

USER MANUAL

i-Click

For Muscle Twitch Detection



Infrared Switch

- ♦ Easy Positioning
- ♦ Auto Trimming
- ♦ Acoustic feedback



I-Click Manual Contents

1 Introduction

- 1.1 What is a I-Click switch
- 1.2 I-Click vs a regular mechanical switch
- 1.3 Outputs
 - 1.3.1 USB outputs
 - 1.3.2 Relay output & toggling
 - 1.3.3 Audio / Bleep feedback
- 1.4 Auto Positioning Feature
- 1.5 Powering the I-Click
- 1.6 Freeze state / Setup State

2 Hardware

3 Configuring

- 3.1 Printing the Current Configuration
- 3.2 Output style (Red options)
- 3.3 Detection Direction (Green options)
- 3.4 Beep style (Blue options)
- 3.5 Miscellaneous (Yellow options)

4 Operation

- 4.1.1 Setting Up the IR Sensor
- 4.1.2 Setting the Sensor Distance
- 4.1.3 Setting the Sensitivity
- 4.2.1 Using the I-Click: Initial Freeze / Setup State
- 4.2.2 Using the I-Click: Run
- 4.3 Long Clicking

5 IR Sensor Mounting

- 5.1 Mounting the IR Sensor
- 5.2 Fundamentals
- 5.3 Choosing: Towards or Away detection?
- 5.4 Aiming the IR Sensor
- 5.5 Mounting Hardware
 - 5.5.1 KIT1 Mount from Own Spectacles
 - 5.5.2 KIT2 Mount from lens-less frame supplied
 - 5.5.3 Example mounting from Spectacles (Kits 1 & 2)
 - 5.5.4 KIT3 Mount from back of hand typically for finger movements
 - 5.5.5 KIT4 Mount from Headband—an alternative to KITS 1 & 2
 - 5.5.6 KIT5 Camera mount adaptor
 - 5.5.7 KIT10 Assessment Selection
 - 5.5.8 Ordering spare IMR mounting rods

More...

6 Specification & Support

- 6.1 Dimensions
- 6.2 Support
- 6.3 Specifications
 - 6.3.1 How Does it Work
- 6.4 Legal & Conformity
- 6.5 Warranty
- 6.6 Cleaning & Disposal

The Warnings !

Your I-Click is designed for PC / Tablet / phone control only, and should not be used for a life safety application such as controlling a wheelchair or machinery.



Avoid leaving in direct sunlight

The I-Click uses small magnets within its construction and although no stronger than what would be found in headphones those users with pacemakers should be aware and take precautions and advice before using the device.



WARNING
CHOKING HAZARD
Small Parts

Not for children under 5 years Old.

Parts of the I-Click mounting system are very small & could be a choking hazard to small children.

1 Introduction

1.1 What is a I-Click switch

An I-Click is a special switch that uses light in the invisible infrared spectrum to detect the tiniest of movements from the human body typically twitches from facial muscles. **As the sensor is sensitive to infrared (IR) from the sun the I-Click is designed for use in shaded indoor areas only.**



Control Module

IR Sensor Module



Infrared light (IR) is transmitted from the sensor and bounces back from the users. The I-Click measures the level of IR reflected and can determine if the distance has changed with great accuracy.

The I-Click can be configured to detect movement towards OR away from the sensor to suit the users best movements.

1.2 I-Click vs a regular mechanical switch

Unlike a conventional switch that can be pressed and **held** a I-Click sends a 'click' ie a **momentary** transient on then off. Although, it is possible to configure an I-Click to toggle its relay on then off based on two click actions.

1.3 Outputs

1.3.1 USB

From the USB, and can be either one of three ascii keyboard characters or a mouse click and these are supported by most Pc/Mac/ tablets & phones

1.3.2 Relay & relay toggling

Relay output is the same as a mechanical switch. This is normally pulsed or it can be toggled On and Off, where On requires a click then another click turns the relay back to Off.

If the Relay is left on for longer than 1 minute it will auto clear to Off.

1.3.3 Audio / Bleep feedback

The I-Click has a small sounder (bleeper) incorporated which indicates when an output is occurring. This sound can be configured to suit the user including being muted. See section 3

1.4 Auto Positioning Feature

If a user accidentally changes position slightly whilst using a I-Click, the I-Click will try to self compensates and continue to operate. However if the movement is sufficient to affect normal operation an alarm will be triggered. See section 4.2

1.5 Powering the I-Click

The I-Click takes its power from the USB lead and this is required to be connected at all times even if a USB trigger signal is not used. An I-Click can alternatively be powered from a USB power source such as a USB mains adaptor or a USB Battery Power Pack such as often used to charge mobile phones.

Once powered the I-Click will enter its Setup State (see 1.8) and this is released by pressing the button once. See 3.5 (1) for direct power up

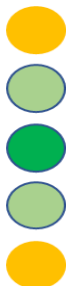
1.6 Freeze / Setup State

The Freeze/ Setup State allows the sensor to be accurately positioned at the optimum distance from the users skin. Whilst in the state all outputs are inhibited ie the I-click is said to be in a freeze state,

When the I-Click is first powered up the I-Click will be in this state. The centre three green leds being on, indicating the optimal distance for the device to be from the users skin.

If the I-Click is far too close or too far away the end leds will flash either red, for too close or purple, for too far away).

This state can be re-entered at any time by a single button press.



2 Hardware

The Control Module

Push Button

Freeze, Run & Configure

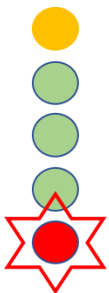
Sensitivity

Max = clockwise

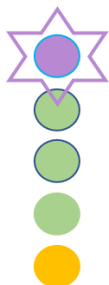
Bargraph

Shown after powering up the device & the pattern (bright green at centre) is indicating optimum distance has been achieved.

