Fitness Technology

Performance Measurement, Training and Rehabilitation Equipment

FORCE PLATE

400 Series Performance Force Plate Manual

THIS MANUAL SHOULD BE READ AND UNDERSTOOD BEFORE OPERATING THIS FORCE PLATE

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Do not hesitate to contact us if you have any questions about this product

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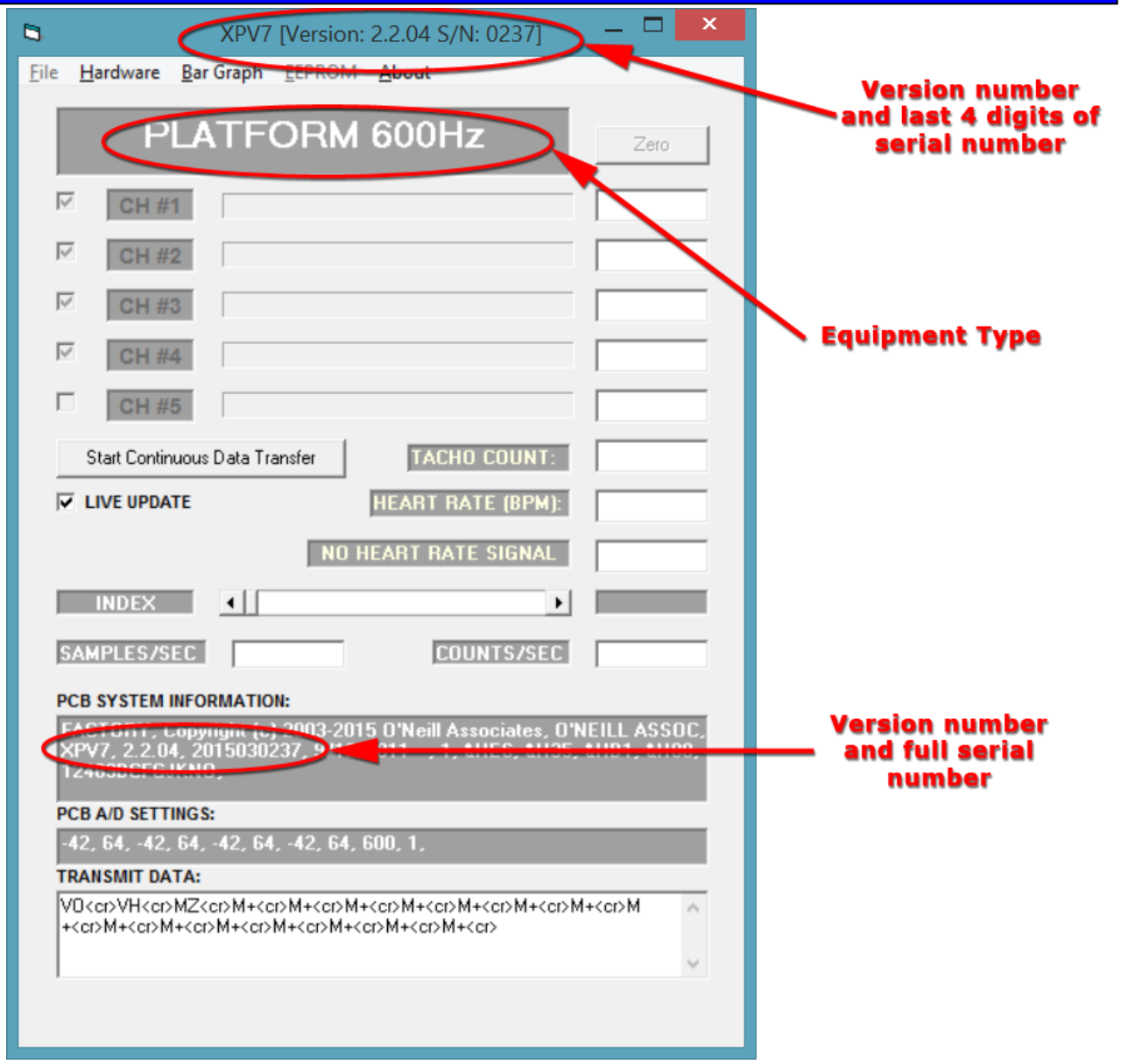

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Specifications.

Capacity: 1000Kg Rated Force

Safety Factor: Side-load rejection ratio 500:1
Safe side-load 100 % of R.C. Maximum safe central overload 150 % of R.C.
Ultimate central overload 300 % of R.C.

Physical Size: 795mm x 795mm x 60mm

Materials: Aluminium Framed Platform & non slip Carbon Fibre Top.
Load Cells complete with adjustable height feet assemblies that can adjust the height of the Plate to approx 120mm

Sample Rate: Maximum Sampling Rate – adjustable in software from 1 – 600Hz on all channels via BMS software program.

Integration: 400S Force Plate + BMS Linear Position Transducer (LPT)is calibrated by users on site via the BMS software via Tools\Configure\Calibration (tab window)

Unique: Only Performance Force Plate on the market capable of running the BMS LPT & auto saving all data files + outputting to Excel via the BMS software.

Operation: Only Performance Force Plate on the market capable of running on our new InnerBalance software tracking used to measure & record all anterior-posterior & mediolateral sway movements.

Weight: 400S, 20.6 Kg (45.3 lbs)

Operation: Integral PCB Module operates 4 Load Cells + Output powered via 5 V DC Computer USB Port only.

PCB monitors: Sensors # 1 – 4 each have a Load cell cable connector 5 terminal plug (Molex) (four in total as shown on pages 3&4) sensors # 1&2, 3&4 may share a Load cell cable connector 10 terminal plug (Molex) (two in total as shown on page 14). These connect to 4 Load cells. (see page 6).

Outputs: Communicates via 1 x USB 2.0 Cable

Power: Computer USB supplies 100% of power supply to operate the 400S from any PC or laptop USB Port. 1

Cables: 1 x USB 2.0 Extension Cable 3 M Long provided with all 400S units

Connections: 1 x RJ 45 Connection (located under the Force Plate) with connection lead supplied going to 1K Ohm Potentiometer on the BMS LPT Model **PT5A-150-V62-UP-1K-M6-632676A** this LPT is an optional plug-in connection – only used if barbell tracking data is also required to be tracked simultaneously with the ground reaction force data (See pages 4 & 5).

PCB: Self contained in the 400S Platform Assembly.

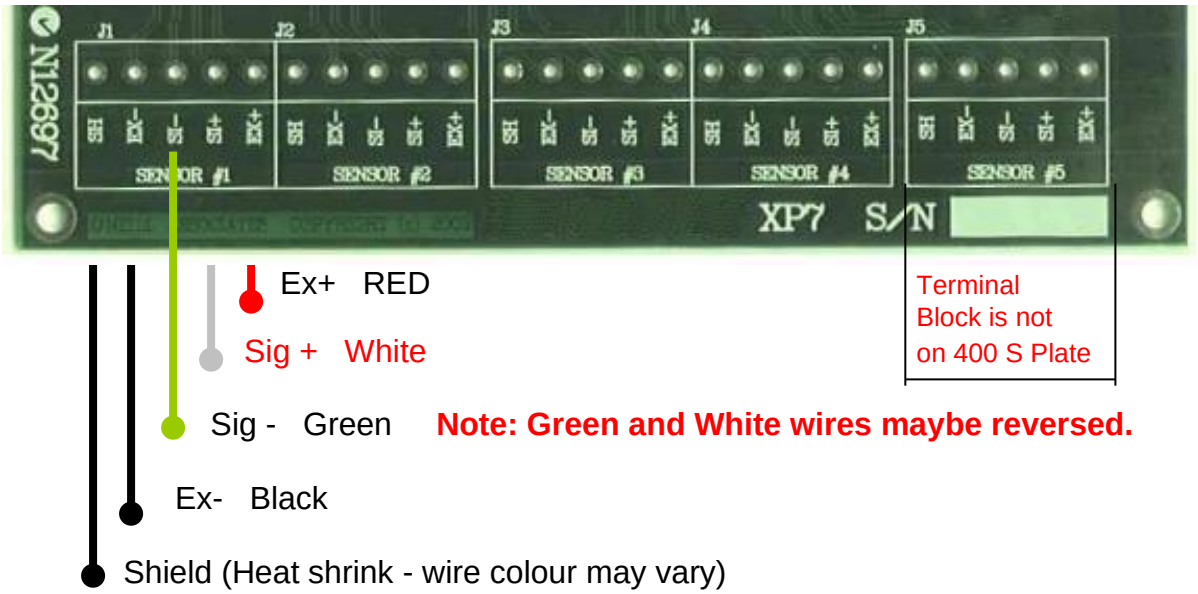
Operation: Simply install the software onto your Hard Drive and then connect the USB Cable plug into your Computer. The 400S requires no other power supply or charging of batteries is required.

