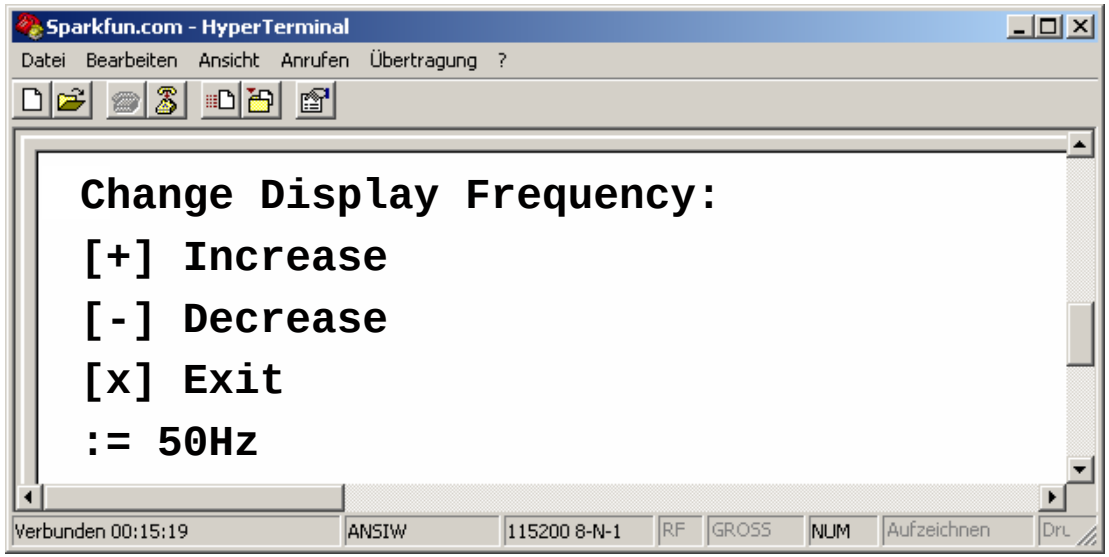


Hyperterminal – Output Frequency

- Pressing „**3**“ in the config. menu opens the menu for changing the output frequency

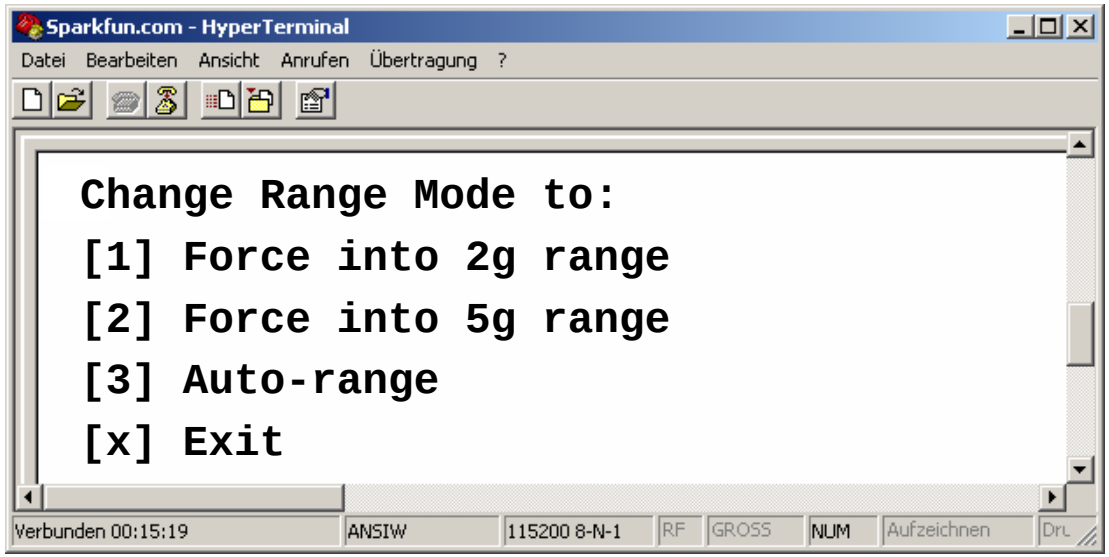
- Maximum frequency for
  - Calculated gravity output: 300Hz
  - Raw Values: 480Hz
  - Binary Mode: 1220Hz

- Default shipped value is 50Hz



Hyperterminal – Sensor Range

- Pressing „**4**“ in the config. menu opens the sensor range menu
- Operation modes
  - +/- 2g mode
    - Resolution of +/- 3.125mg over a +/- 2g range
  - +/- 5g mode
    - Resolution of +/- 7.5mg over the entire +/- 5g range
  - Auto-mode
    - Resolution of +/- 3.125mg over a +/- 2g range AND
    - Resolution of +/- 7.5mg over the 2-5g range