Alarms: see 4.2 for full details

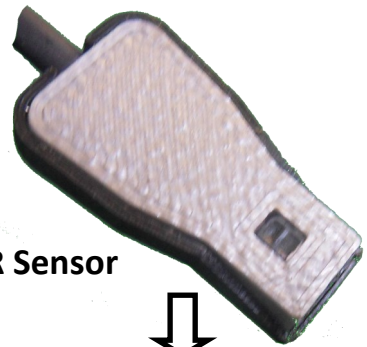


Red flashing
=
Sensor is too close

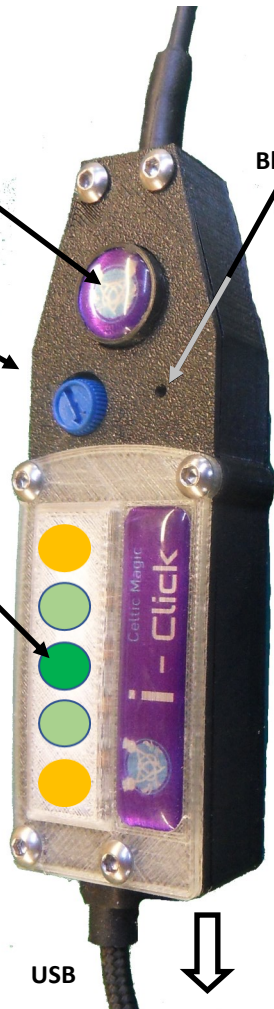


Purple flashing
=
Sensor is too far away

IR Sensor



Beeper



USB

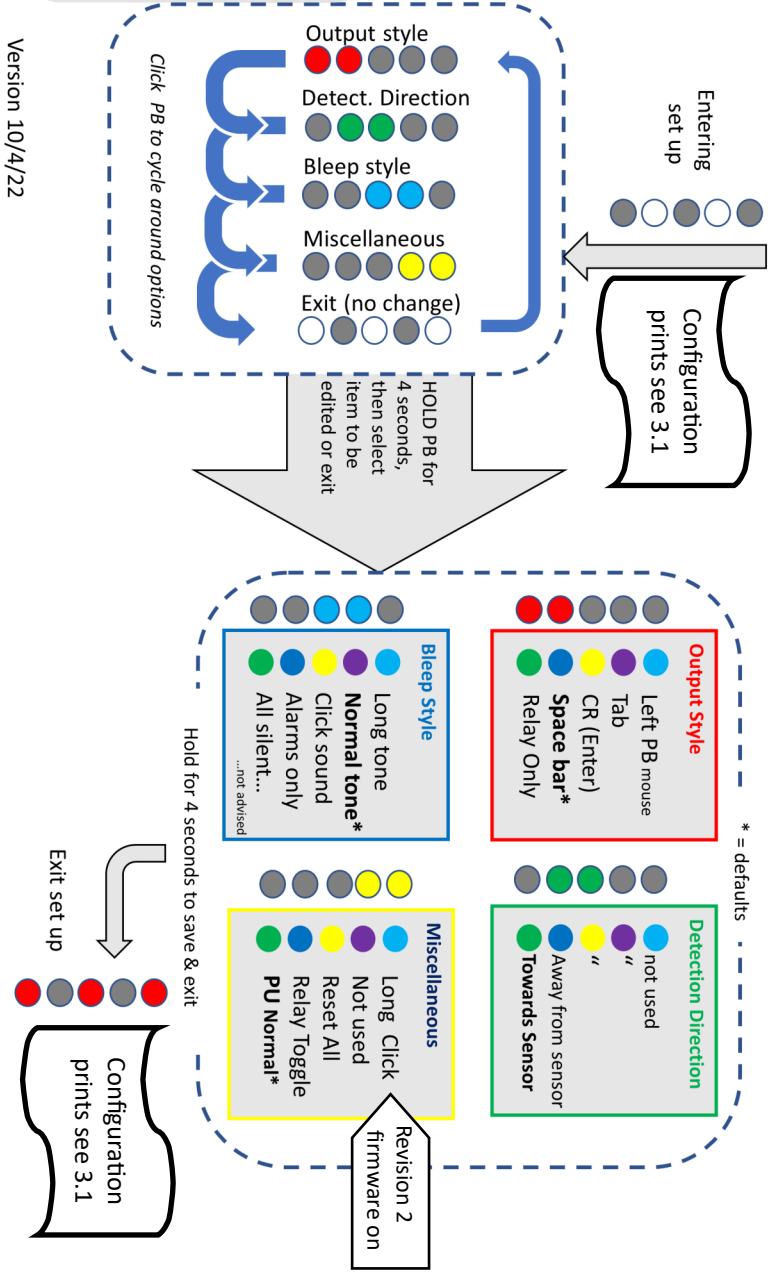
Relay Output

3.5mm jack socket

Configuring the I-Click

To enter Set Up mode... Insert the USB to a computer WHILST holding the G-Click push button.

3 Configuring

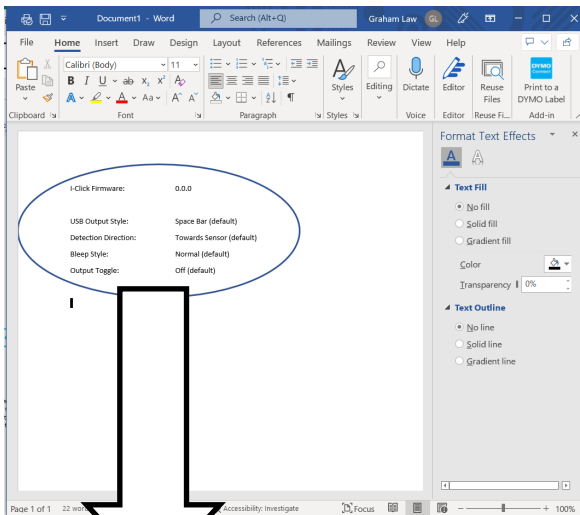


3.1 Printing the Current Configuration

On your PC start your favourite word processor such as MS Word or Notepad and make sure it is in focus (ie click on the page ready to type) .