Load Cell Wiring

The four Load Cells connect into the XPV7 Electronics Module are colour coded on the load cell cables at the terminal blocks for ease of wiring, they are as follows

Load Cell	1.	Blue	Heat - Shrink shroud as per next page
Load Cell	2.	Green	Heat - Shrink shroud as per next page
Load Cell	3.	**Red**	Heat - Shrink shroud as per next page
Load Cell	4.	**Yellow**	Heat - Shrink shroud as per next page

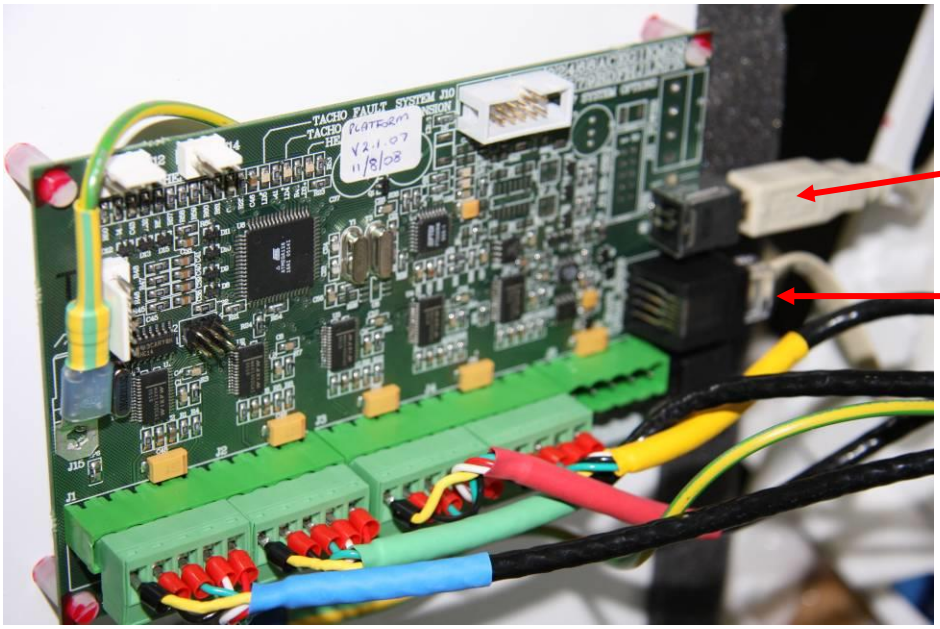
The wiring connection for each individual load cell is as follows.

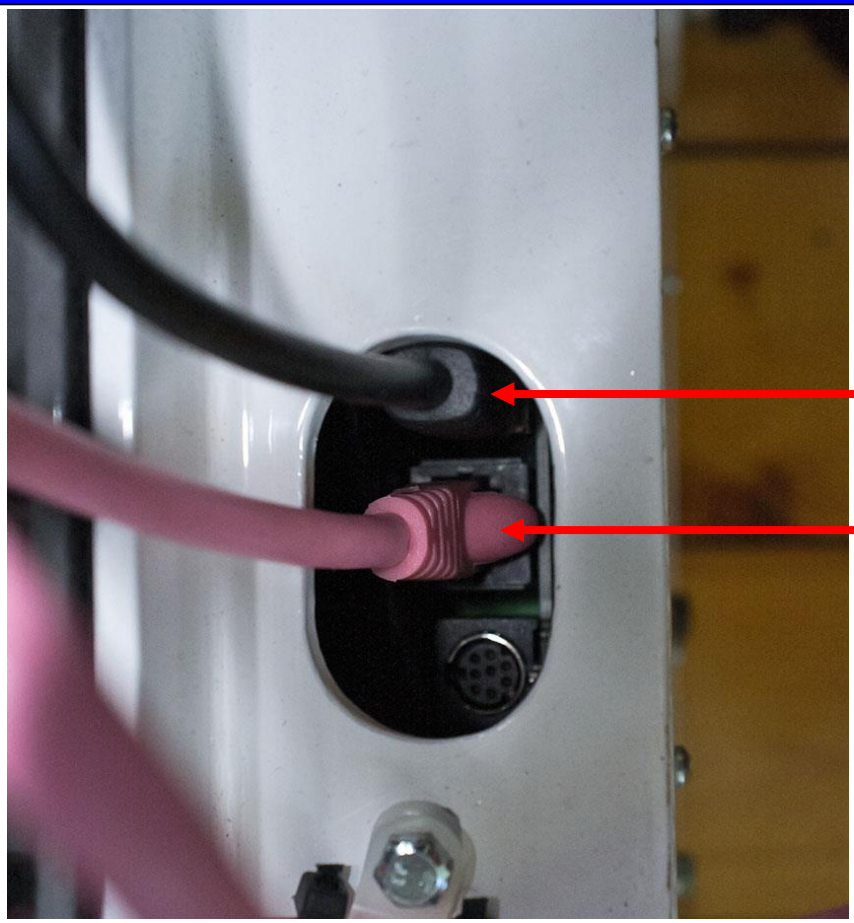


Installation:

1. Carefully unpack the platform by lifting it out the end of the transport carton. Make sure all items are present. (Report any discrepancies immediately.)
2. Place the platform onto a flat stable surface.
3. Install each foot into the load cell holes on the four corners of the platform by rotating the feet to the right. (right hand thread) Adjust height as show below.
4. Connect the USB communication cable as shown below by removing the plug allowing access to the communications port. (See photos below)
5. The Platform is now ready for use.
6. Install the communications software and the processing software following the instruction for each module
7. The XPV7 PCB Electronics Module will automatically identify any cable faults. Should this happen make sure the communication cables are properly installed. If communication failure continues, then replace the USB cable.
8. For any other problems contact our office for further instructions.

