

Xicoy

Electrónica SL

CG & Angle Meter 1.3

Users Guide.



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Welcome!

Congratulations on the purchase of your weight, balance & angle meter. Xicoy are dedicated to the design and production of electronic controllers to the highest standards of quality and reliability to bring you the customer the very latest next generation designs.

Features:

The Xicoy CGMeter allows both weight and balance of aero models up to 40kg (88lb) weight (standard model) or up to 100Kg (220lb) on the HD model. By replacing the weight sensor by angle sensors, the system can be used to adjust the travel of control surfaces and to measure the different relevant angles in an aero plane.

The display unit can store the settings of up to 100 different models, and can save/recover the data on a uSD card (not supplied).

Measuring CG and Weight:

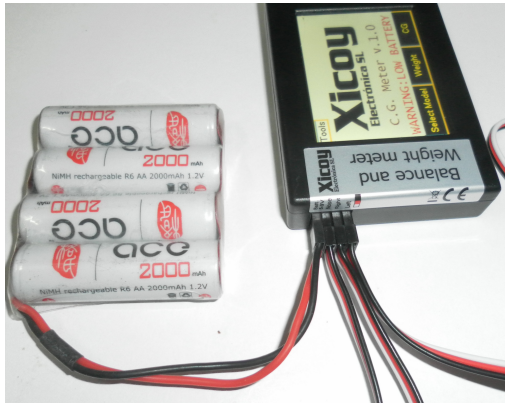
The system consists of 3 x digital weight sensors, to be placed under the wheels of the airplane, and one computer/display unit to show the results in graphical form.



Electric connections:

Connect the 3 sensors to the display unit using the leads supplied. Leads can be extended using standard servo leads if necessary. Respect the proper orientation of the connector as per the labels on the underside of the sensors and on the lateral on the display. The 3 sensors are identical and interchangeable on the 40kg version, but on the 100kg version, it uses 2 sensors rated to 50Kg on the mains.





Connect a standard battery (not supplied) on the "Bat" input. Battery voltage could be from 5V to 9V.

Connect the sensors to the sockets on the display unit. Connect the sensor placed on the Nose (Tricycle Undercarriage) or tail (Bicycle/Tail Dragging planes) in the "Nose" input, and the sensors on the main wheels on the "Left" and "Right" inputs.

System check and calibration:

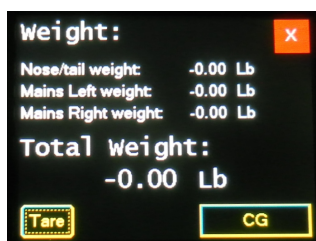
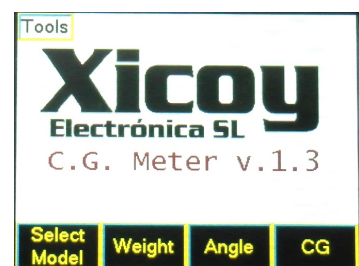
Before to measure the weight or the CG, it is important to check and calibrate the sensors, especially if they have got mechanical stress, like transport or shock, if the temperature is significantly different since last calibration, or at least once per year.

After power-on, leave the system to stabilize for at least 5 minutes. Then touch the "weight" button, and next touch the "Tare" button. All 3 readings should display zero. Then place a known weight on each scale and check that the reading is accurate and same on the 3 scales. If the readings are wrong, then perform the calibration procedure described in the "Advanced Options" section.

Measuring the weight:

Place the sensors close to the wheels of the airplane and connect the battery. Don't place the wheels over to the sensors yet.

Click on the "Weight" button on the main screen.



The individual readings of the 3 sensors will be displayed, together with the Total Weight.

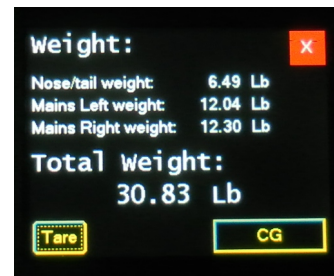
Sometimes you will see that the readings are not exactly zero. This is normal; the sensors could drift a little due temperature and aging.

Commercial weight scales do an "auto zero" calibration at power up to compensate for these variations, but we have chosen to do it manually, so that the system can be powered-up loaded, not needing to unload the airplane from the sensor each time the system is powered up.

Check that all sensors react to weight placement, indicating that connection is correct.

Click on "Tare" button. All readings will go to zero.

Place the sensors under the wheels. Check that wheel sits on the center of the pad, and that no lateral force is being placed on the sensor, all the force should be in vertical sense.



The display will show the weight over each wheel, and the total weight of the plane.