When the I-Click is frozen in its seup state (see 1.6) press and hold the button until two red lids light (approx 6 seconds). The current configuration will then be typed into the open word processor document.

The configuration will also be typed when the I-Click enters and leaves the configuration utility.



I-Click Firmware: 02.00

USB Output Style: Space Bar (default)
Detection Direction: Towards Sensor (default)
Bleep Style: Normal (default)
Advanced Features:
.....1 Power up Normal (default)
.....2 Toggle Mode OFF (default)
.....3 reserved for Reset.....4 reserved 0
.....5 Long clicking OFF (default))

3.2 Output style (Red options)

This configures the USB communication to the host computer.

It can be a keyboard character or a left mouse click.

It can also be turned off if only the relay is required.

The relay will operate at all times and is not affected by the USB output selected.

3.3 Detection Direction (Green options)

The IR Sensor can detect either movement towards the sensor (default) or some applications such as detecting from a finger nail it is useful to do the opposite and trigger from movement away from the sensor

ie a finger moving down is more natural & would trigger yet the actual finger nail is moving away from the sensor.

3.4 Beep style (Blue options)

The sounder/ bleeper can be turned completely off (not recommended) or just allow the alarm beeps. It is also possible to change the duration of the beep for a valid click.

3.5 Miscellaneous (Yellow options)

This selects the behaviour of the relay output

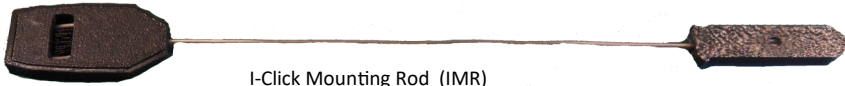
- 1 **Power up Normally** (default) rev 2 firmware
The I-Click will power up in its not active state where a button press is required to activate it. If this turned off the I-Click will power up into its active state
- 2 **Relay Toggles**
If Toggle is selected then the first click will turn the relay on and the white led at the top of the bargraph display will also stay lit. A second click will turn (toggle) the relay and led back to off.
- 3 Resets all settings back to factory defaults
- 4 Reserved
- 5 **Long Click On** rev 2 firmware
Allows for the relay output to be hold on for a longer click allowing for better access to some digital devices . See section 4.3 Long Clicking for more details

4 Operation

4.1.1 Setting Up the IR Sensor

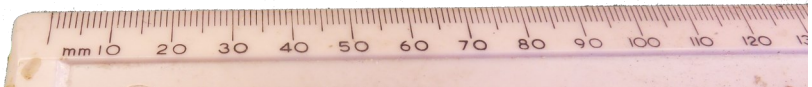
The sensor is typically set to 1-4mm from the skin and this mounting arrangement must be stable so that the distance remains relatively constant during use otherwise false triggers will occur.

The I-Click will attempt to compensate for small movements over time and will alarm by flashing all leds with a bleep if the distance is too large (purple) or too small (red) and manual intervention is then necessary to correct.



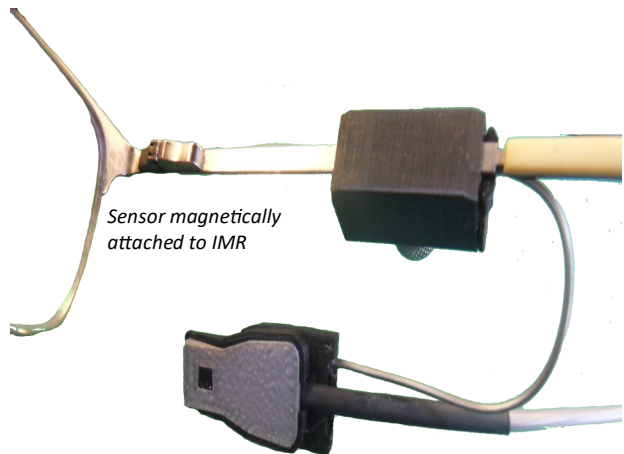
I-Click Mounting Rod (IMR)

*Magnetic
holder for
sensor*



The sensor is magnetically mounted via a bendable stainless steel rod called an I-Click Mounting Rod (IMR) which are available in different lengths.

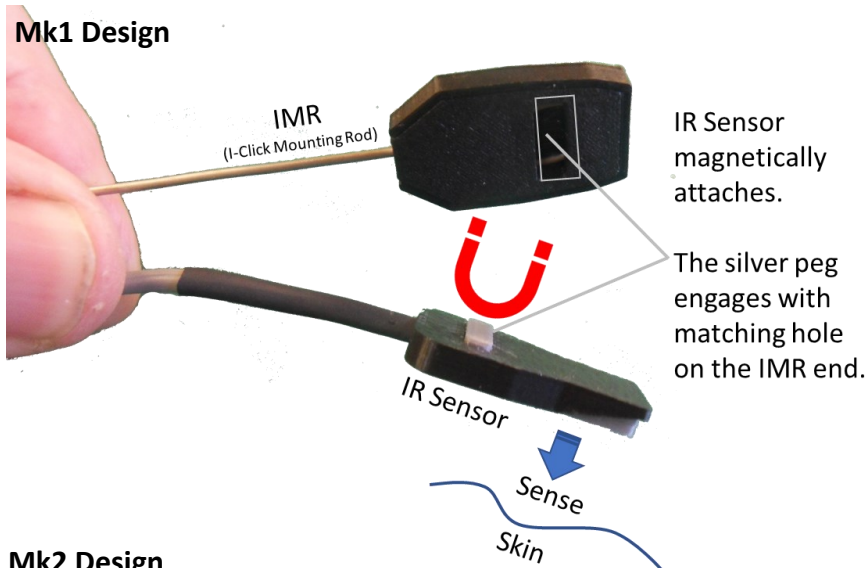
Typically if mounting from spectacles the IMR may be 100mm, the part number would then be IM-R100. The IMR parts are considered consumables and are low cost items.