USB and PT5A position Transducer Cable Connections

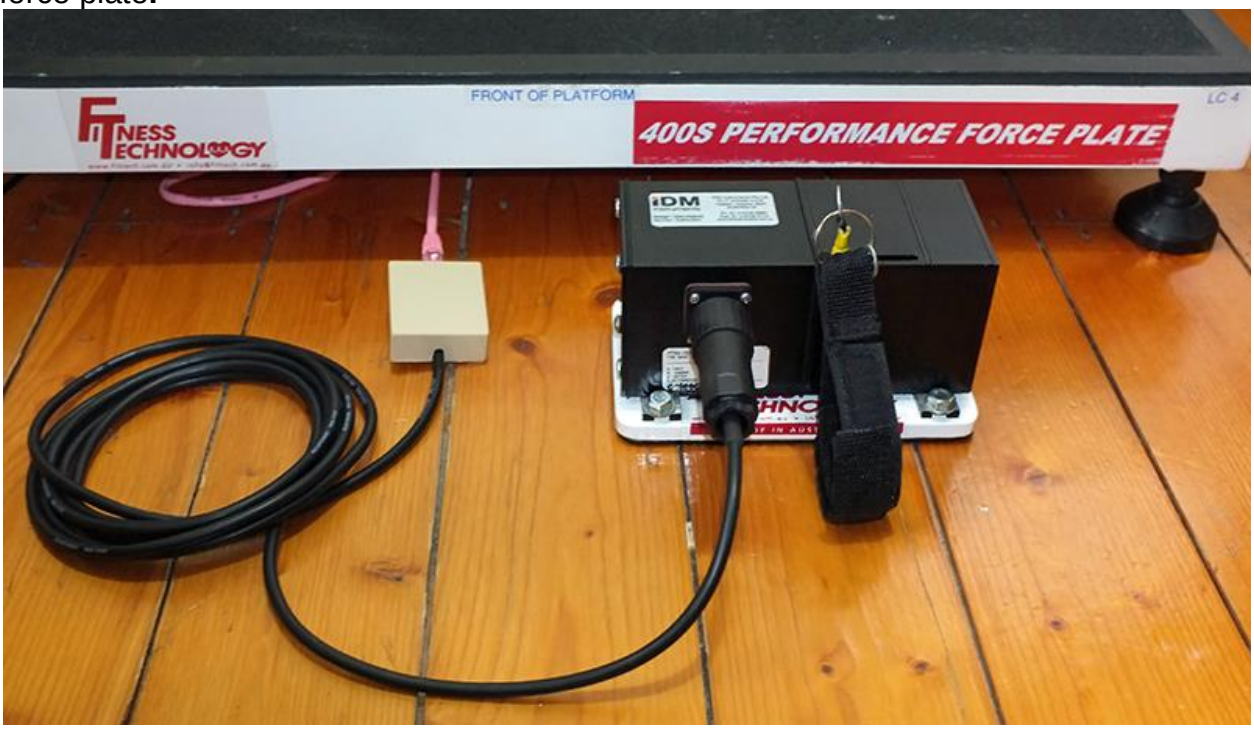




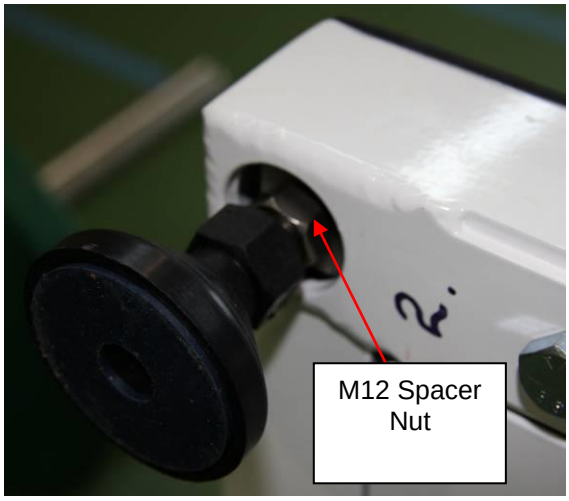
USB Connector

Lead to RJ45 Connector to External RJ45 Socket for LPT cable connection

See below for an example of the PT5A position transducer connected to the 400 Series force plate**.**



Installation of 4 x Platform Feet



The Platform cannot be used until the 4 x feet with M12 1.75 pitch threads are installed in each of the four corners. They screw into the Platform with standard a right-hand thread.

Stainless Steel M12 spacer Nuts are used for levelling and adjusting the height of the Platform. If required the M12 spacer nuts can be removed but if this is done never thread the 4 x feet threads thru all the way - back off 5mm. See page 11 for more detail.

Levelling the 400s Force Plate

The Platform should also always be level when in use.
How to Level the 400S Force Plate using the XPV7 Diagnostic Test Software
1 of the 4 x low profile shear beams bolted in position.

Trouble shooting the 400S Force Plate

If you are unable to receive data from the 400S Force Plate there are a number of simple causes. For technical reasons not all are detailed in this document:

1. Our system requires you have the correct and latest USB Driver. You may have an older version of the USB driver which sometimes may not work if your PC also has a virtual COM Port driver loaded. Re-Install the BMS Software from the following location. Click HERE

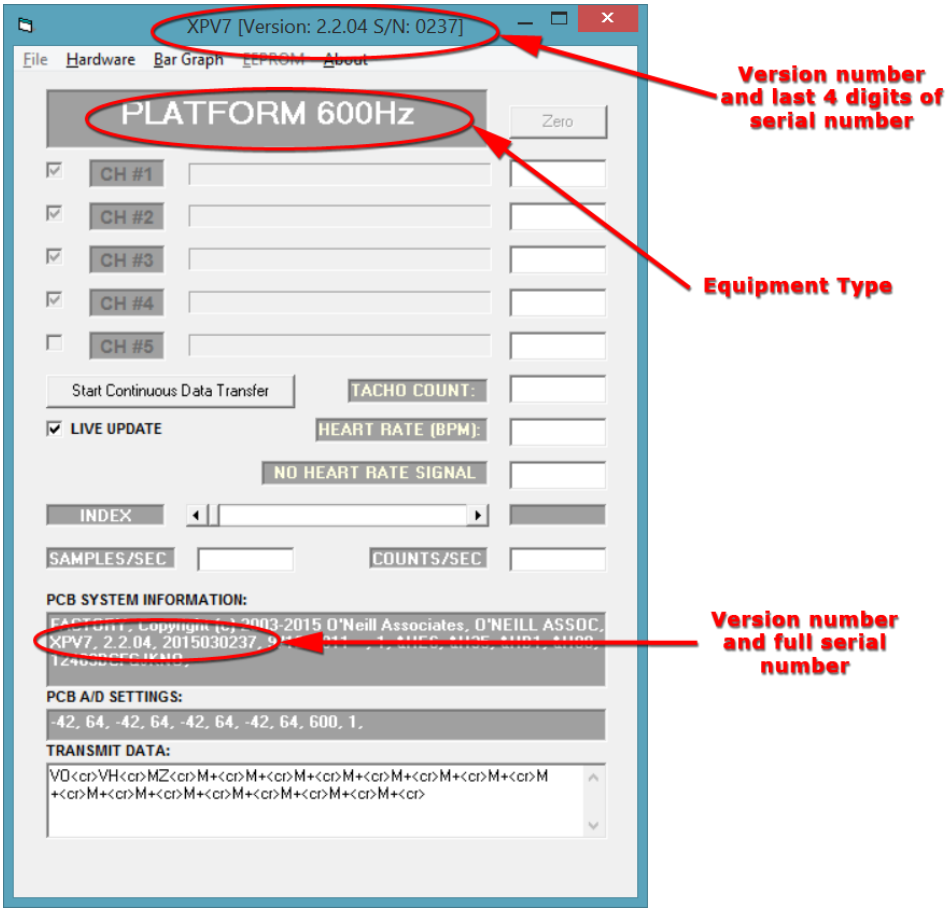
2. Are you using a USB extension lead? Until the trouble shooting is complete we recommend that you disconnect any USB extension leads.

Running the XPV7 Diagnostic software.

The diagnostic software is available from the following link.

XPV7 Diagnostic Test Program

Plug your force plate into your USB port and run the XPV7 diagnostic software. It will open and look like below.