To change the readings between Pounds(Lb) and grams(g) see the "Tools" section.

Measuring the CG

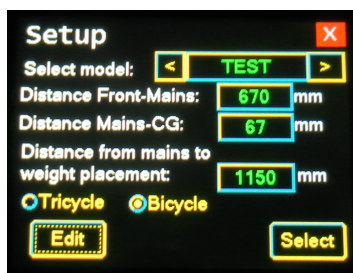
1. Setup the Model

Besides the information of the weight on the wheels, provided by the sensors, the computer needs to know the measures of the airplane on test. These measures are:

- 1) Distance between the **center of the sensors** under the main wheels and the **center of sensor** under the nose wheel.
- 2) Distance between the **center of the sensors** under the main wheels and the desired position of the CG.
- 3) Distance between the **center of the sensors** under the main wheels and the place where the correction weight will be added/removed.

Distances 1 and 2 should be measured as accurately as possible. The precision of the measure for the distance of point 3 is not very important; an error on this measure will cause an error on the calculated correction weight, but not an error on the calculation of the real CG location.

Once these 3 measures are known, click on "Select Model" on main screen.



The unit can store the settings of up to 100 different models. Use the < and > buttons to change models. The model name (TEST in the picture) and the distances will be displayed.

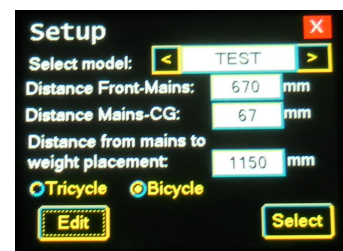
To enter the data of a new model, first move to an empty file, or to over an existing one to be modified using the <> buttons.

Click on the "Edit" button. The fields that can be modified will change to white background color.

Click on the field you want to edit.



A virtual keyboard will be shown, alphabetic if the field



to be edited is the model name, numeric for the numeric fields.

Use the "Del" key to delete the characters of the old text displayed on the blue ribbon, enter the new text. Once done, then click on "OK".

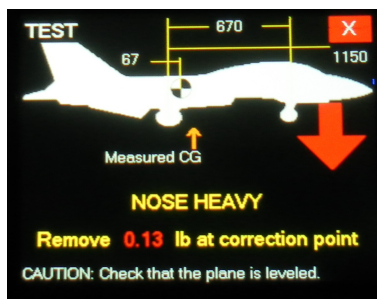
Enter the distances on the other fields using same procedure, and select if your plane has Tricycle undercarriage or Bicycle (Tail Dragging).

Once all data entered, click on "Save" button. This data will be recorded in the memory of the unit.

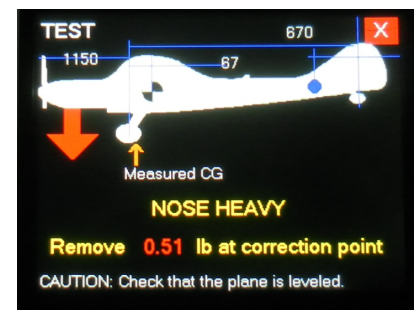
Finally click on SELECT button to record the selected model in the permanent memory.

Measuring the CG

Click on the CG button on the main screen to access to the measured results.



Depending of the model type selected, the displayed image will be different, but the data is the same.



On top, left side, the model name is shown.

On top of the drawing, the distances set in the setup screen are shown. The CG symbol is placed on the drawing at scale distance, and the correction point is shown as a BLUE dot.

Under the drawing, the results of the measure are shown.

The current measured location is displayed; graphically you can see its location relative to desired CG and numerically as the current distance from main landing gear.

A RED arrow indicates the "Heavy" side (Nose/Tail). The amount of the correction to be placed / removed from the correction point is displayed on the bottom line.

The measures are updated in real time, so you can move equipment, add weight, etc. and immediately see the results.

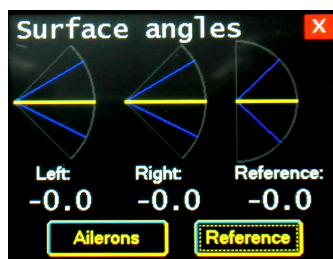
Note: There is a known bug on version 1.0 when measuring the CG on Bicycle (Tail Dragging) planes. Tricycle works correctly. Contact Xicoy for last version of upgrade files.

Measuring angles:

In order to measure angles, your unit should be updated to software version 1.3 or higher, and the angle sensors purchased separately.