4.1.2 Setting the Sensor Distance

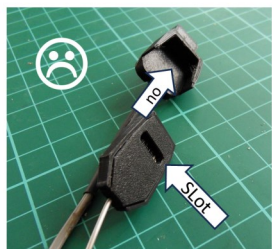
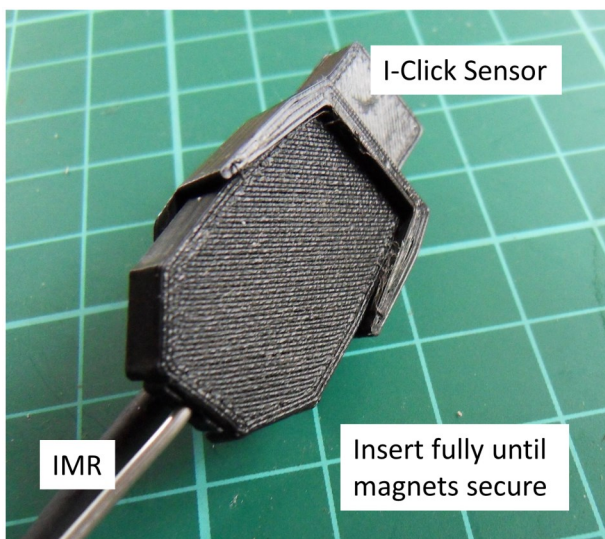
To set the optimum distance for from the chosen part of the body, first ensure that the IMR is secured by using the silver thumbscrew to clamp the IMR to, for example the arm of spectacles (*See previous page*), and attach the sensor magnetically as shown.

Mk1 Design

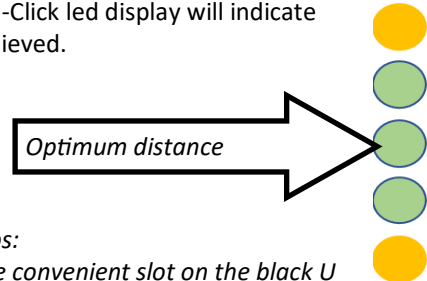


Mk2 Design

The Mk2 design uses an enclosure rather than the silver peg to improve the strength of the grip. Take care that the slot on the IMR faces the sensor otherwise the magnet grip will repel rather than attract.



Bend the IMR rod **without straining the plastic ends** to locate the sensor such as it is pointing **straight** at the area of skin with the best movement, at a distance of around 1-4mm. The I-Click led display will indicate when the optimum distance is achieved.



Tips:

The cable can be pushed into the convenient slot on the black U clamp ingprevent it from pulling the sensor from its magnetic mount.

With long IMR mounts it can be useful to wrap the cable once around the IMR wire.

The sensor can be configured to either detect movement towards or alternately away from itself. The direction being detected is indicated by the colour of the bargraph when in use.

Green:	Towards the sensor (default)
Blue:	Away from the sensor

See the Hardware section 2

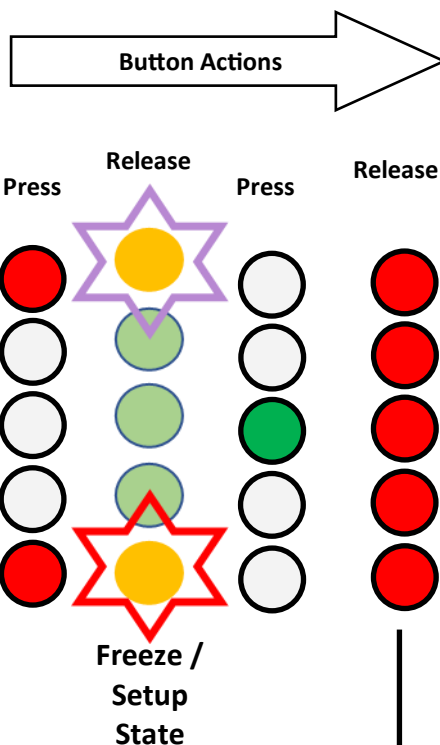
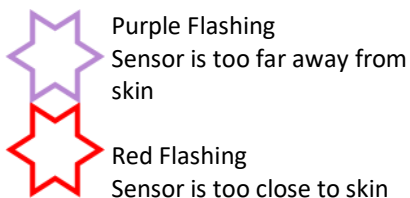
4.1.3 Setting the Sensitivity

The sensitivity knob should be carefully set. Start with minimal sensitivity (Knob fully anti clockwise) and increase the knob until the user reliably triggers the output. If the sensitivity is set too high then multiple clicks will occur

4.2.1 Using the I-Click: Initial Freeze / Setup State

Initial Freeze / Setup State

After powering up, the I-Click will hold (no outputs) awaiting a second button press to release and run



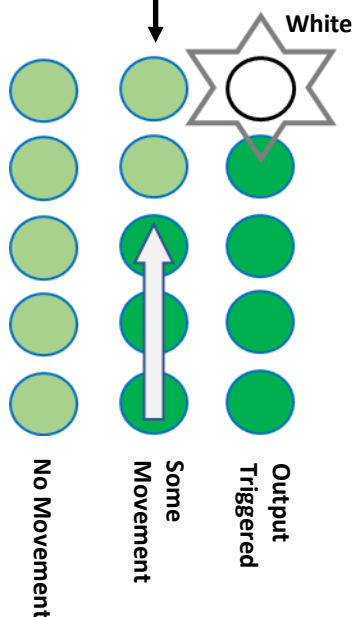
4.2.2 Using the I-Click: Run

The I-Click will display a dim background. This colour represents the direction to be detected, the default is Green as shown and is for movement towards the IR sensor to be detected (default). Blue is used for 'away from the IR Sensor'.

As the distance changes a bright bargraph grows.