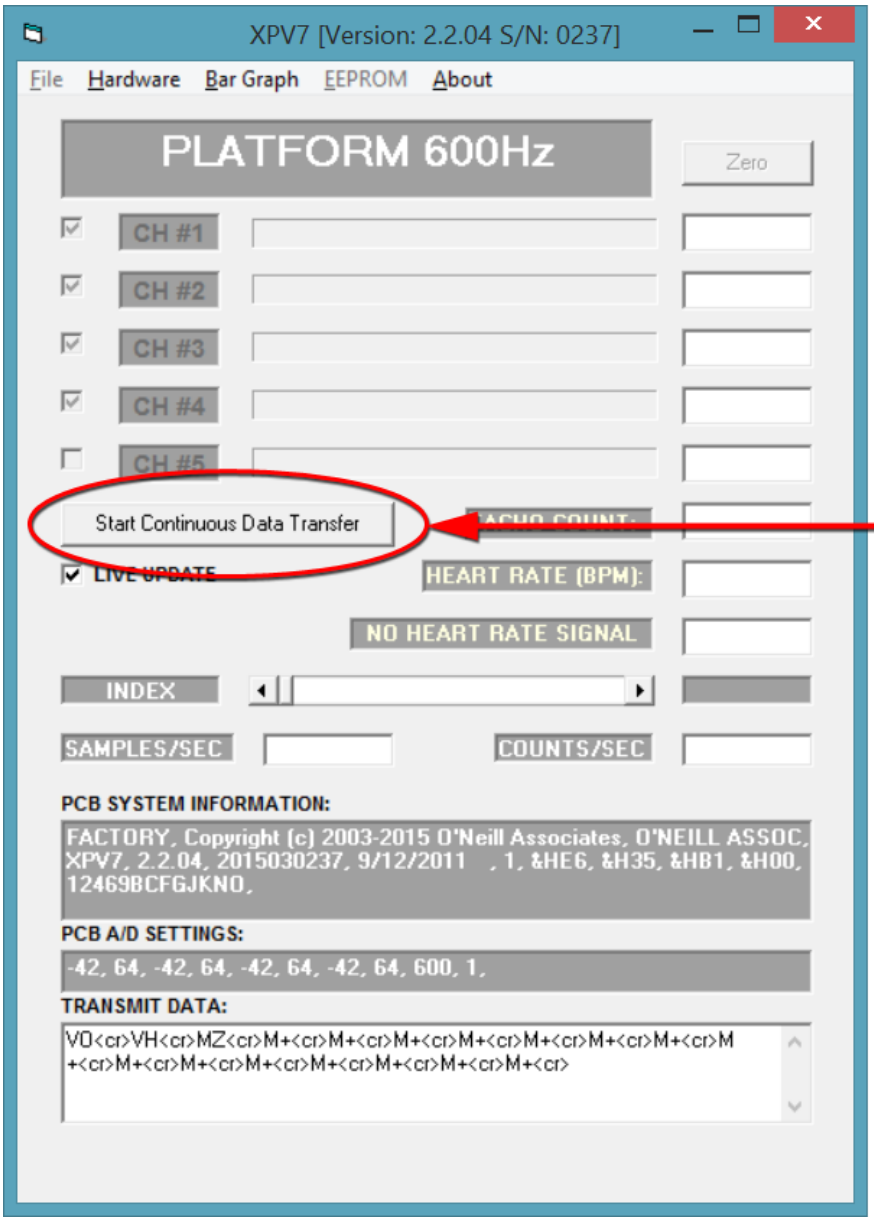


If your serial number has the last 4 digits 0001

It is likely there is an issue with the XPV7 interface and you will need to contact Fitness Technology for further instruction.

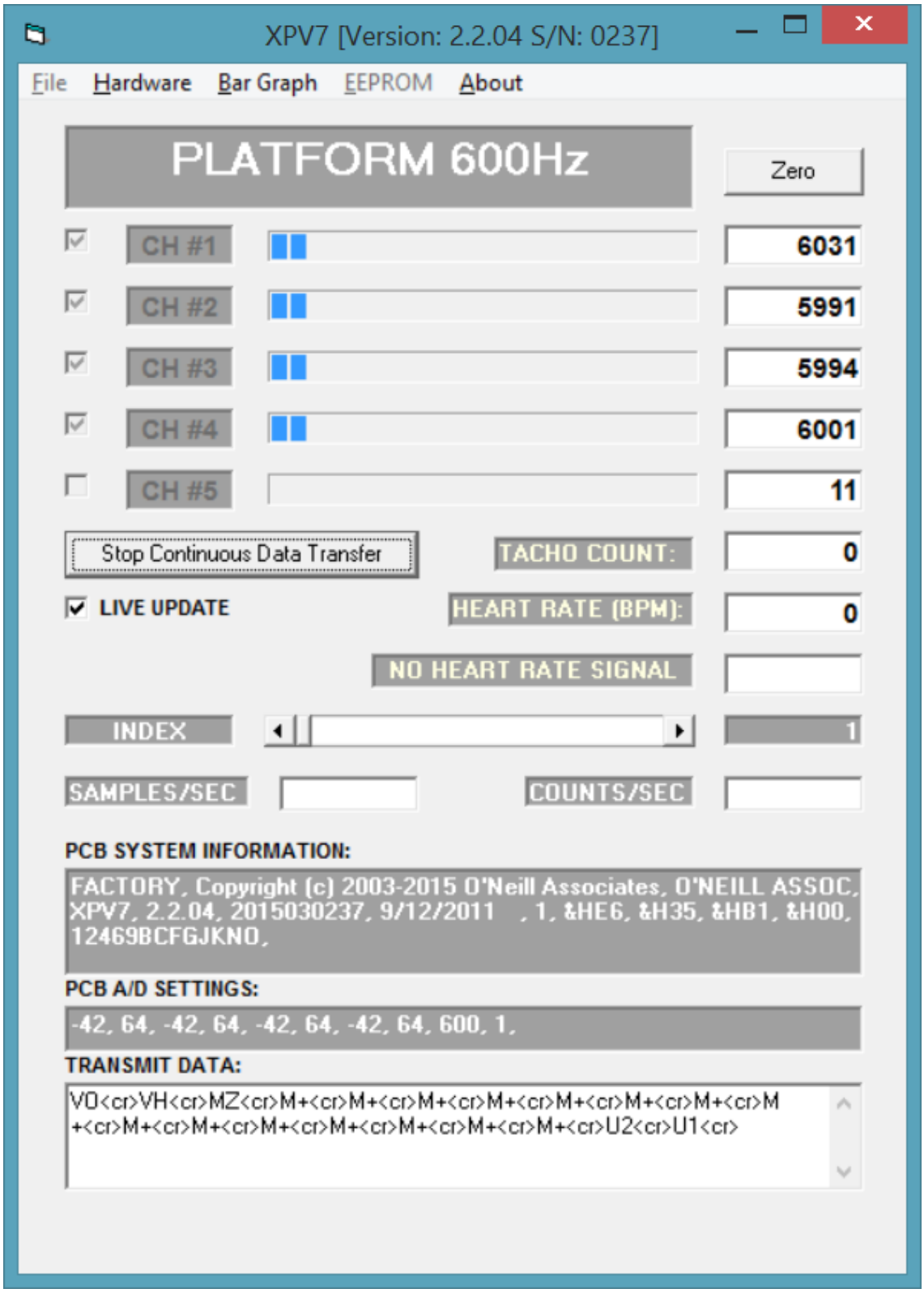
Start data transfer in XPV7 Diagnostic Software

If your serial number is ok you can then click on the start continuous data transfer button.



