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Operation Manual

Essential Angle Sensor Unit REV C

December 2017

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Control Unit Specifications

Rated power source	9v DC
Format	Battery
Max current consumption	39mA
Dimensions (L x W x H)	12.55cm x 7cm x 2.4cm 4.94 in x 2.75 in x 0.94 in
Weight (without battery)	116g

Before you start

- When storing or using this device, do not allow it to come into contact with liquids or intense heat. This may damage the unit and its accessories. Smoke and overheating could result from contact with liquids.
- This device is **not** single use and is for commercial use only.

Indications and Intended Use

Designed to give immediate audio and visual feedback on hip, knee and elbow joint movement, the Essential Angle Sensor can be used to facilitate functional training and improved joint control in various positions.

The angle sensor is portable, easy to set up, simple and efficient to use daily during rehabilitation.

Conditions assisted by the Essential Angle Sensor may include Acquired Brain Injury or rehabilitation post orthopaedic surgery.

Essential Angle Sensor Unit

Includes the following items:

Carry case with foam inserts
Operation Manual
Essential Angle Control Unit with belt clip
Essential Angle Sensor
Straps – 6 sizes
2 - XSMALL (XS) Pink 15 - 20cm (elbow / knee)
2 - SMALL (S) Green 22 - 30cm (elbow / knee)
2 - MEDIUM (M) Blue 40 - 55cm (knee / hip)
2 - LARGE (L) Purple 45 - 75cm (knee / hip)
2 - XLARGE (XL) Silver 55 - 95cm (knee / hip)
2 - XXLARGE (XXL) Gold 75 – 100cm (hip)
Headphone (Mono)

Warranty

- This unit comes with a 12month warranty on parts from date of purchase.
- Wherever possible a replacement unit will be provided while your unit is being repaired

Returns / Repairs Policy

All items for return or repair must have a return number given by nCounters attached to it.

They should be sent to:

nCounters
PO BOX 2336
KEW VICTORIA 3101
AUSTRALIA

Care of the Control Unit

Installing the battery

- Remove the back panel of the enclosure and insert the battery with the plus (+) and minus (-) poles pointing in the designated direction.
- Use one 9 Volt (PP3) battery. A rechargeable 9V battery may be used.**
- Remove the battery if the control unit will not be used for a month or longer.
- If the battery is incorrectly replaced, the control unit will not function.
- In the event of battery leakage, wipe the control unit completely clean and install a new battery.

Cleaning

- All surfaces of this system are non-porous and should be cleaned between each client, using a disinfectant wipe

Operating the control unit

What's what?

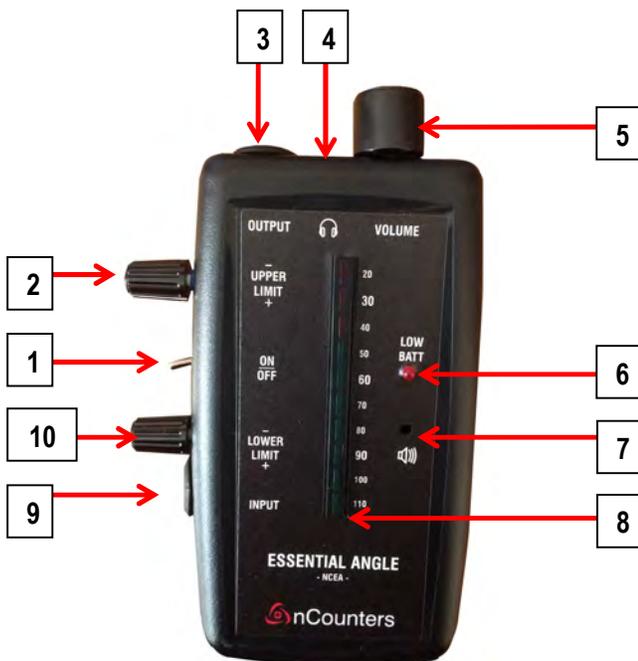


Figure 1
Control Unit Front Panel

NB THERE IS NO AUDIO FEEDBACK WHEN CLIENT IS IN THE TARGET RANGE

- ON / OFF switch**
- UPPER LIMIT**
Dial to be used by therapist to establish upper limit of target range
- OUTPUT for DataQ Unit**
Socket for plug of red cable to transfer data from control unit to DataQ Unit (Figure 2)
See Accessories for DataQ

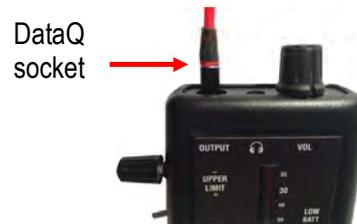


Figure 2
DataQ Output Socket

- Headphone Socket (Mono)**
 - Volume Control**
For either speaker or headphone
NB Audio feedback by either speaker or headphone
 - Low Battery LED**
Battery needs to be **immediately** replaced or recharged when LED comes "on"
 - Speaker**
 - 10 LED BAR DISPLAY**
Real time visual feedback is provided by a 10 coloured LED display.
- 

3 RED LED bars represent LOWER values

7 GREEN LED bars represent HIGHER values
- INPUT socket**
For Angle Sensor plug
 - LOWER LIMIT**
Dial to be used by therapist to establish lower limit of target range

Using Control Unit and Angle Sensor

Position Essential Angle Sensor on client

The angle sensor can be placed over the joint being trained and aligned with standard bony prominences. The metal stays (*Figure 3*) are placed either side of the joint and secured in position by using coloured straps (*Figure 4*). The size Guide for Angle Sensor Straps is on the back page. The angle sensor is connected by a cable to a simple control unit.



