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Operation Manual

Portable Angle Monitor (PAM)

To be used with the Portable Limb Load Monitor

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Portable Angle Monitor (PAM)

The Portable Angle Monitor (PAM) is designed to only be used with the Control Unit for the Portable Limb Load Monitor (PLLM). For further information on the PLLM visit our website: ncountersonline.com

If you have ordered the PAM Unit you should have the following:

Operation Manual; version: nCounters September 2019
Portable Angle Monitor (PAM) Unit
4 x elastic Velcro straps to secure PAM unit in position:
XSmall – 15cm, Small – 20cm, Medium – 30cm,
Large – 40cm

Specifications wireless PAM unit

General

Rated power source	3.7 V DC
Format	Lithium Polymer
Max current consumption	68 mA
Dimensions (L x W x H)	81 x 55 x 23 mm
Weight	54g

Cleaning

All surfaces of the system should be cleaned with wet wipe between each use

Indications and intended use

The Portable Angle Monitor (PAM) is an assist device that provides feedback on ankle joint range of movement by sending data wirelessly to the Portable Limb Load Monitor (PLLM) Control Unit. The Control Unit displays the live data and provides audio-visual feedback on joint flexion and extension.

The PAM is an assist device to augment gait rehabilitation and enhance gait retraining. It may assist orthopaedic surgical patients to exercise their ankle joints following surgery. The PAM may aid in recovery from the following pathologies/injuries; acquired brain injury, cerebrovascular accident (stroke), as well as conditions which affect the Central Nervous System

Theory of operation

The PAM will provide feedback on ankle joint range of movement.

Feedback is designed to encourage joint range of movement by at least 1 degree each time

Position the ankle at the angle of desired feedback – this is the Target Level. This level can be adjusted up and down via the Control Unit. The range of movement has to be greater than 1 degree to increase the count and receive audio visual feedback via the Control Unit. The Repetition (Rep) Counter records each time the user receives feedback and the number of repetitions is shown on the screen.

Warranty

- This device comes with 12 month warranty on parts from date of purchase.
- Wherever possible a replacement unit will be provided while yours is being repaired.
- **Free** firmware and software upgrades are available for the first 12 months of purchase

User instructions

Battery charging

The PAM unit comes pre-installed with a lithium polymer battery that does not need replacing.

The battery is charged via a USB connection to a PC and whilst charging a red LED will appear.

Once your battery has finished charging the red LED light will disappear.

If you have finished the session and the Low Battery LED is lit, then recharge your device before the next use.

If for any reason you need to replace your battery, contact nCounters, so as we can provide you with the correct battery for the charger circuit.

The Portable Angle Monitor (PAM) Unit

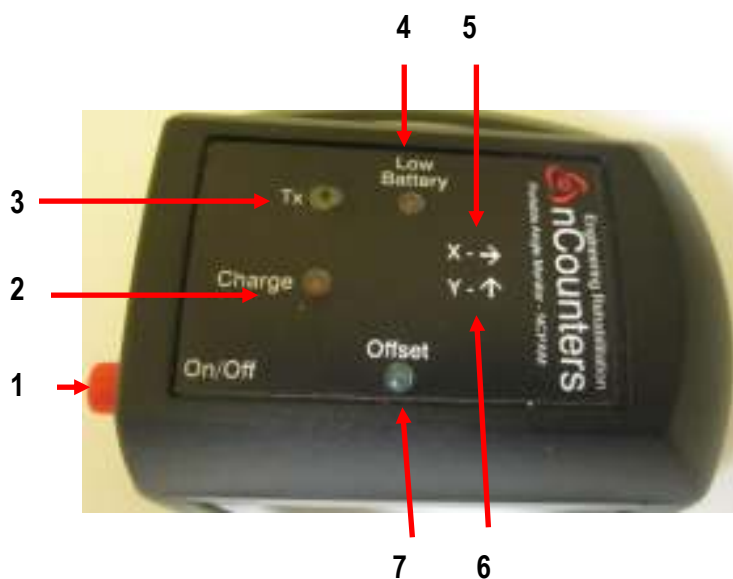


Figure 1 – Portable Angle Monitor – upper surface view



Figure 2 – Portable Angle Monitor – end view.
Ensure On / Off switch **MUST** face away from user's ankle

- 1 **On / Off single press** switch
- 2 **Red light active** when **charging battery via USB port (8)**. When battery is fully charged, red light turns off
- 3 **Yellow light** active when device in Transmit mode (data is being transferred to Control Unit)
- 4 Red LED lit when PAM Unit battery low – battery needs to be charged via USB port (8)
- 5 **X Axis for feedback on flexion / extension of joint**
- 6 **Y Axis** for feedback on inversion / eversion – **CURRENTLY INACTIVE**
- 7 Offset – blue LED briefly lit when device is turned on
- 8 **USB port**. USB cable required to charge device.