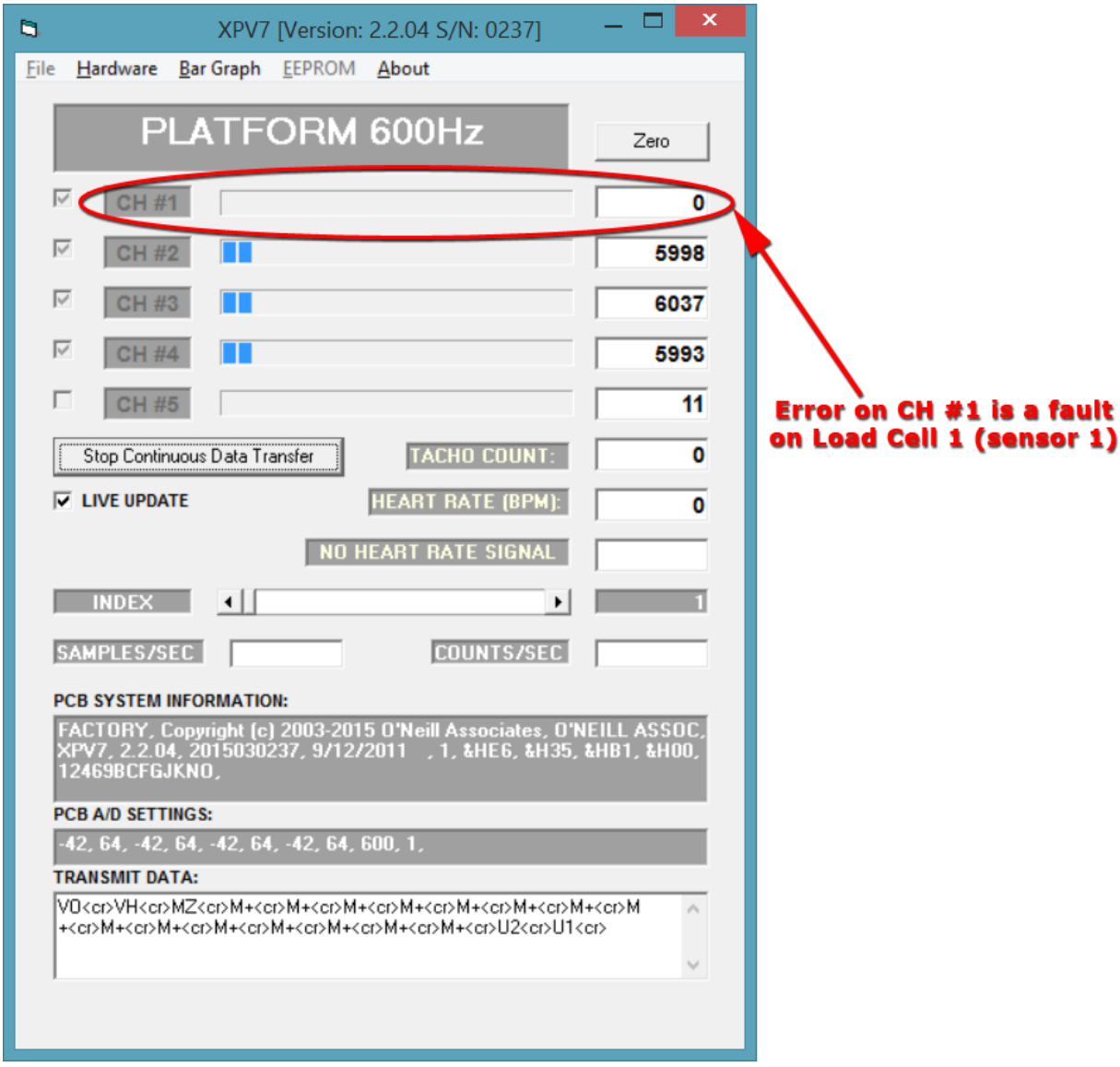
Press 'Start Continuous Data Trensfer' button

If your XPV7 interface is working correctly the software should look as below.



So you have run the XPV7 diagnostic software and one of the channels is reading low or has no reading.

The XPV7 diagnostic software results looks as below.



The XPV7 diagnostic software is showing an error on CH #1. This means that there is an issue with load cell 1 (sensor 1). There are three possible causes for this.

Do you have the spacer nuts on the feet of the platform?

This problem could occur when the 4 x M12 Feet are fully screwed thru into the 4 x Load Cells (Shear Beams).

(a) If the 4 x M12 spacer nuts are used it will not be possible to screw these 4 x Feet in too far. In the image below the spacer nuts are in place and the foot cannot be screwed in too far.

(b) If these 4 spacer nuts are not used do not screw these 4 feet through all the way. Back off the 4 x Platform feet approximately 5 mm refer Page 5. in the first image below you can see a platform foot without the spacer nut that has been screwed in too far. this can lock up the load cell and stop its ability to transmit data. the second and third images show how to loosen the platform foot to ensure it is not locking up the load cell.

Once you have ensured that the foot is not screwed in to far you can test again with the XPV7 software.

If the software is showing all channels working correctly (see image on page 9) you can follow the calibration and testing procedures outlined below.

Step 1 Now calibrate the plate as per our web site Instructional Footage for Media Player Instructions.

How to Calibrate Force for the 400S Force Plate in the FT700 Power Cage

How to calibrate Force for the 400S Force plate.

Then once calibrations have been completed proceed to

Step 2 - (now when step 1 has followed,) next you should be able in the in the BMS program to set a 5 sec time test span - then in Collect & Analyse window Zero out the plate then hit then Collect Data button put a know Mass on the Plate & it should read the correct value of the Mass. Within 0.1 Kg is a typical acceptable Mass reading.

How to test the calibration of the 400s Force Plate for accuracy.

If the XPV7 diagnostic software is still showing no reading after loosening the foot

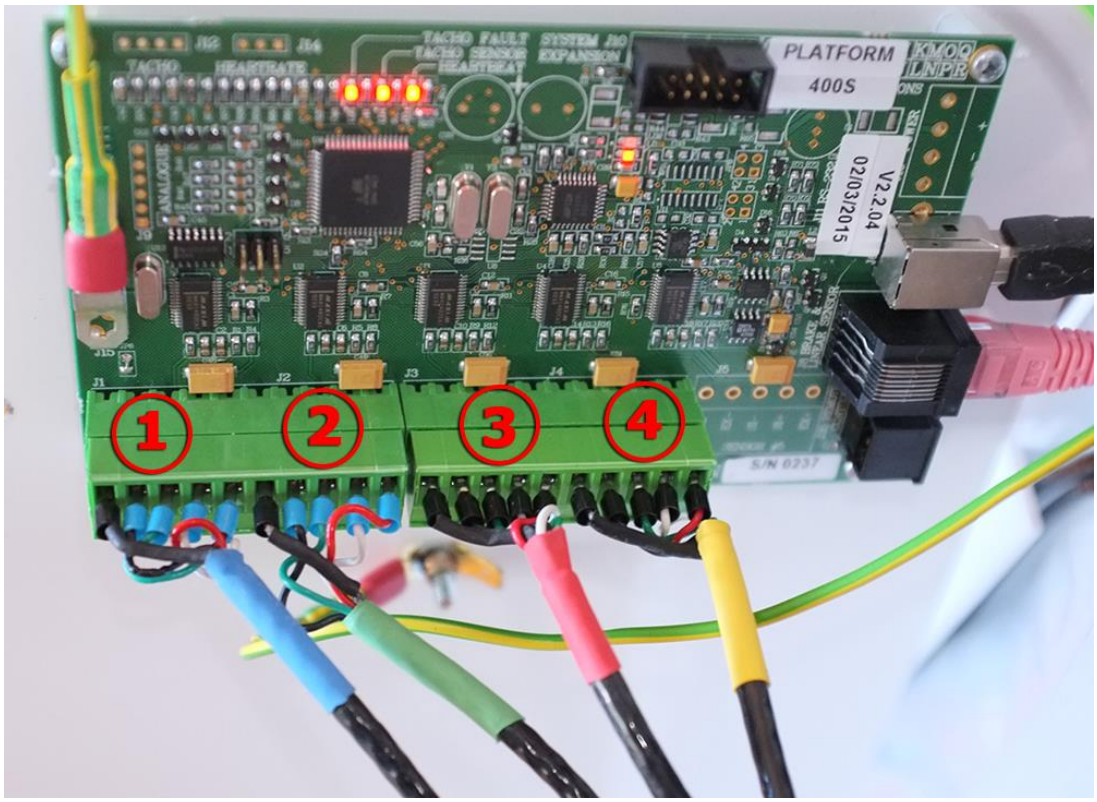
There are two possibilities that could cause this. to check which it is you will need to get access to the XPV7 interface by removing the backing plate on the force platform.