An output occurs when the top led turns white and a audio bleep occurs simultaneously

To return the I-Click to Freeze press the button once.



4.3 Long Clicking: (Revision 2 firmware)

Some devices using IOS and Android can accept a longer press to more easily make selections. To enable the I-Click to produce a longer output pulse from the relay (only) when required, the optional 'Long Click' feature can be selected in the Yellow Miscellaneous menu . See section 3.

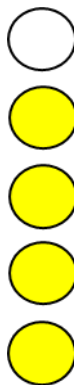
To use, the muscle movement should be brief for a normal short 'click' output and to instigate a longer output click the twitch movement from the user should be held a little longer.

The I-Click will then...

- Double bleep (Short then Long beeps) indicating that a longer output is occurring . *Note the output is just longer it is not a double click.*
- The display will indicate four yellow and one white led
- The Relay output will be just over one second compared with a normal click of 0.1 second.

Tips:

- It is useful for the user to see the display whilst learning to use this feature.
- IOS: The default setting of one second for Long Click should work.



5 IR Sensor Mounting



KIT1 illustrated

5.1 Mounting the IR Sensor

There is no right or wrong method to mount the I-Clicks IR Sensor. The I-Click will be provided with at least one mounting system that is chosen at time of purchase. Two types are discussed here to illustrate the principles involved, for the latest range of option accessories please visit the I-Click page on the Celtic Magic website : www.celticmagic.com/I-Click.

Standard mounts may be applied in any practical way that works for the user and can be incorporated in home grown solutions as necessary.

The cable can be looped over the user's ear or some users secure with a folded tab of Velcro on the cable to a matching tab on the ISR support rod or spectacles.

5.2 Fundamentals

When selecting a location on a potential user, the muscle movement must be:

- 1) Visible - but can be very slight
- 2) The user can control this motion consistently
- 3) No involuntary movements associated with the location chosen
- 4) The user must have the necessary cognitive ability to use a switch

5.3 Choosing: Towards or Away detection?

By default the IR Sensor will detect motion towards the sensor and this is the normally accepted

method of use. However this photo the sensor is mounted to detect slight movement of the users forefinger and as the user would expect to press down to operate a switch then the I-click in this example must be configured to operate when the finger is moving away from it. See Section 2.



in

5.4 Aiming the IR Sensor

Normally the IR-Sensor points directly at the skin in a flat orientation and detects slight movement towards or away.



However it will be found that some locations such as eyebrow movement may not produce a good signal, this being due to the skin moving upward on the forehead and not significantly out towards the sensor. Under this conditions try experimenting with the angle that the sensor is pointing and instead of straight try 45 degrees towards the eyebrow from above or below.

5.5 Mounting Hardware

The standard mounting hardware is available in Kits with each kit providing the parts necessary for a particular style of mounting arrangement.

Kit 1: For mounting from the users own spectacle frame. As spectacles come in different styles three sizes of U clamps are supplied.

Kit2: Similar to Kits 1 but is suitable for non spectacle wearing users and a special frame is supplied with this kit that has no lenses.

Kit 3: Where the I-Click sensor is to be used to detect moment from the hand or other area of the body

Kit 4 Headband mounted as an alternative to Kits 1 or 2

Kit 5 From a camera mount

All kits use the same basic parts supporting a stain-less steel I-Click Mounting Rod (IMR), which can be manually bent to the desired position.

