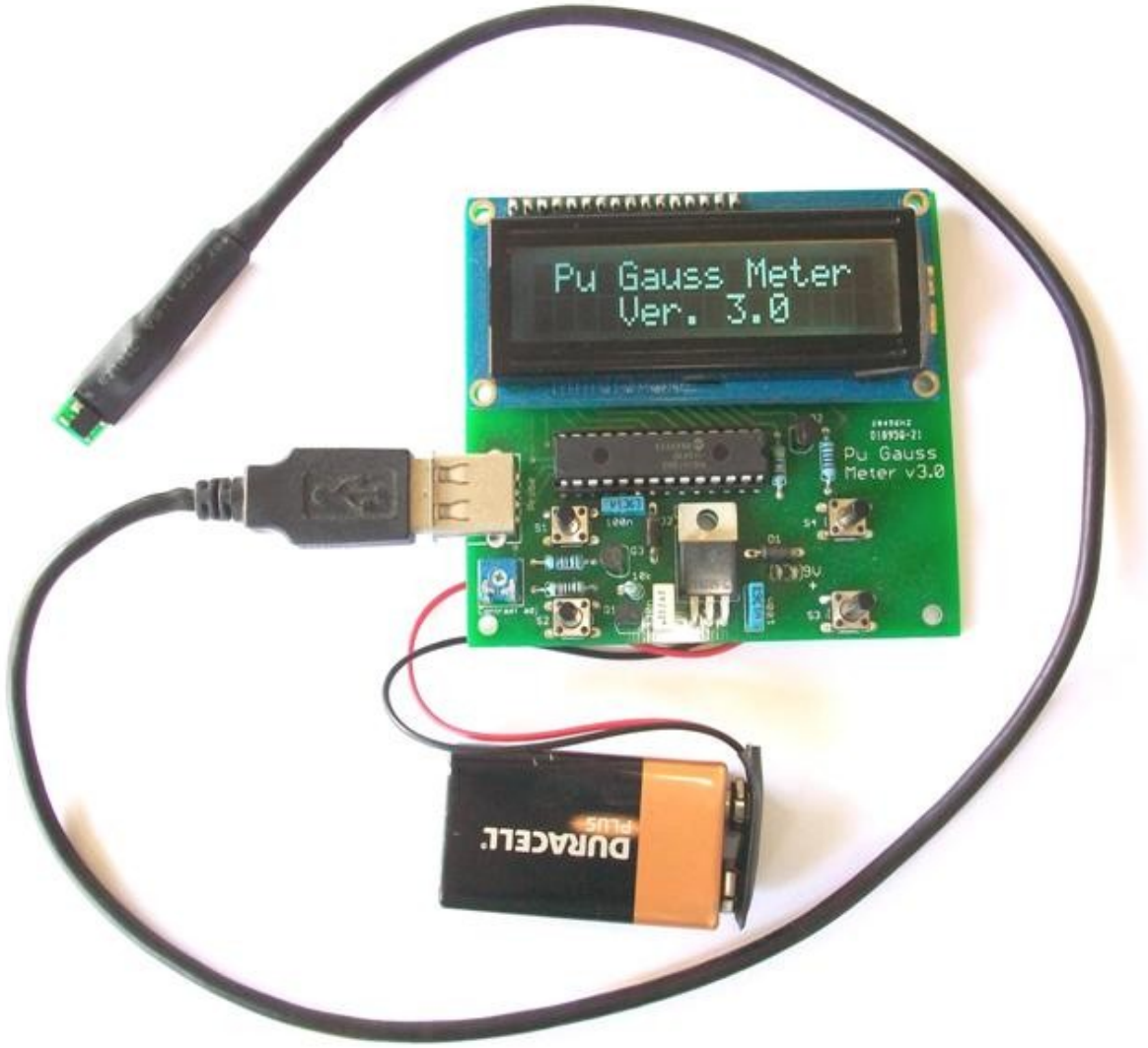
Pickup Gaussmeter v.3.0



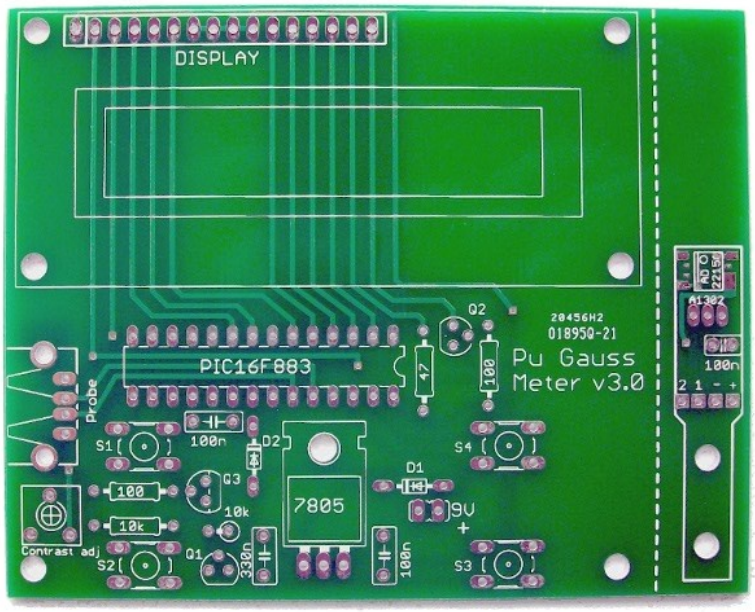
Features:

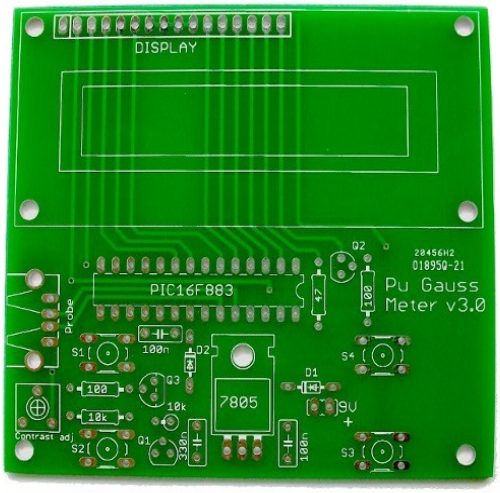
- Range +/- 5600 gauss (with AD22151 sensor) or +/- 1700 Gauss (with A1302 sensor)
- PCB for main unit and for a double-sensor (A1302-AD22151) double-face probe
- Normal, peak-hold and average mode
- 1024 sample per reading in normal mode, 64 in hold peak and 131k in average mode
- On board tactile push buttons to reduce cost and wiring
- Storable calibration and polarity for two sensors (sensivity value from 0.250 to 6.000 mV/gauss)
- Auto zero set at startup and at each sensor change... + zero set button

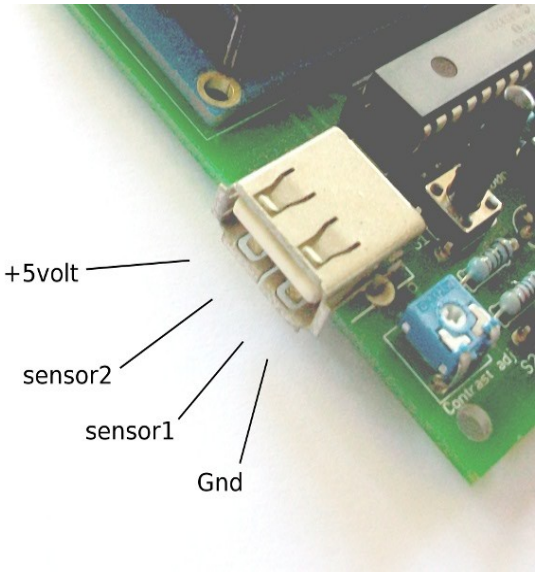
Pcb and assembly

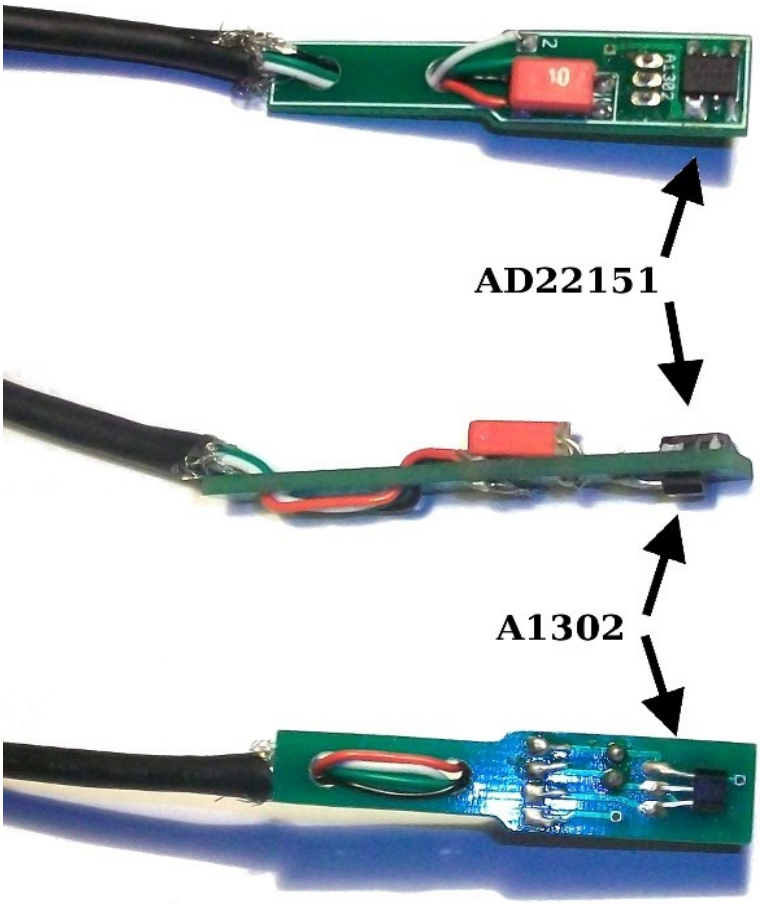
The pcb is a professional double side with silkscreen and soldermask and has a small area to be cut and formed to create the double sensor probe with AD22151 and A1302....(or other sensor with same pinout)
If you want to use sensors with different pinout you can build your own probe without using the small pcb... All sensors with sensivity between 0.250 mV/Gauss and 6 mV/Gauss are supported.