You will need a Phillips head screwdriver and a small flat head (jewellers) screwdriver.

Unplug the USB lead from your PC.

Turn the force plate onto its side to gain access to its underside and remove the 6 screws holding the backing plate in place. you will want to remove the backing on the side where the cables enter the force plate (see image below)

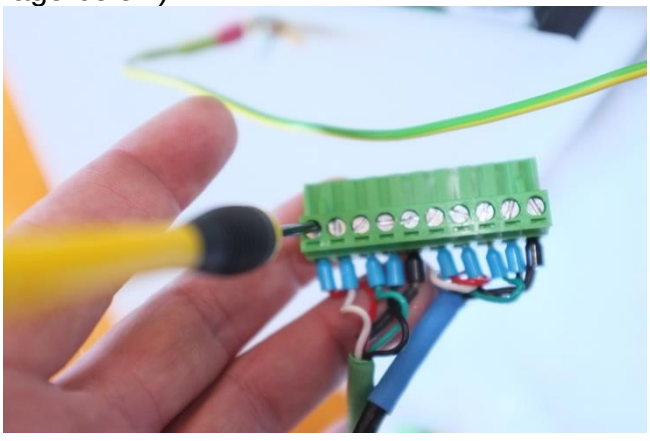
Once you have removed the screws gently pull the backing plate away from the force plate so you can see the XPV7 interface PCB (see image below).



Warning – NEVER remove the individual force sensor wires from the 400S load cell cable connectors (molex). Just remove these load cell cable connectors (molex) from the PCB sockets (they are a firm fit for a very good mechanical fit / electrical connection reason but the plugs do detach).

In the image above you can see that the load cells have colour coded heat shrink. The load cells number from left to right 1-4 as shown in the image. LC1 is blue cable, LC2 is green cable, LC3 is red cable and LC4 is the yellow cable.

Since our software is showing a fault with CH #1 we are going to unplug the connector with the blue cable (indicated by the number 1 in the image). once unplugged turn the connector around and ensure that all of the screws on the underside of the connector are done up tightly. (see image below)

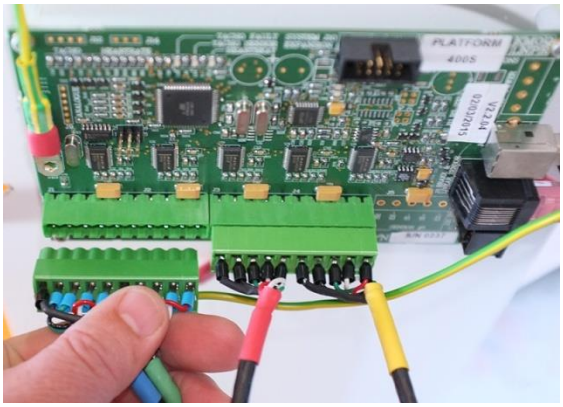


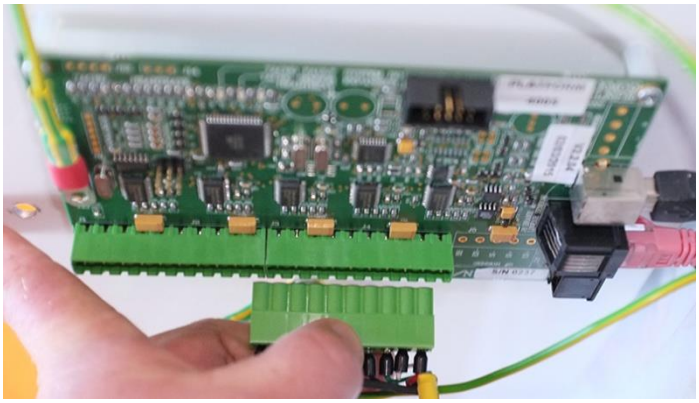
Once the screws have been checked plug the connector back in place and retest the force plate using the XPV7 diagnostic software. If your XPV7 test software is reading normally now (see image on page 9) follow steps 1 and 2 starting on page 12.

You have checked the feet and tightened the connectors and are still getting no reading on one of the channels in the XPV7 test software.

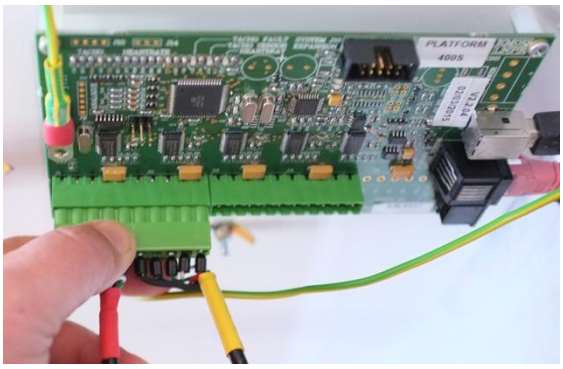
This leaves one option for what is causing the problem. It is either a faulty load cell or a faulty XPV7 interface to determine what item is at fault we will need to open the backing plate of the force platform again. Once it is open use the image on page 13 to determine which connection is at fault. In this example it is CH #1 so the issue lies with Load Cell 1 (the connector with the blue heat shrink on the cable).

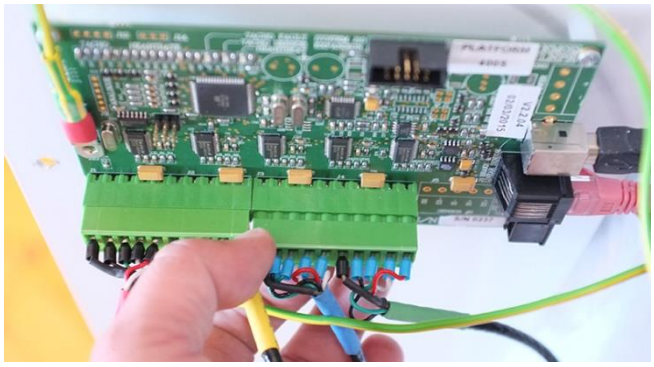
To narrow down the fault we are going to swap two connectors around and retest with the XPV7 Test software. Unplug the connector with the fault(see image below). Then unplug the other connector.