Kits 1 & 2 parts

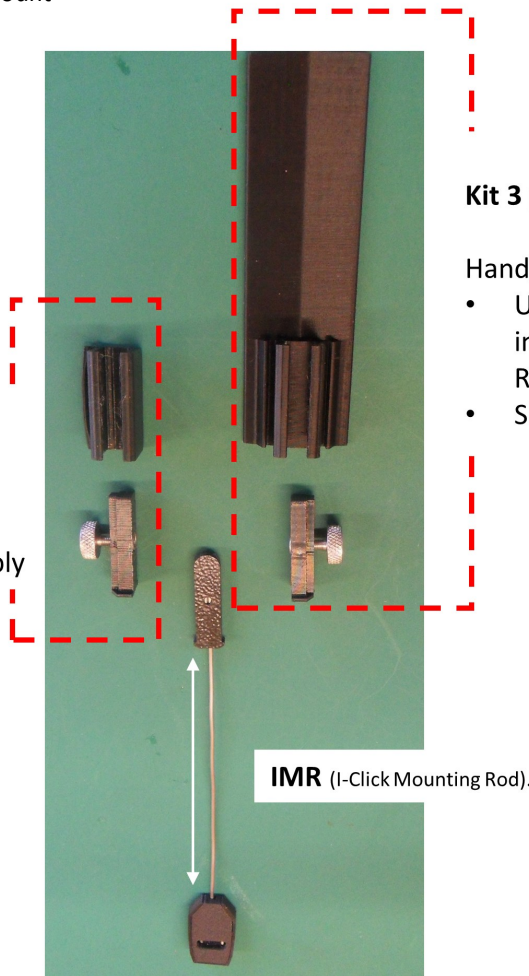
Spectacle Mount

- U-Clamp(s)
- Slide assembly

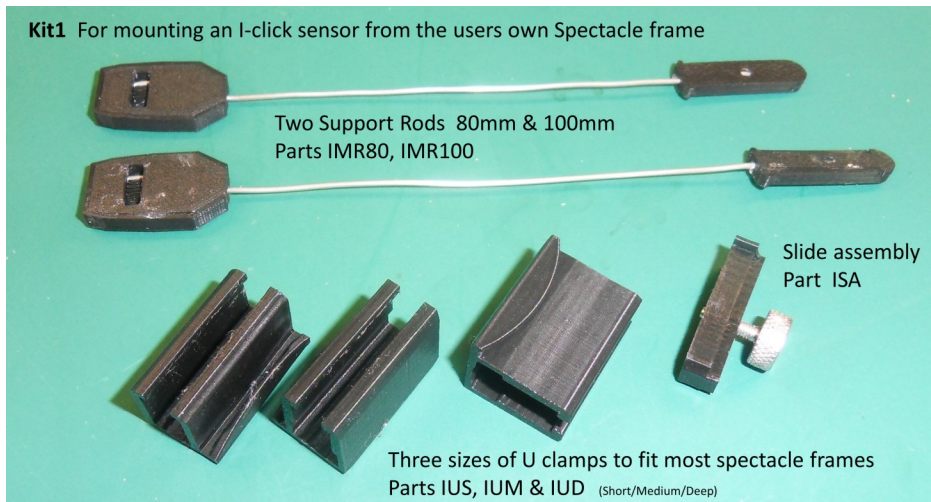
Kit 3 parts

Hand/ universal mount

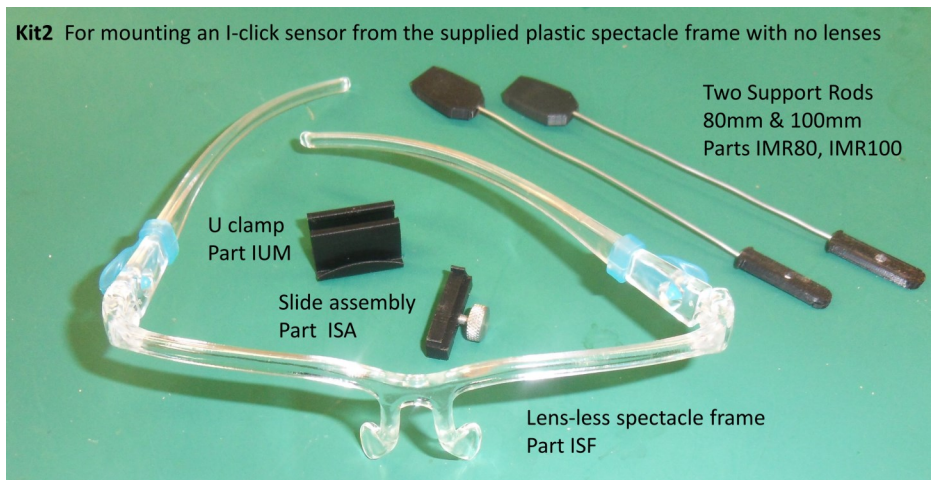
- U-Clamp incorporated into Ruler
- Slide assembly



5.5.1 KIT1 Mount from Own Spectacles



5.5.2 KIT2 Mount from lens-less frame supplied

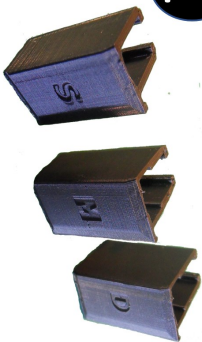


5.5.3 Example Mounting from Spectacles (Kits 1 & 2)

I-CLICK

Mounting example :
Spectacle frames

1



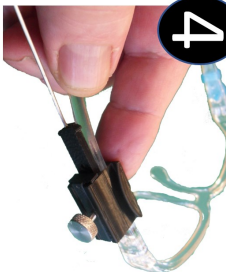
Choose the best size of U-Clamp to suit the frame. Short, Medium or Deep

2



Wrap the U-Clamp around frame and insert the thumb screw Slide Assembly. The wider T end should be at the end the rod will be from

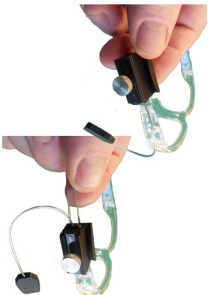
4



FULLY insert the magnetic I-Click Mounting Rod (IMR) between the frame leg and the Slide Assembly, taking care that the magnetic socket on the IMR for the sensor is facing the user.

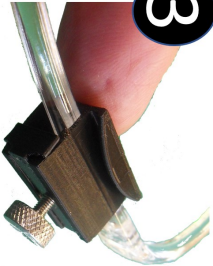
7

To suit the user the IMR wire can be rear or front mounting and above or below the arm of the spectacles



Tip: For movement around the eye try the rear option first

3



Fully insert the Slide Assembly with thumb screw undone, leaving a gap for the support rod.

5



Tighten the thumb screw to secure. **Do not overtighten the thumb screw beyond that necessary to secure**

6



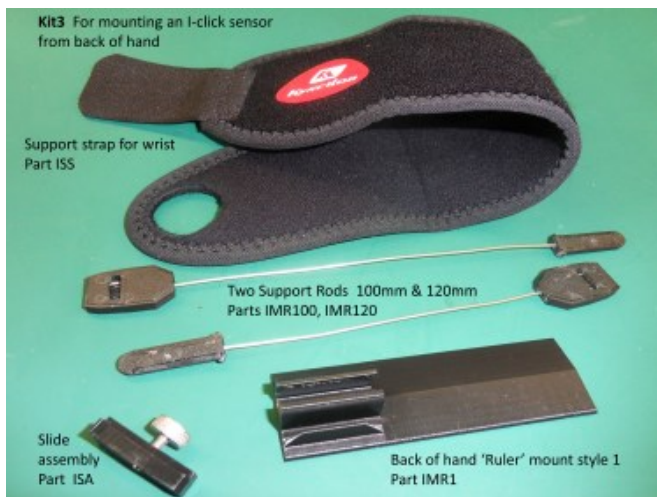
Without straining the leg of the spectacles bend and shape the wire into the approximate shape for use

Important Tip
After you have found a good shape for the mounting rod that works, resist continuously bending the rod until you have tried repositioning whatever the rod terminates in.
ie In this example adjust the spectacles on the user

5.5.4 KIT3 Mount from back of hand typically for finger movements

The Hand mount Kit 3 consists of a shaped 'ruler' which is gently concaved and can generally be comfortably tolerated against the skin.

