

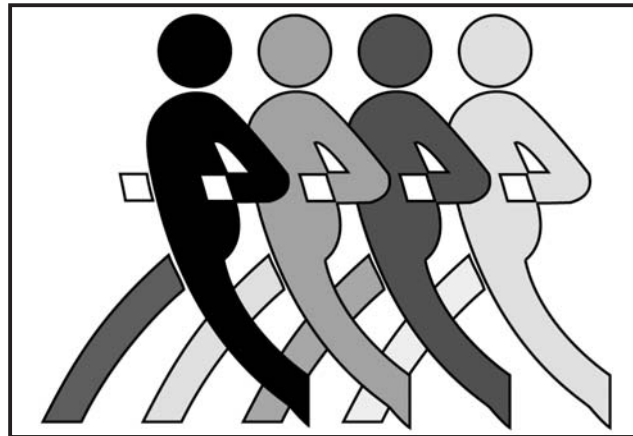


Instruction Manual

Hydroweight Software

Windows Version 5.12

Manual No. X17070
For Cat No. 17061 &17062



Read Warning on Page 3

Specifications subject to change without notice

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Last Update 10/11



Contents

1. Must-Read Warning	3
2. Installation	4
3. Calibration	5
4. Software Installation	5
5. Running the Software	6
6. Preparing the Subject	7
7. Tare Weight Procedure	7
8. Underwater Weighing	8
9. Printing	9

GENERAL INFORMATION

The water in the tank must be treated with chlorine and checked for proper pH level. We suggest you purchase appropriate chemicals and a test kit from your local swimming pool supply house. You may also wish to buy a pool ladder for easy access to the tank.

You will also need a weighing scale, a thermometer to measure water temperature and a method to measure Residual Volume (RV) or a spirometer to measure Vital Capacity for the estimation of RV.

See also model 17400 Residual Volume Measurement System available from VacuMed.

Warning

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Warning

Read this. Your life may depend on it.

Improper installation could cause death by electrocution.

- **Lethal voltages may cause death if this system is not installed properly.**
- **This installation must be done by an expert in installing electrical systems near swimming pools and other water vessels.**
- **VacuMed cannot give you advice about safe installation. Building codes vary, but they all require the installation of special GFI circuits.**
- **If the electrical contractor that is handling the installation is unsure, beware! Get a second opinion or inspection by a qualified electrical engineer or local government building code inspector.**
- **Look in the Yellow Pages under Swimming Pools or Spas. Call a swimming pool supplier and ask them to recommend an electrical contractor familiar with Spa installations.**
- **Installation of our equipment may require a permit from your local government building and or safety agency. Check with them. Failure to get such permit may subject you to fines.**
- **Warning: Test subjects with long hair must wear a hair net. Know how to shut off the pump quickly in case you choose to ignore this hair net warning.**
- **Take care to hang the transducer from the support arm using the hardware supplied. The transducer wire should be secured to the supports using the plastic wire ties supplied in the package. The digital indicator must be placed in a location where it cannot fall, or be accidentally dragged, into the hydrostatic tank. The indicator should be plugged into a properly grounded outlet with a ground fault interrupter (GFI).**





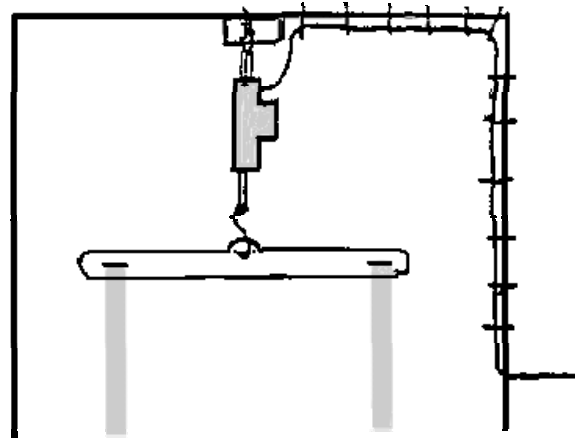
Body Fat Measurement System

The Body Fat Measurement System is a hardware and software package designed to allow the user to automate the collection of hydrostatic measurements. Hardware included in this package should include a single transducer, digital weighing indicator, a 2 button remote control and an RS-232C computer interface.