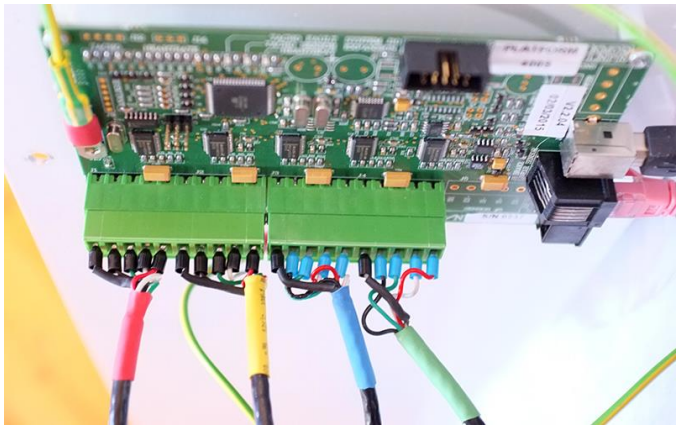


Swap the connectors around an plug them back into the XPV7 interface. (see images below)

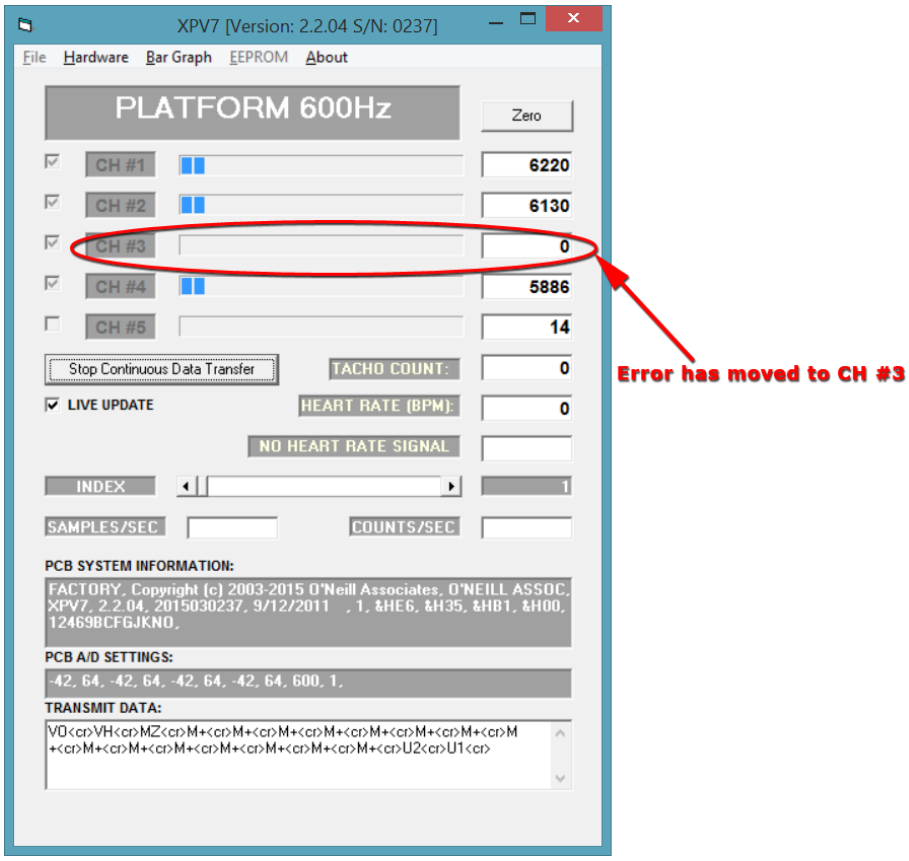




You can now see from the image below that we have LC3 (red cable) plugged into CH #1, LC 4 (yellow cable) plugged into CH #2, LC1 (blue cable) plugged into CH #3 and LC2 (green cable) plugged into CH #4.



Once this is done plug your USB lead back into your PC and start the XPV7 test software again. If the fault changes channel in the XPV7 test software there is an issue with the load cell. If the fault does not change channel there is an issue with the XPV7 interface. See an image of the fault changing channel below indicating a faulty load cell.



The next step will require a multimeter. With the terminal block disconnected from the XPV7 use a multimeter to measure the resistance of the loadcell.

First measure the resistance between the RED and BLACK wires, this should be approximately 350 ohms.

Next measure between the GREEN and WHITE wires, this should also be 350 ohms.

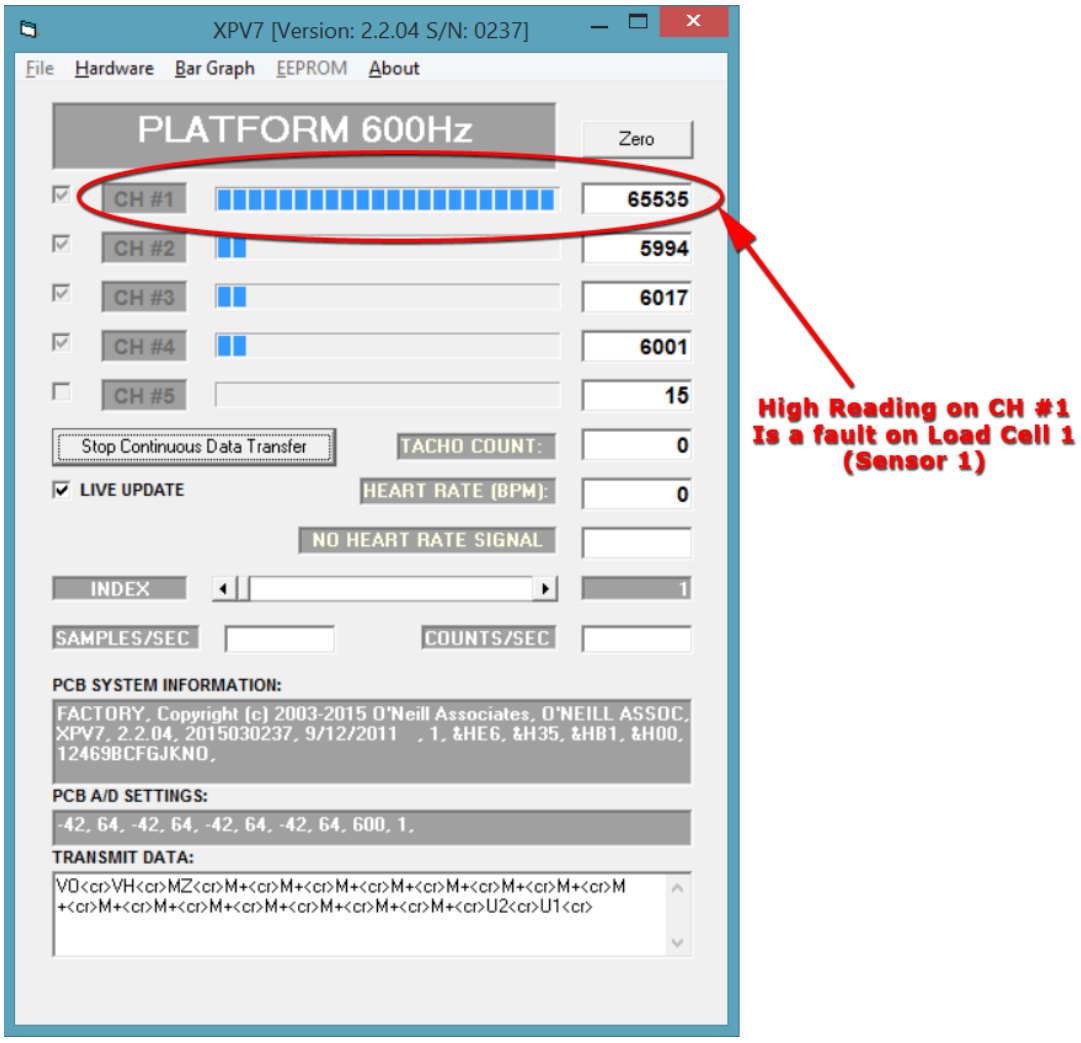
Result 1. If either measurement is significantly higher than 350 ohms then either a wire in the cable is broken the wiring in the loadcell is damaged.

Result 2. If the resistance values are close to the normal values then the loadcell has had a dramatic mechanical overload.

At this point contact Fitness Technology and inform us of your issue and we can take you through the process for repair.

