



# Topcat Metrology Ltd



"Looking behind the measurement"

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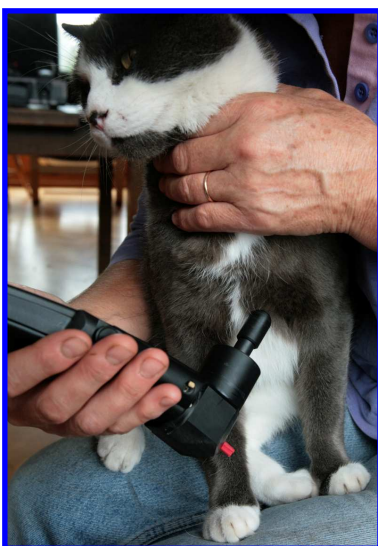
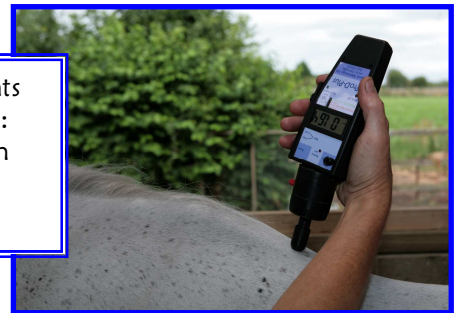
## User Manual for the Prod range of algometers 19/02/2014

The Prod (pressure rate onset device) range of algometers for mechanical threshold testing allow accurate and appropriate measurement in both research and clinical environments. There are no buttons to press: just touch the probe against the subject and the lights guide you to increase the pressure at a controlled rate. At threshold, simply withdraw the instrument; the peak reading is stored and displayed in Newtons.

There are 3 instruments in the range: the entry level Prod, ProdPlus with interchangeable actuators and ProdPro which may also be used with our range of limb-mounted actuators, making it an extremely versatile research tool. ProdPro may also plug into our Standard Interface Module and notebook computer, running Topcat's application and database software, with exportable files to Excel.



**Pressure rate onset:** As soon as tissue pressure is detected, the guide lights activate, teaching you to increase the pressure at a constant, preset rate: press too hard and the red light comes on; press too little and the green light comes on. This ensures repeatable application of the force-an important point for publication.



Prod is supplied with the following:

- A 2mm diameter flat ended probe

ProdPlus also includes:

- Replaceable actuator mount (to interface with the 90° angled head)
- 1, 2, 4 and 8mm diameter probes
- An extension piece for palpating soft tissue
- Rechargeable batteries, charger and battery indicator
- Flight case

ProdPro includes, in addition:

- 2 force rise-rate ranges
- 3 force ranges (for our LA and SA actuator kits)
- Interface adaptor for our actuator kits

Accessories:

- a second, 90° angled head for upward palpation on a recumbent or sedated subject (ProdPlus or ProdPro)
- Computer interface socket (ProdPro)
- Limb mounted actuator kits (ProdPro) for LA, SA, cats and chickens
- Extension pole for the axial actuator (usually for cattle)

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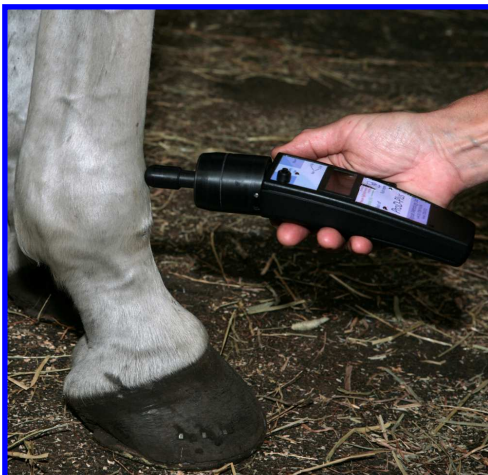
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## To set up a Prod:

1. The rechargeable batteries are supplied discharged. Plug them into the charger and leave on until the red light goes out (approx 8 hours). Disposable 9V PP3 batteries may also be used but do not attempt to recharge them.
2. Insert a battery into the battery compartment and clip the lid on.
3. Screw one of the tips onto the end of the actuator, finger tight only, while gripping the protruding end of the piston with the other hand to prevent it from twisting. Do not tighten so far that you twist the rubber diaphragm.
4. Insert the red (or white) pressure cap into the hole in the side of the actuator. (It is supplied separately for shipment. If it is already in place, then remove and replace it to vent any pressure).
5. Switch on (top switch on the right hand side).
6. Depress the reset switch and wait 2 seconds. The display should read zero ( $\pm 0.2\text{N}$ ).
7. Select the ramp rate (if fitted) using the smaller switch on the right hand side. Forward (towards the power switch) is the higher rate and backwards is the lower. For an axial or LA actuator, the rates are 4 N/sec and 2N/sec. For a SA actuator, the rates are 2N/sec and 1N/sec. Note that the test is still valid even if you don't set the rate switch or use the guide lights. You just won't know the rate of increase of force.
8. Turn the display knob on the right hand side (if fitted) to select either Prod actuator force (in Newtons) or one of the two limb mounted actuator ranges (SA or LA). See the last page of this manual for set up of a limb mounted actuator.



## To use Prod:

1. Press Reset
2. Push gently against the site. After about a second, the green light labelled "push more" will glow.
3. Push harder to increase the force. When you are increasing the force at exactly the rate selected on the switch, the green light will go out. If you push too hard, the red light will glow. Your aim is to increase the force without either of the rate lights glowing.
4. At the response, withdraw the Prod rapidly. The peak reading will now be held on the display until the reset button is pressed before the next test.
5. Prod is calibrated to 25N (20N with an SA actuator). Beyond this, the readings may fall outside the accuracy limit ( $\pm 0.5\text{N}$ ).
6. Remember this accuracy limit when writing down readings; 0.1N is not that relevant, especially with a behavioural measurement on an animal!

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ProdPlus and ProdPro may also be used with an angled actuator for recumbent subjects.

To change the actuator:

1. Remove the red pressure cap from the side of the axial actuator.
2. Twist the actuator until the bayonet pins are disengaged.
3. Pull the actuator free, twisting it back and forth slightly to help the sealing rings to slide and slide it into the storage ring (to protect the spring and pin).
4. Replace the red pressure cap in the axial actuator.
5. Remove the pressure cap from the angled actuator.
6. Apply a small amount of petroleum jelly to the two sealing rings on the bayonet fitting.
7. Slide the actuator onto the bayonet fitting, and then twist to lock it against the pins.
8. Replace the pressure cap.
9. Press Rest, wait 2 seconds and check that the display reads zero ( $\pm 0.2\text{N}$ ).
10. **Note:** When replacing the axial actuator, make sure that the guide rod is in the middle of the spring. If not, twist the spring gently to release the coils. Then engage the guide rod with the brass tube and push the actuator home.



## Troubleshooting:

- |  |   |
|--|---|
| <ol style="list-style-type: none"><li>1. <i>The peak reading is not held:</i></li><li>2. <i>The Prod does not read zero before a test:</i></li><li>3. <i>The rate lights glow as soon as the Prod is switched on</i></li><li>4. <i>The display is faint and the Prod will not work:</i></li><li>5. <i>The rate lights are difficult to follow at the start of the ramp:</i></li><li>6. <i>The readings are too high or low to give headroom for treatment:</i></li></ol> | <p>Withdraw the Prod more quickly from the subject.<br/>Remove and replace the red cap (to vent the pressure).<br/>Remove and replace the red cap.<br/>Change the battery.<br/>Remember to reset before a test<br/>Consider a different tip size.</p> |
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ProdPro is also supplied with an actuator adaptor. This may be fitted in place of the axial actuator and allows connection to Topcat's range of limb mounted actuators. With a syringe connected to the other port on the actuator adaptor, the Prod may then be used as a bench-top mechanical threshold testing system with an automatic peak hold.



## Technical Specification

- Force range: 1-25N, axial and LA actuators
- Force range: 1-20N, SA actuator
- Zero Range:  $\pm 0.2$ N
- Accuracy:  $\pm 0.5$ N (ProdPlus and ProdPro)
- Accuracy:  $\pm 1$ N (Prod)
- Rate of force rise: 2N/sec or 4N/sec
- Power: 9V PP3 battery
- Battery life: 10 hours, with 25 tests.
- Dimensions: 23cm by 7cm by 4cm (nominal)
- Weight: 260g

## Packing List

1. Prod with axial actuator
2. Docking ring for actuator storage
3. 1mm, 2mm, 4mm and 8mm tips
4. 25mm extension piece
5. 2 red pressure caps
6. 2 PP3 200 mAh NiMH rechargeable batteries
7. Battery charger
8. Spare sealing rings for the actuator
9. Spare grip ring for the display knob
10. Actuator adaptor
11. Limb mounted actuator kit, if supplied (detailed on next page)
12. Manual
13. Quick guide
14. Flight Case