Figure 3



Figure 4

Feedback

Feedback on the joint range wanting to be achieved or worked within is set easily by the therapist.

By turning the dials at the side of control unit the upper and lower limit values are established. When the client's joint angle is between these values, the client will hear no sound. If the joint angle is outside these two limits, then the client will receive audio feedback via the speaker or headphone. The sound changes and increases in pitch the further away the client is from the target range.

Knee Joint Angle Feedback

The angle sensor can be placed over the **knee joint** as shown below in *Figure 5* and *Figure 6*



Figure 5

- **For LEFT KNEE angle feedback**
Position this sensor over the lateral side of the knee joint and place the stay with the white line along the calf as shown in *Figure 5*
Ensure the stay marked LEFT THIGH is on the left thigh
- **For RIGHT KNEE angle feedback**
Position this sensor over the lateral side of the knee joint and place the stay with the white line on thigh.
Ensure the stay marked RIGHT THIGH is on the right thigh



Figure 6

Hip Joint Angle Feedback

The Angle Sensor can be placed over the **hip joint** as shown below in *Figure 7* and *Figure 8*



Figure 7



Figure 8

- **For LEFT HIP angle feedback**
Position this sensor over the lateral side of the hip joint and place the stay with the white line along the trunk as shown in *Figure 8*
Ensure the stay marked LEFT THIGH is on the left thigh
- **For RIGHT HIP angle feedback**
Position this sensor over the lateral side of the hip joint and place the stay with the white line on thigh.
Ensure the stay marked RIGHT THIGH is on the right thigh

Hip Joint Angle Feedback

The Angle Sensor can be placed over the **elbow joint** as shown below in *Figure 9*



Figure 9

Before turning on the control unit

Insert angle sensor plug into the input socket



Figure 10

Once the angle sensor has been positioned on the client, insert angle sensor plug into the input socket as shown in *Figure 10*.

Turn on control unit using the side toggle switch. One of the green or red LEDs will come on.

Set volume by using the volume control dial (5) in a clockwise direction so the speaker can be heard or alternatively plug the headphone into socket (4) and adjust volume until it is comfortable for the client.

Set Target Range

Position sensor at angle where feedback is required.

The therapist needs to set the correct upper and lower limits. Make sure the two dials are in the following default positions:

- **Lower limit dial (10)** fully anti-clockwise (minimum position)
- **Upper limit dial (2)** fully clockwise (maximum position)

Firstly, establish lower limit. So, turn this dial (10) clockwise until you hear a sound from the speaker / headphone.

Now establish upper limit by turning this dial (2) anticlockwise, until you hear a sound from the speaker.

In summary, when the client's joint angle is between the lower and upper limit values, the client will hear no sound. If the joint angle is outside these two limits, then the client will receive feedback.

The sound changes and increases in pitch the further away the client gets from the target range.

Before using the headphones turn the volume control back to minimum then slowly increase until the sound is comfortable for the client.

Belt Clip

Attach Control Unit to client using belt clip shown in *Figure 11*



Figure 11

Examples of how the Angle Sensor can be used are as follows:

Scenario one:

Feedback on knee hyper-extension

Feedback on knee hyper-extension is a common problem encountered post acquired brain injury.

Set the lower limit so the sound comes on just before patient reaches full hyperextension. Set the upper limit dial fully clockwise.

Scenario two:

Feedback on knee flexion reaching 60°

Set lower limit dial fully anti clockwise i.e. minimum position. Set upper limit dial so sound comes on at 60°. The numbers on the front are an approximate guide to the angle.

Accessories: DataQ Unit

DataQ Unit with software has been pre-configured to accept, record and save data from the Essential Angle Sensor Unit.

What's what?



Figure 12

11. INPUT Socket

Socket for plug of red cable to connect Essential Angle Sensor Unit to DataQ Unit for transfer of data

12. OUTPUT of data to computer

USB cable (fixed) for transfer of data to from DataQ Unit to PC.

Video of DataQ data acquisition, playback and exporting to Excel is available on the nCounters website

SIZE GUIDE FOR ANGLE SENSOR STRAPS



XSMALL (XS) 15 - 20cm (elbow / knee)



SMALL (S) 22 - 30cm (elbow / knee)



MEDIUM (M) 40 - 55cm (knee / hip)



LARGE (L) 45 - 75cm (knee / hip)



XLARGE (XL) 55 - 95cm (knee / hip)



XXLARGE (XXL) 75 - 120cm (hip)