So you have run the XPV7 Diagnostic Software and one of the channels is reading high.

If the XPV7 diagnostic software is reading high (see image below) you will need to follow the process laid out from page 12 to page 15. Starting at the title 'If the XPV7 diagnostic software is still showing no reading after loosening the foot'. In this case you will be looking for the high reading channel.



Testing a Faulty Load Cell

1. If the values a to f below are the value stated, or 1-3 ohms higher allowing for lead wire resistance then the load cell is electrically okay.
2. If test a or b gives an open circuit reading, then there is a broken wire. Performing tests c to f then allows you isolate the broken wire this test is useful if only one wire is broken.
3. If any of the readings are a few 10s to 100s of ohms higher than the values below, then the load cell is likely to have been mechanically overloaded.

a. Test between RED and BLACK, should be close to 350ohms.
b. Test between GREEN and WHITE, should be close to 350ohms.
c. Test between RED and GREEN, should be close to 262ohms.
d. Test between BLACK and GREEN, should be close to 262ohms.
e. Test between RED and WHITE, should be close to 262ohms.
f. Test between BLACK and WHITE, should be close to 262ohms.

Care and Maintenance of Force Plate
PRECAUTIONS

Before the Force Platform is used for any purpose, checks must be carried out to ensure the safety of the individuals using the Platform. Appropriate footwear must always be worn when using the Platform.

All operators must ensure themselves that the Platform is suitable and safe for the application or testing purpose, by carrying out a series of tests prior to using the system.

The Testing Officer or Force Plate Operator acknowledges the decision to use the Force Plate and it's suitability for the purpose rests solely with their deliberate decision to use the device.

Warranty.

The Company warrants that the products are thoroughly examined before shipment and agrees to make good any part that is proved to be defective due to faulty workmanship. Defects or failures in equipment which, under proper use, appear therein and arise solely from faulty materials or workmanship will be remedied by us free of charge provided the equipment is returned to our Workshop within a period of twelve (12) months from date of delivery, freight paid both ways. In the case of warranty service to equipment "on site" or at the purchaser's premises, all traveling and accommodation costs shall be to the purchaser's account. Damage to product including broken or damaged cabling caused by maliciousness, negligence or through changes to electrical configuration of equipment or voltage in excess of rating is specifically excluded from this warranty (the Proof to the contrary being the onus of the purchaser). Where this occurs then such warranty real or implied offered by The Company, shall immediately come to an end, The Company extends such warranties as are offered by the original manufacturer of material. Liability

under this warranty applies only to repair or replacement (at the discretion of the Company) of the original goods supplied. The Company will not be liable for any damages or delay (general or consequential) whether directly or indirectly caused by the said defect, and shall not be responsible for any work done, or alterations, or addition, made to the products by any other party.

NO VERBAL ARRANGEMENTS: If the purchaser accepts this quotation it is acknowledged that any variations to the terms and conditions herein defined must be given in writing by Fitness Technology and that no reliance will be placed upon oral representation.

APPLICABLE LAW: Shall be the Law of the State of South Australia, and no variations to these conditions can be agreed to unless such agreement is in writing and signed by The Company.

Frequently Asked Questions

Q. How do you calculate your variables?

A. We use standard biomechanical analysis to derive the additional data sets and summary parameters.

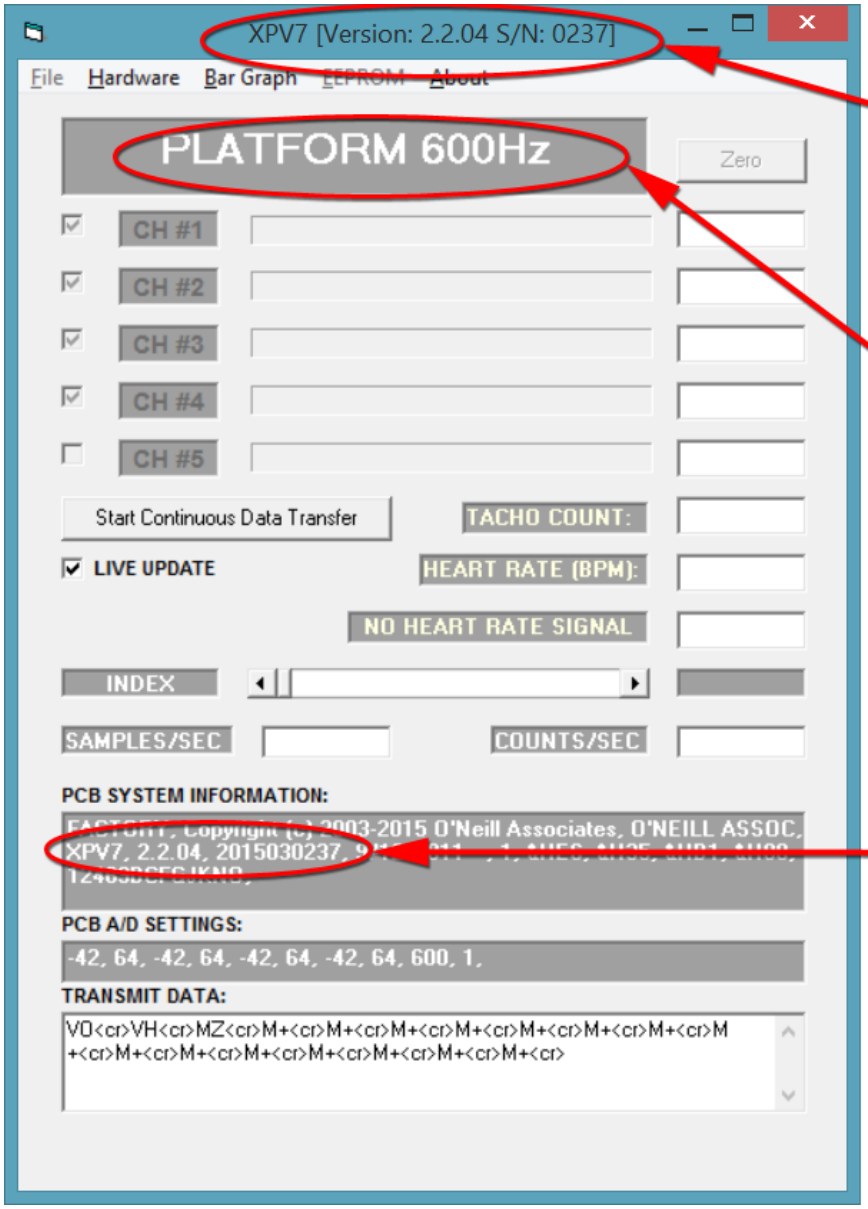
1. Vertical ground reaction force measured directly using the force plate
2. Force data is then integrated over time to derive the velocity time data set.
3. Velocity data is then integrated over time to derive the displacement time data set.
4. Power is calculated as instantaneous velocity multiplied by instantaneous force that each time point.
5. Maximum and minimum as well as average summary variables are being calculated for each data set.
6. Additional summary variables such as impulse over defined time periods, time to various peaks, rate of force development and time periods of various phases are calculated using standard biomechanical methods.

Q. what is the sampling period for maxRFD in the BMS software?

A. maxRFD is calculated as the greatest increase in force over a 30ms time epoch for the selected section of the data – that is the period of data displayed in the graph.

Q. What is the sampling frequency of the BMS software?

A. The sample frequency of the BMS software is dependant on what version of 400S force plate XPV7 interface is. You can determine your XPV7 interface sample frequency by running the XPV7 diagnostic software and looking at the equipment type highlighted in the image below. The XPV7 diagnostic software can be downloaded here.



Version number and last 4 digits of serial number

Equipment Type

Version number and full serial number