Note: *This manual may not reflect all changes caused by changing to a different hardware supplier in 2007.*

2. INSTALLATION

Install the stainless steel upright supports, mount the crossbar. In a room with a low ceiling you may need to tilt the tank horizontally to do this. Now install the two hoses connecting the tank to the pump/filter unit.



Once this has been completed, hang the transducer from the support arm using the hardware supplied. The transducer cable should be secured to the supports using the plastic wire ties supplied in the package. The digital indicator must be placed in a location where it **can not** fall, or be accidentally dragged, into the hydrostatic tank. The indicator should be plugged into a properly grounded outlet with a ground fault interrupter.

Warning: It is mandatory that you have an electrical expert assist you in this step of the process.

Note: *We cannot, and will not, give you advice about the electrical connection, read the warning on the previous page again!*

Hang the weighing chair from the transducer and connect the computer to the indicator with the cable provided. The 2-button remote control box is hard-wired to the indicator.

Note: *Initial heating of the tank water may take up to 10 hours.*



3. CALIBRATION

Note: *The transducer and indicator have been calibrated prior to shipment. Do not make any adjustments. The indicator will show an initial negative weight. This is normal, because you must always use the supplied weight belt. The system will not TARE while there is a negative reading.*

It is easy to check the calibration by hanging objects of known weight on the transducer. For example, hang the supplied weight belt or any 2-3kg weight from the transducer and press the TARE button (left). The indicator should now indicate zero weight. Now add an object of known weight on the transducer and read the weight. If the calibration is not within acceptable limits the system must be re-calibrated. Directions for this procedure are contained in the Instruction Manual of the indicator. It is important to note that calibration must be done with a weight close to the maximum capacity of the transducer (250 pounds).

4. SOFTWARE INSTALLATION

The software supplied with this package is contained on a CD labeled TurboFit "Hydro-Weight".

Install the software to your hard disk, to do so insert software into your CD drive and type:

```
D: setup.exe          (Enter)
(or find setup.exe on the CD)
```

Continue as prompted

The next step in installing the system is to determine if your computer system has an available serial port. If your computer does not presently have an available serial port, you must install one, or install a Serial to USB adapter, your local computer store can help you. If your computer has a serial port and it is not being used by another device, then it may be used for this system. The standard software supplied with this package is designed to read from the connected/active communication port.

In TurboFit, click on **Setup**, then **User Header** to enter the name of your laboratory to be printed on report.

Note: USB Connections

If you have both an RV system and a Loadcell, both USB cables must be connected to open the software



5. RUNNING THE SOFTWARE

- 5.1. Click on the **TurboFit** icon
- 5.2. Click on **Calibration** to enter ambient temperature, pressure and humidity.
- 5.3. Go direct to **Quit to Test** or click **Hydro-Weight** on Main Menu.
- 5.4. Click on **New** to enter information for a new subject and **Save**, or **Previous** to recall a previously tested subject.
- 5.5. If using Load Cell Indicator 17070 or 17071, make sure **Comm Port** box is checked, unless you want to enter weight manually. A list of available COM ports is shown in the Comm Port window. The default is COM 1, but you may need to change it. If no results are recorded in step 8.2, come back here and select a different available COM port.
- 5.6. Enter known **Residual Volume** or click on **Estimated Residual Volume*** and enter Vital Capacity so that software will calculate residual volume or, if importing a RV value from an RV test, open the *.RV file first, then click on IMPORT RV.
- 5.7. Enter **Water Temperature**

- 5.8. Click **Continue**

***Note:** Estimated Residual Volume is computed using the following formula:

$$\begin{aligned} \text{Males: } \quad \text{RV} &= \text{Vital Capacity} \bullet 0.24 && (\text{VC} \times 0.24) \\ \text{Females: } \text{RV} &= \text{Vital Capacity} \bullet 0.28 && (\text{VC} \times 0.28) \end{aligned}$$



6. PREPARE THE SUBJECT

Note: *Some users have the test subjects shower before entering the tank to keep tank water clean.*

Test subjects should try to rub out air bubbles trapped in body hair before taking a weight to minimize errors.