## CONFORMANCE

1. This equipment is not CE marked. Under the guidelines of the low voltage directive(73/23/EEC) it is exempt because it falls below the lower voltage threshold. The bought in, external battery charger is CE marked.
2. This equipment has been tested and found to comply by the method contained within EN55022(B)@3m for Radiated Emissions, battery-operated equipment, light industrial use.
3. This equipment has been tested and found to comply by the method contained within IEC 61000-4-3 for RF\_Immunity, battery-operated equipment, light industrial use.

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## Packing list, limb mounted actuator set

1. 1 off limb mounted actuator with 2mm diameter pin
2. 1 off dummy actuator (for use on the contra-lateral limb)
3. 2 off actuator boots
4. 2 off straps and buckles (straps only for a cat)
5. 1 off manometer line with donut fitting for connection of the actuator to ProdPro (Luer connection replaces donut for a cat)
6. 1 off larger diameter manometer line for connection of the syringe
7. Selection of spare tubing and connectors
8. Coil of protective sleeving (cat actuator only)
9. 20ml syringe



## Protective sleeving, cat actuator set

The cat actuator set is supplied with a reel of plastic spiral sleeving. This may be used, if needed, to prevent cats from chewing the tube during a test. To use, cut to length and wind round the tube, leaving 2-3cm at the actuator end to allow the tube to flex freely.

## To use ProdPro with the limb-mounted actuator

1. Attach the actuator to the subject's leg with the boot.
2. Attach the strap and buckle (just a strap for a cat actuator) and adjust so that there is no slack in the strap. If the strap is too tight, the subject will be uncomfortable (and will probably show it). If the strap is too slack, then the actuator will move away from the leg and may run out of stroke before threshold is reached.
3. Attach the dummy actuator to the opposite leg.
4. Connect the actuator to ProdPro with the reinforced manometer line and donut fitting (or Luer connector for a cat actuator).
5. Plug one end of the short manometer line into the other port on the ProdPro actuator adaptor and place ProdPro where the rate lights can be seen.
6. Select the actuator force range and the rate.
7. Press "reset" and check that the display reads zero ( $\pm 0.5\text{N}$ )
8. Attach the 20 ml syringe to the other end of the manometer line and press to apply the force, using the rate lights as a guide.
9. At threshold, disconnect the syringe quickly from the manometer line. The actuator force will be removed immediately, and the threshold reading held on the display until reset is pressed.

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## Hints for testing with the limb-mounted actuator

1. Our experience indicates that, for some species, the pre-set force rise rates in ProdPro may be too high for testing with a limb mounted actuator. Increasing the force more slowly allows more time for the animal to react and may increase the repeatability of your data. Topcat suggest that researchers experiment by timing the ramp to determine the best ramp rate for their setup. For example, for sheep a rate of 0.25N/sec -0.5N/sec may be more appropriate whereas for cats, the Low pre-set rate for SA of 1N/sec is usually correct.
2. Some animals are quite sensitive to the tightness of the strap and will start to show regular leg lifts without a stimulus. Conversely, if the strap is too loose, the actuator piston may reach the end of its travel during the stimulus (as the actuator can then move away from the leg). Under this condition, the indicated force will continue to rise but the force will not be transmitted to the actuator pin.
3. With some species, the actuator will tend to rock from side to side, especially if the animal knocks it against the side of the pen or stall. This can result in the pin not pushing squarely against the tissue and can lead to very high thresholds, or no threshold at all. Check the placement before each test.
4. Some animals are also sensitive to the initial touch of the pin and may react at this point (although not every time). The latest Topcat LA actuators do not retract strongly and, after the first test, the pin should always be lightly in contact with the tissue. For SA, be prepared to ignore a very low response (less than 2N) and to continue the ramp.
5. On older actuators where the pin rests naturally in the retracted position, a preload of around 1N may be applied to bring it into contact, about 1 minute before the test, using a second syringe connected in parallel with the first and isolated by a three-way tap. Inflate the second syringe until the ProdPro display reads 1N and then turn the tap to maintain this pressure. Then operate the first syringe as usual to apply the stimulus. Note that, when a preload has been applied, the rate lights will not work and that battery drain will be much higher.

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