The unit can measure up to 3 different angles at time. The sensors measure inclination relative to the ground, with a precision of $0,1^\circ$. Therefore, surface to be measured should be placed parallel to the floor. Ailerons, Flaps and Elevators can be measured normally, but to measure the Rudder, it is necessary to rotate the fuselage 90° .

Measurement is displayed in graphical and numeric form. Usual application is to place the sensors connected to "Left" and "Right" inputs in to surfaces to be measured (Ailerons, Elevators, Flaps). The 3rd sensor can be used as a 3rd measurement or as a zero reference for the other two sensors.



The graphic includes the current position of the surface and the maximum deflection positions, marked in BLUE lines. The current position line is YELLOW in color when the position of the surface is between minimum and maximum. The color will change to GREEN when the deflection is exactly as desired ($\pm 0,5^\circ$). If the deflection is excessive, then the line color changes to RED.

Entering the data of the surfaces:

The unit accepts the data in either Distance or in Degrees. Usually the manufacturer's instructions of aero models specify mm of travel at the Trailing Edge of the surface.

Once you know the measurements required, for your plane, click on "Select Model" on main screen. If you already have defined this model on the system, just select it, if a new model; enter the name and CG data as described in the CG Measures Section.

Once the model is selected, click on the "Angles" button.

The Setup screen shows the following fields and buttons:

- Select model: < TEST8 >
- Distance Front-Mains: 1000 mm
- Distance Mains-CG: 477 mm
- Distance from mains to weight placement: 1277 mm
- Tricycle (selected) / Bicycle
- Edit, Select, Angles buttons

The "Set throws in mm" screen shows the following fields and buttons:

- Aileron width: 80 mm
- Up: 30 mm, Down: 26 mm
- Elevator width: 50 mm
- Up: 16 mm, Down: 14 mm
- Flap width: 50 mm, Throw: 79 mm
- Rudder width: 50 mm, Throw: 30 mm
- Set Degrees, Edit, Save buttons

If Deflection requirements are defined in Degrees of Deflection, click on "Set Degrees" button. The units will change to Degrees.

When Deflection requirements are in Degrees, it is not mandatory to enter the width of the surfaces, but if you enter the data in mm, then you should measure the width of the surface, from hinge line to point of measure. The system will use this data to calculate the angle.

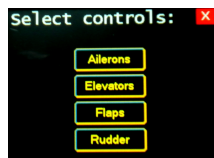
On Ailerons and Elevators, UP and DOWN travel should be entered, always in positive numbers, if travel is symmetrical, enter same number in both boxes. Rudder and Flaps need only one value to be entered.

Once values are entered it is possible to change between Degrees and mm, the system will automatically display the calculated Degrees value for data entered in mm and vice versa.

Please check the "Setup the model" section for a description of how the data is entered. Don't forget to click on "Save" before exiting this window.

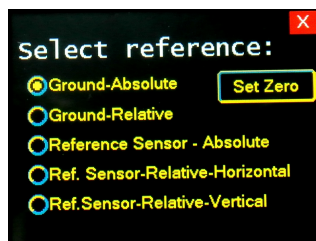
Measuring:

Click on "Angle" button on the main screen to go to Measures Screen. Besides the graphics described above, there are two buttons:



The left side one ("Ailerons" on picture) allows to select the surface to be measured. The BLUE lines on the graphic will be drawn accordingly to the data entered for this particular surface and the

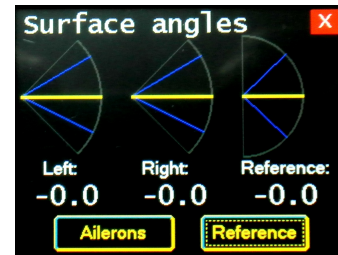
color of the position line will change accordingly its position, turning to GREEN in color when in correct position at full deflection.



The Side Buttons allow selecting the reference for the measurements.

Five options are offered:

- 1) Ground Absolute: The 3 sensors work independently, and the zero is absolute, factory calibrated, like a bubble level, zero degrees will be displayed when the sensor is absolutely parallel to ground.
- 2) Ground Relative: The 3 sensors work independently, but the zero can be reset. Click on the "Set Zero" button to set all 3 sensors to read zero, whatever position they are in. Use this setting when adjusting the surfaces and need 3 measurements at a time, like adjusting Flaps/Elevator mix.
- 3) Reference Sensor Absolute: The readings of sensors left and right show its angular difference against the reference sensor (the one connected to "NOSE" input). Useful when you need to compare the incidence of a surface compared to a reference line on the fuselage.
- 4) Reference Sensor Relative Horizontal: Same as above, but with the possibility to zero the readings on a given position.
- 5) Reference Sensor Relative Vertical: Same as above, but the reference sensor working tilted 90° on its longitudinal axis. Useful when the reference line is at the side of the fuselage.