Except for MCU 16F883 programmed with my firmware, all other components are quite available in all well-supplied electronic components stores or in the big online stores (like Mouser, Distrelect, etc)









Components list:

main unit:

- PIC16F883 programmed with my firmware
- 10kohm trimmer (.2" X .2" lead spacing)
- 47ohm 1/4watt resistor
- 2 pcs 100ohm 1/4watt resistor
- 2 pcs 10kohm 1/4watt resistor
- 2 pcs 100nf polyester cap .2" lead spacing
- 330nf polyester cap .2" lead spacing
- 2 pcs bs170 (Q1 ad Q2 in the PCB)
- bc327 (Q3 in the PCB)
- 2 pcs 1n5819
- DIL28 narrow socket
- 4 pcs tactile push buttons 17mm height
- 16X2 hd44780 compatible display. Refer to this mechanical drawing for dimensions
- A type pcb usb female connector
- 7805 voltage regulator
- 16 pin lcd header

probe:

- 100nf polyester cap .1" lead spacing
- A type usb male connector
- 4 conductors cable
- AD22151 sensor and/or A1302 (or any sensor with same pinout and sensitivity between 0.25 and 6.0 mV/Gauss)

User Guide

when you turn on the meter (with S1) display shows firmware version, it performs an auto zero set (you have to keep probe away from magnet field) and then it skips to normal mode ... now it is ready to work in normal mode with probe1

Normal mode

In normal mode the meter shows continuously gauss value and polarity....

S1 changes between probes (display shows PR1 or PR2) or if you press and hold for a second meter turns off when released
S2 skips to peak hold mode
S3 performs zero set (you have to keep probe away from magnet field)
S4 toggles on/off backlight

Peak hold mode

In peak hold mode meter takes measure continuously but shows highest value measured... it resets when value returns to zero or when magnet polarity changes...
This mode is useful to find max gauss value in a magnet...

S1 changes between probes (sensors) or if you press and hold for a second meter turns off when released
S2 skips to average mode
S3 performs zero set (you have to keep probe away from magnet field)
S4 toggles on/off backlight

Average mode

in average mode, meter takes 131070 measures and shows average value.... it could be useful to know average gauss value in a bar magnet (moving probe along magnet while measuring)...

S1 changes between probes (sensor) or if you press and hold for a second meter turns off when released
S2 returns to normal mode or if you hold for some sec it starts measuring
S3 performs zero set (you have to keep probe away from magnet field)
S4 toggles on/off backlight

when measuring procedure starts you have a few seconds to prepare probe near the magnet (display shows "Prepare probe" message) then measuring starts and takes about 8 seconds... in this time you can move probe along the magnet...at the end display shows average value and polarity.

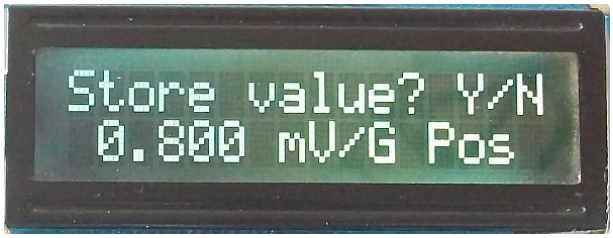
Calibration menu

In the calibration menu you have to store your sensors sensitivity and polarity*... this allows you to use any sensor with sensitivity between 0.25mV/G and 6mv/G...
To enter the calibration menu, switch on the meter and before auto zero set press and hold both S2 and S3 buttons until display shows message as in picture

- select probe with S2 and confirm with S3

- enter the sensitivity of your sensor with S2 (+) and S3 (-) and sensor polarity with S4

- if you wait a few seconds display shows message as in picture... press S2 if you want to store the new value or press S3 for exit without saving .... the meter restarts



If you use the small pcb for probe with A1302 and AD22151 and respect the right wiring between probe and main unit you will have sensor A1302 as PR1 and you have to enter 1.300 mV/Gauss for it in calibration menu. You will have then sensor AD22151 as PR2 and you have to enter 0.400 mV/Gauss for it in calibration menu.**

Note: these sensitivity values are specified in the datasheet of sensors but could have a small resonable tolerance of error.... if you have a reference magnet with a known gauss value you can enter datasheet sensitivity values and then adjust them by trial and error to have perfect gauss reading.

* in a sensor the output can be positive or negative with respect to magnet field polarity... you have to store this data in the calibration menu in accordance with datasheet specification of your sensor (Positive for A1302 and Negative for AD22151)

** see reference silkscreen on pcb probe and pinout of usb socket shown in photo at page 2