Warning: *Every test subject with long hair must wear a hair net to prevent their hair from being sucked into the pump. Do not use a rubber cap that might trap air under the cap.*

You are now ready to conduct a hydrostatic weighing session. Have the subject enter the tank and stand to the side or front of the weighing chair. Have the subject place the weight belt on the chair. Practice with the subject expelling all the air from their lungs. To expel air, it is suggested that the subject be directed to begin to slowly exhale air prior to submerging and as they get to the end of their expiration they submerge and continue to complete exhalation. Direct the subject to move slowly in the tank to reduce the dynamic effects of moving water. If you notice a great deal of variability in your measurements, try using more weight on the subject. (If weight is added you must proceed through all the steps, e.g. a new TARE, prior to data collection). This is a learned skill so it may take some practice. A large error may be introduced into your measurement unless the water in the tank remains calm when you are taking a tare or net weight.

7. TARE WEIGHT PROCEDURE

Hold the Remote Control box with the buttons facing up and the cable connector pointed toward you, then the button on the left is the TARE button, the button on the right is the PRINT button. These buttons functions the same as the buttons on the indicator.

The indicator may be turned on by connecting it to a power source. This starting procedure should be done before each testing session and before each subject. You will note there is no off position, when not in use the system should be unplugged. You are now ready to proceed.

Place the weight belt in the chair. When the subject is ready, have him/her slowly expel their air and submerge their head while not sitting in the chair. The total body should be submerged and no part of the subject should be leaning on the weighing chair. Add additional weights to the weight belt if the weighing indicator shows a negative weight.



When all the subject's air is expelled and the is water quiet, press the **TARE** button on the indicator or on the hand held remote control. This procedure zeros the weight of the chair and weight belt. The weight should now indicate "0.0" and the **NET** indicator will light up. The weight placed on the chair must be sufficient to record a positive weight on the indicator prior to pressing TARE.

If you encounter a problem and desire to take a second tare weight, just press the TARE button again. This will replace the old tare weight.

8. UNDERWATER WEIGHING

The subject can now place the weight belt around their waist and get into the chair. No part of their body should be touching the sides or bottom of the tank.

You are now ready to collect data. Have the subject slowly empty his/her lungs and lean forward and submerge. Do this slowly so the water is not disturbed. When the bubbles stop press the PRINT button on the indicator or the right button on the hand held remote control. The computer will beep when the data is received and will display the data. This beep is the signal for the test subject to surface.

Software Procedure

- 8.1. Follow Subject Testing Prompts. You can repeat weighing without re-TARE by following the on-screen "Subject Testing" prompts again.
- 8.2. Each time PRINT is pressed a new trial (H2O Weight in kg) is recorded in the table.
- 8.3. Check "Select to Average" boxes to average trials you select.
(Leave out results that are not close to average "outliers")
The RESULTS button will turn green after the first "Select to average".
- 8.4. Click **RESULTS** to see %Body Fat for trial(s) checked.
(SAVE button now turns green)
- 8.5. You MUST click **SAVE** to save trials, or data file can not be retrieved.
- 8.6. Click **REPORT** for Print Preview
- 8.7. If desired, click into bottom of page to add comments



Patient Info Menu

ID: 2345

First Name: King

Last Name: KONG

D.O.B.: Nov/11/1982 (MM/DD/YYYY)

Sex: Male Female

Weight: 297.6 Lbs

Height: 58.2 Inches

MKS (Meter Kg System)

English (Inch Pound)

Save

New **Previous**

Spirometry **Help**

Subject Testing 10/05/11 3:59:14 PM S W R B C D

(1) Have subject get into weighing chair
(2) Have subject submerge, expire maximally
(3) After completing expiration and water has settled, press PRINT
(4) At sound of computer beep have subject come up

TRIAL # 0
Computer Ready

Trial #	H2O Weight	Body Density	Select to average
1			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>
			<input type="checkbox"/>

Results **Save** **Report**

Click this SAVE button to save data

8.8. Click **PRINT** to print report

8.9. For manual entry of underwater weight uncheck the box "Use Comm Port" in the Patient Info Screen click into the **H2O Weight** field, enter the underwater weight and hit ENTER.