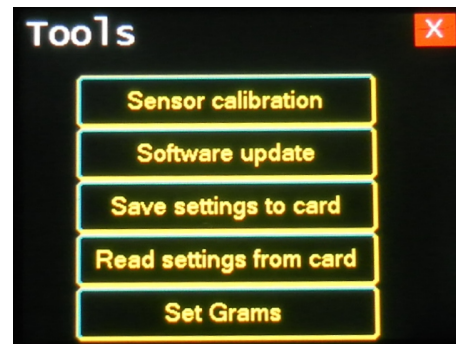
Advanced Options

Besides the normal operation of the system, the button "Tools", placed on the upper left side of main screen, provides access to the advanced functions:

SET GRAMS/POUNDS button: Change the readings from Grams to Pounds and back.

SAVE SETTINGS TO CARD: Dumps the contents of the memory of models to a uSD card.

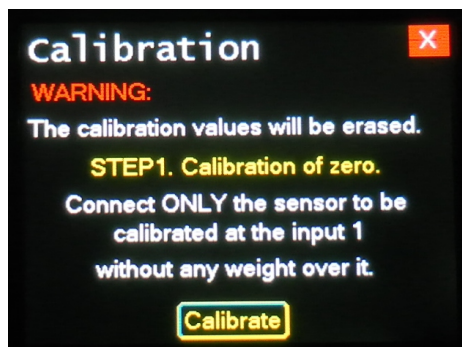
READ SETTINGS FROM CARD: Read a previously recorded file on the card and write to the memory of the unit. **CAUTION:** All settings on the memory will be replaced by the contents of the file.



SENSOR CALIBRATION: Sensors are already calibrated in our factory. In case the sensors require recalibration, this button provides access to the calibration procedure.

CAUTION: The calibration data from factory will be lost. Do not calibrate a sensor if you don't have a precision reference weight of at least 1kg.

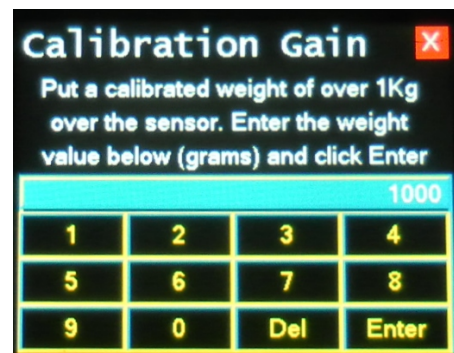
The sensors store the calibration values in the sensor memory. In order to have access to this memory by the display module, the sensor to be calibrated should be connected to input 1 (NOSE Input)



1. Connect the sensor to be calibrated to the "NOSE" input. Don't connect any other sensor to other inputs.

2. Check that the sensor is not loaded, No weight on it. Click the CALIBRATE button.

1. Place a precision weight over the sensor, at least of 1000 gram. If the precision weight is different than 1000gram, use the DEL button and the keyboard to enter the value of the weight used.



It is always recommended to calibrate all 3 sensors at the same time, so that all 3 are calibrated with same reference weight. Differences of calibration between sensors will

cause errors in the measured weight and in the CG position. If all sensors are calibrated using same reference, even if the reference weight is of a non-exact value, the error will only be in the weight measure, but CG position will be correct.

SOFTWARE UPDATE Procedure:

- 1) You need a uSD card formatted in FAT16 or FAT32. At time of writing tested with cards from 1 to 8Gb. ExtFAT (32 GB and over) not supported.
- 2) Unzip the provided file. Copy the CGMeter.bin file on the uSD card. Do not rename the file.
- 3) Insert the card on the unit.
- 4) Assure you have a healthy battery connected.
- 5) Click on TOOLS button, Software Update, Update button.
- 6) **WAIT!** The procedure takes about 1 minute. Do not shutdown the unit while updating, the software can become corrupted and the unit damaged.
- 7) Once you again see the normal screen with Xicoy logo, check that it display's the new version number.

Disposal

Electrical equipment marked with the cancelled waste bin symbol must not be discarded in the standard household waste; instead it must be taken to a suitable specialist disposal system.

In the countries of the EU (European Union) electrical equipment must not be discarded via the normal domestic refuse system (WEEE - Waste of Electrical and Electronic Equipment, directive 2002/96/EG). You can take unwanted equipment to your nearest local authority waste collection point or recycling centre. There the equipment will be disposed of correctly and at no cost to you.

By returning your unwanted equipment you can make an important contribution to the protection of the environment.