The strapping shown is typically used for treatment of carpal tunnel syndrome and offers a convenient and comfortable method to secure the ruler mount.



Each user is unique and should be assessed appropriately before long term use of this mounting arrangement.



The Ruler incorporates a U-Clamp and an IMR mount is inserted into the U-clamp FULLY and the thumb screw GENTLY tightened to secure.

See section 4 for setting the distance



5.5.5 KIT4 Mount from Headband—an alternative to KITS 1 & 2

The headband mount Kit 4 consists of a shaped concaved plastic support for the IMR rod which fits comfortably between the headband and the user.

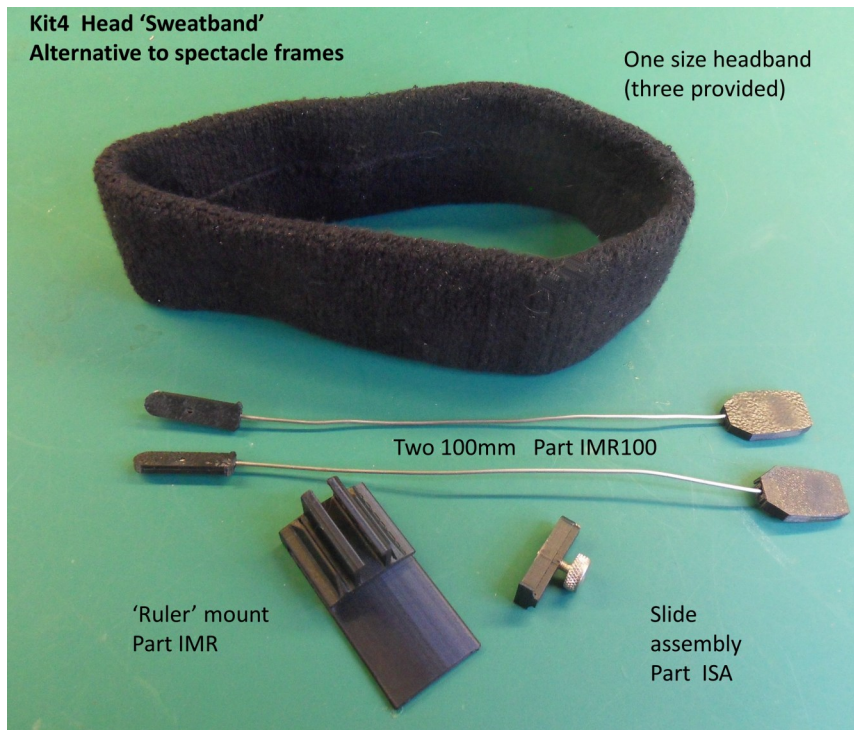
There are three headbands supplied for hygiene reasons and these should be washed daily

Each user is unique and should be assessed appropriately before long term use of this mounting arrangement.



The support incorporates a U-Clamp and an IMR mount which is inserted into the U-clamp FULLY and the thumb screw GENTLY tightened to secure.

See section 4 for setting the distance



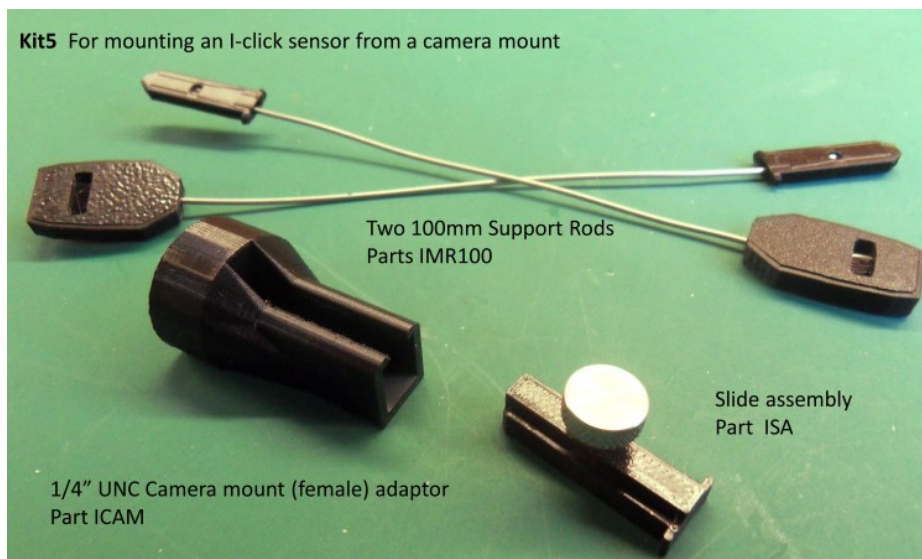
5.5.6 KIT5 Camera Mount Adaptor

Kit 5 is an adaptor designed to allow a the I-Click IMR mounting rods to be supported from popular mounting systems such as Manfrotto that terminate in a standard 1/4" UNC camera screw.

The adaptor incorporates a U-Clamp and an IMR mounting rod is inserted into the U-clamp FULLY, and the thumb screw GENTLY tightened to secure.

Two 100mm IMR rods are included in this kit.

See section 4 for setting the distance



5.5.7 KIT10 Assessment Selection

Kit 10 contains all the principal parts from all the other kits and is aimed at Health Care Professionals for assessment purposes, before ordering a specific kit to suit an end user.

Only a subset of the parts is included, eg KIT4 would have 3 headbands for user long-term use whereas KIT10 would contain only one for assessing the suitability for an individual.