You can view the result immediately by clicking **Results**, then get a printed record by clicking **Report**.

9. Printing

To print a report from a previously tested subject, click on the **Review** button, select the file and click **Open**.

Note that you can add comments prior to printing by clicking into the **Comments** section at the bottom of the page. The numbers at the bottom of the page represent the in-water weight in kg for each trial averaged.

Hydro weight files are saved as *.hdwt files.
Residual Volume files are saved as *.RV.

*This program is a part of VacuMed's TurboFit VO2 measurement system. You may view those features by selecting a *.stress file in the Review menu.*



INFORMATION AND PROBLEMS

The largest source of error in hydrostatic weighing is the inability of the test subjects to clear their lungs, transducer bounce, and estimation of residual volume. It takes practice to get accurate results.

Desirable body weight (in pounds) is calculated as follows:

Females: $45.5 + (0.91 \times (\text{height in cm} - 152.4)) \times 2.2046$

Males: $50 + (0.91 \times (\text{height in cm} - 152.4)) \times 2.2046$

Body Composition Calculation Source

SIRI, W. E. *Body Composition from Fluid Spaces and Density*. Donner Lab. Med. Physics (Univ. Calif.) Rept. of 19 March, 1956

USB Connections

If you have both an RV system and a Loadcell, both USB cables must be connected to open the software

Cable Problems

A standard RS232 cable is hardwired to the rear panel on indicators delivered after 2006.

Units delivered before 2006 require a modified "Null-modem" cable, contact VacuMed.

Warning: *Lengthening the cable between loadcell and indicator may un-balance loadcell, factory re-balance will be required.*

Revision History

28 Nov 2005:	Initial Issue
16 Dec 2006	Minor corrections, add H2O weight at bottom of report
14 Sep 2008	Corrections for new indicator
20 Oct 2008	Explain SAVE buttons
7 Aug 2009	Minor clarifications
8 Oct 2011	Simplify software procedure and change manual accordingly



VacuMed (Version 5.10 / 9-17-08-Spiro)
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Body Fat Measurement Report

ID(M/F)	9834	BMI	16.53
Sex	Male	BSA	1.47 (m2)
First Name	Skinny		
Last Name	Minnie	File Name	MinnieSkinny8.hdw
D.O.B (Age)	3 September 1979(26)		
Weight	45 Kg (100 Lbs)		
Height	165 cm (65 Inches)	Date Printed	09/23/2008

Test Conditions

Date	12/11/2005	Time	19:02:38
Temperature	25.0 °C	Water Temp	30 °C
Baro Pressure	760	Residual Volume	0.67 (measured)
Humidity	50 %		

Results

PERCENT BODY FAT	28.42 %
FAT WEIGHT	28.14 Lbs (12.66 Kg)
LEAN BODY WEIGHT	70.86 Lbs (31.89 Kg)
DESIRABLE WEIGHT	90.85 Lbs (40.88 Kg)
NEEDED WT LOSS	8.15 Lbs (3.67 Kg)

BODY FAT NORMS

CLASSIFICATION	MALES	FEMALES
ESSENTIAL FAT	2.0 - 4.0%	10.0 - 12.0%
VERY LEAN	6.0 - 8.0%	14.0 - 16.0%
LEAN	10.0 - 13.0%	17.0 - 20.0%
AVERAGE	14.0 - 17.0%	21.0 - 24.0%
ABOVE NORMAL FAT	18.0 - 22.0%	25.0 - 29.0%
OBESE	23.0% +	30.0% +

Comments

Skinny Minnie wants to lose 5 pounds.

H2O#1 = 1