Firmware Update – WIN PIC Programmer

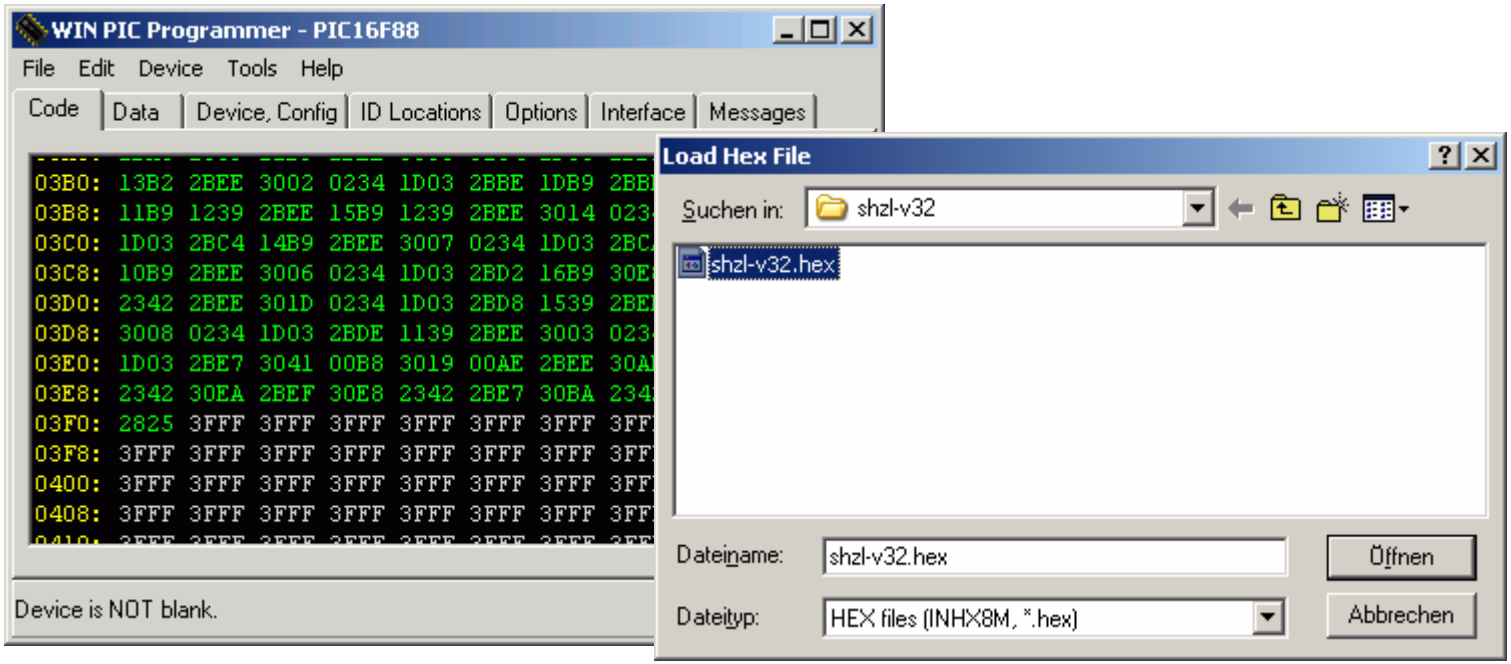
Update the Firmware of the PIC (16F88)
Programming interface between serial port and SerAccel-device

Download & Install WIN PIC

- http://www.qsl.net/dl4yhf/winpicpr.htm

Download & Program the Firmware

- Menu „File“ → „Load & Program Device (LOAD+DATA+CONFIG)“



RXTX – Communication Library

A native lib providing serial and parallel communication for the JDK (Java Development Toolkit).

All deliverables are under the GNU public license

Sources: http://users.frii.com/jarvi/rxtx/

RXTX – Communication Library

A native lib providing serial and parallel communication for the JDK
(Java Development Toolkit)

All deliverables are under the GNU public license

Sources available: http://users.frii.com/jarvi/rxtx/ (actual version: rxtx-2.1-7-bins-r2.zip)

- rxtxSerial.dll, rxtxParallel.dll → into **Windows**-directory
- rxtxComm.jar → **java\lib\ext**-directory

Documentation: http://java.sun.com/products/javacomm/reference/api/index.html

Serial Accelerometer: JAVA Example Code Snippet

```
import gnu.io.CommPortIdentifier; /* from RXTX-library*/
import gnu.io.SerialPort;         /* from RXTX-library*/

import java.io.InputStream;
Import ...


SerialAccel accel = new SerialAccel();

usedPort = "COM1";
CommPortIdentifier id =
   CommPortIdentifier.getPortIdentifier(usedPort);
accel.serPort = (SerialPort)id.open("SerialAccel", 1000);

accel.serPort.setFlowControlMode(SerialPort.FLOWCONTROL_NONE);
dataRate = 115200;
accel.serPort.setSerialPortParams(dataRate,
                                  SerialPort.DATABITS_8,
                                  SerialPort.STOPBITS_1,
                                  SerialPort.PARITY_NONE);
```