5.5.8 Ordering spare IMR mounting rods

IMRs are considered consumable parts see the www.celticmagic.org for ordering information

Any Combination can be supplied including custom lengths



6 Specification & Support

6.1 Dimensions

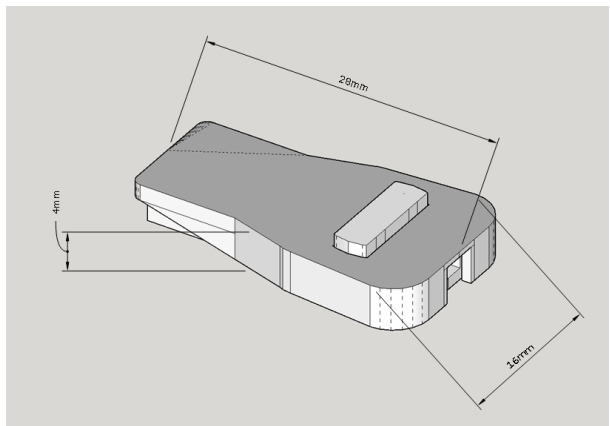


I-Click Sensor Module

6.2 Support

For the latest support information please visit the support webpage

www.celticmagic.org/I-Click



6.3 Specifications

Electrical	
Connection to computer	USB
USB Max load	80mA
USB Lead length	1m
Fixed lead to IR Sensor	1m
Relay connection	3.5mm mono jack
Relay Output rating	24v @ 750mA ac/dc
Relay pulse time	100mS Normal click 1100 mS Long click * * see section 4.3
Audio bleep	>80dB @ 100mm
Sensor technology	Infrared
Mechanical	
Weight	Sensor 10g All 100g
Ingress rating	IP40
Operating temperature	5C—35C
Storage Temperature	-15C—40C

6. 3.1 How Does it Work (a bit technical)

Both the G&I Click devices are momentary switches and work with assistive software such as Grid3. They have similar control strategies so we will refer to the G-Click here.



The reason they must be momentary is at the core of how the motion is detected, in that it is using the first derivative of movement, that is the rate of change of tilt in the case of the G-Click and rate of change of distance for the I-Click.

The alternative would be to chose a fixed reference angle (G-Click) or distance (I-Click) and trigger when that is exceeded by a margin. That would let you 'hold' BUT would then be highly susceptible to going out of calibration when such small movements are to be reliably detected.

Consider this example of not using rate:

A G-Click sitting at a random angle of say 30 degrees and it triggers when say 31 degrees is reached or exceeded.

If the user then moves to say 33 degrees and returns to 32 degrees due to stiction and real world conditions (happens all the time) then the G-Click is now out of calibration and will fail to work next time. How would the device 'know' that the user has accidentally moved too far against the possibility the user is deliberately holding on. So autocalibration to compensate becomes less practical as both possibilities can not be resolved.

However if, rate of change is used and the output triggers at say 1 degree in 200ms and the user ends up at 32 degrees as per the last example, then this doesn't matter as the next trigger is also a rate signal detected from that new 32 degrees angle.

So rate is therefore MUCH more stable and inherently auto compensating, and this ALSO lets the device detect much smaller movements reliably as it can be self tuning on the threshold of triggering, then detects the slightest rate of change no matter how the position has changed in the real world. The compromise for these worthy features is the device can only click momentary and that is why the name G/I-Click was chosen.

To compensate slightly the Relay Toggle feature (see 1.3.2) was always in the design to allow a click for on and a second click for off.

6.4 Legal & Conformity

On the advice of the UK Medicines & Healthcare products Regulatory Agency (MHRA), the I-Click has been classed as a ‘Aid for Daily Living’ (not a medical device) and is deemed suitable for controlling a personal computer, tablet, phone or Environmental Controller in a home environment. . MHRA Opinion Reference E/2021/3585

EU Declaration of Conformity

In accordance with EN/ISO 17050-1 : 2010



Product: I-Click – Infrared muscle twitch switch
Product Type: Aid for daily living. (MHRA Opinion ref: E/2021/3585)
Manufacturers name: Celtic Magic
Manufacturers address: 126 Leicester Rd, Thurcaston, Leicester. LE7 7JJ
Conforms to the following standards
EMC EN 55032
EMC (US) FCC Part 15 Class B.
Electrical safety EN 62368-1:2020
General product safety 2001/95/EC

Additional Information

The technical documentation (Technical Construction File) for this device is maintained by the manufacturer at the address above

Signed for & on behalf of: Celtic Magic
Place of issue: Leicester UK
Date of issue: 1st January 2022
Name: Mr Graham Law
Function: Owner

Signature

UK Declaration of Conformity

In accordance with EN/ISO 17050-1 : 2010



Product: I-Click – Infrared muscle twitch switch
Product Type: Aid for daily living. (MHRA Opinion ref: E/2021/3585)
Manufacturers name: Celtic Magic
Manufacturers address: 126 Leicester Rd, Thurcaston, Leicester. LE7 7JJ
Conforms to the following standards
EMC EN 55032
EMC (US) FCC Part 15 Class B.
Electrical safety BS 62368-1:2020
General product safety 2001/95/EC

Additional Information

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6.5 Celtic Magic I-Click Limited Warranty

What Does This Warranty Cover?

This warranty covers any defects or malfunctions in your new G-Click.

How Long Does The Coverage Last?

This warranty lasts from one year of purchase date. Coverage terminates if you sell or otherwise transfer the device.

What Will Celtic Magic Do?

Celtic Magic will replace any defective or malfunctioning part at no charge in the UK. For other territories Celtic Magic reserves the right to charge shipping costs.

What Does This Warranty Not Cover?

Any other problem that is caused by abuse, misuse, or an act of God (such as a flood) are not covered. Also, consequential and incidental damages are not recoverable under this warranty.

6.6 Cleaning & Disposal

Cleaning instructions

- Do not use water on this device
- Thoroughly wipe the device with an alcohol wipe.
- Dry with a microfiber cloth.
- Use toothbrush on engrained dirt
- Use toothpick on heavy dirt in crevices

Disposal Instructions

Your device is electronic and should be disposed of as any electronic waste product in your area. It is common for waste disposal sites and large institutions to handle electronic waste known as WEEE waste in a way that the metals and other material within its construction are recycled.