Portable Angle Monitor placement for ankle joint monitoring

To get the best results from your PAM, place the sensor over the forefoot of the user's shoe / runner. Choose the appropriate size nCounters' elastic strap with Velcro, to attach each side of the PAM enclosure securely in position as shown in Figure 3.

Four elastic straps with Velcro are provided: Small - 30cm, Medium – 35cm Large – 40cm, XLarge – 55cm



Figure 3
Portable Angle Monitor – in position with the On / Off switch facing away from user's ankle

Use an nCounters' elastic strap with Velcro to secure the PAM unit to user's forefoot as shown in Figure 3

ENSURE THAT RED ON / OFF SWITCH IS FACING AWAY FROM USER'S ANKLE

NB When the PAM is attached to the user's runner and the ankle is in a neutral position, the Control Unit will display the Current Level as a negative value. This reflects the offset for the PAM.

Using the PAM with the PLLM Control Unit.

- 1 After securing the PAM in position use a single press of the on-off button to turn your unit on. An active Tx yellow light will indicate the device is in Transmit mode.
- 2 If yellow Tx light is active – turn on PLLM Control Unit - **Welcome Screen** appears.
- 3 **Start Screen appears** if there is communication between the PAM unit and the PLLM Control Unit.
- 4 **Position ankle for feedback and press Start**
OR Select **Options** to choose
 - **Flexion (Dorsi Flexion)**
 - **Extension (Plantar Flexion)****Make selection then press OK. Return to Start Screen and press Start**
- 5 After pressing **START** – angle is captured and recorded on Control Unit screen as Target Level (Target Lvl). The Target Level can be altered using the live screen “+” or “-“ buttons. Current Level (Lvl) represents joint angle. The Rep Counter records each time the user receives feedback. User must move ankle at least 1 degree to increase rep counter and get feedback.
- 6 **Feedback designed to encourage ankle range of movement by at least 1 degree each time.**
- 7 Analysis screen with graphs, repetitions and time. Screen displays number of seconds each feedback LED has been on. **XX REPS** number of times user received feedback. **T MINS** Total Session Time. Press **OK** and Goodbye screen appears and the Control Unit turns off by itself

For other information about this and other screens please consult our manual for the PLLM Control Unit.

PLLM MODE OF OPERATIONS SCREENS WHEN USING THE PORTABLE ANGLE MONITOR (PAM)

WELCOME SCREEN



Turn on PAM / turn on PLLM Control Unit. Welcome screen displayed if there is communication between PAM unit and PLLM Control Unit

CHOICE SCREEN



Choose Angle for feedback then press OK

START SCREEN



START SCREEN

Set target angle and then press **Start** or select **Options**

Select **Options** to choose

- Flexion (Dorsiflexion)
- Extension (Plantar Flexion)

Make selection then press **OK**. Return to Start Screen and press **Start**

OPTIONS SCREEN



LIVE DATA SCREEN



Displays Target Level (Target Lvl). Current Level (Lvl) represents joint angle. Rep Counter records each time user receives feedback.

PLLM Control Unit hard turn off – press ON / OFF button for at least 2 seconds and machine turns off – NO Visual Feedback Screen or Goodbye screen

VISUAL FEEDBACK SCREEN



Press **OK** - Goodbye screen appears and Control Unit turns off by itself. The PAM unit must be manually turned off.

GOODBYE SCREEN



Goodbye screen displays Total Time PLLM has been used since manufacture in minutes.

Flexion (Dorsiflexion)

Hold the foot to the desired angle for feedback. Press **START** – angle is captured and recorded on Control Unit screen as Target Level (Target Lvl). See Live Data Screen

The Target Level can be altered using the live screen “+” or “-“buttons

For feedback the user must extend ankle / foot at least 1 degree below the target to receive feedback.

1 degree is needed so that the Control Unit registers when the ankle joint returns to the threshold angle.



Figure 4

Ankle joint at angle for desired feedback - press **START**



Figure 5

Extend ankle by 1 degree,
then flex ankle to target level for feedback

Extension (Plantar Flexion)

Hold the foot to the desired angle for feedback. Press **START** – angle is captured and recorded on Control Unit screen as Target Level (Target Lvl).



Figure 6

Ankle joint at angle for desired feedback - press **START**



Figure 7

Flex ankle by 1 degree,
then extend ankle to target level for feedback

