

USER MANUAL



G-Click

Articulated Movement Detection

Gyroscopic Tilt Switch

- ♦ Zero Force
- ♦ Hyper Sensitive
- ♦ Auto Positioning
- ♦ Acoustic feedback
- ♦ Spasm Detection (Dystonia)
- ♦ Mouse button control including 'Drag'

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The Warnings

Your G-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.

1 Introduction

1.1 What is a G-Click switch

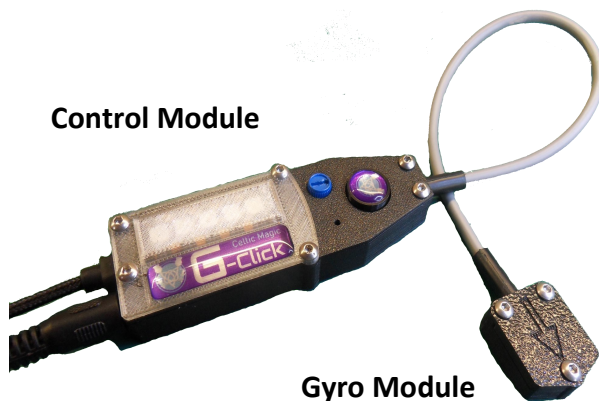
The G-Click is a special switch that operates in free space unlike mechanical switches and buttons which are mounted from a bracket or sit on a desk.

The G-Click sensor is **normally mounted on the user**, and moves with the user from any appropriate part of their body that can generate tilt.

The G-Click creates its own reference in free space using a miniature gyroscope that can detect a tiny amount of tilt.

IMPORTANT, the G-click detects **tilt** not up, down

or sideways motion. To be precise the G-Click will detect the **rate of change of tilt** in a chosen direction, and dependant on the sensitivity set will trigger an output. See 1.5 below.



1.2 G-Click vs a regular mechanical switch

The G-Click offers Auto Positioning but unlike a conventional switch that can be pressed and **held** a G-Click can only sends a 'click' ie a transient on then off. Although, it is possible to configure a G-Click to toggle its relay on then off based on two click actions.

1.3 Advantages of a Gyro switching

- Auto calibration of position such as if the the G-Click is mounted on the user, accidental movements from daily care activities will not prevent it from working.
- Does not require the user to faithfully return to an off position unlike all other switches
- Capable of detecting Dystonia related spasms and ignores these movements by disabling the device for a short time.



1.4 Disadvantages of a Gyro switching

As the sensor takes its reference from free space it is not suitable for use whilst moving such as on a moving wheelchair or transport.

1.5 Outputs

1.5.1 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

1.5.2 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.

1.5.3 Audio / Bleep feedback

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

1.6 Auto Positioning

If a user changes position slightly whilst using a G-Click, the G-Click will self compensates and if the movement is significant it will trigger an auto recalibration. The G-Click will then continue to operate without the need for human intervention to realign it as would be required with a conventional switch.

1.7 Powering the G-Click

The G-Click takes its power from the USB connection and this is required to be connected at all times even if a USB trigger signal is not used. It 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.

If taking power from a **Microsoft Adaptive Controller (XAC)**: The G-Click output must be set to Relay only else the XAC will get confused by the unexpected data that the G-Click will send down the USB connection.

Once powered the G-Click will enter its Freeze state (two yellow leds) and is released by pressing the button once.

1.8 Freeze state

It is useful to be able to temporarily disable the G-Click whilst setting the device up for a user or at the end of the day. With a single press of the button the G-Click will enter Freeze state (two yellow leds) and all activity will be suspended until a second button press releasing the Freeze state. See section 4.3.

1.9 Manual calibration

Whilst using the device a double press of the button will force a fresh calibration.

Tip : Use Manual Calibration if the G-click was accidentally moved during an auto calibration process.

1.10 Dystonia Spasm Detection (Advanced Feature)

The G-Click (revision 2 firmware on) has the ability to detect intermittent spasms as caused by **Dystonia**. The G-Click will temporarily freeze all outputs and wait for the spasm to subside. Then it will continue to work as before even in a new position so long as the user can still move the G-Click in approximately the same way.

See 4.7 for full Operational details.

2 Hardware

The Control Module

Push Button

Freeze / Run
Manual Calibrate &
Configure

Sensitivity

Max = clockwise

Top led is red when the relay operates & a USB output occurs .

Bargraph

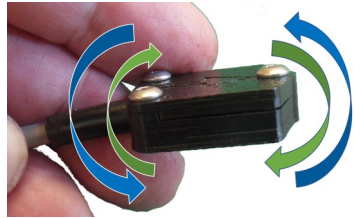
Background colour is green indicating Tilt down is being detected and the bright level of the bar indicates the magnitude of tilt.



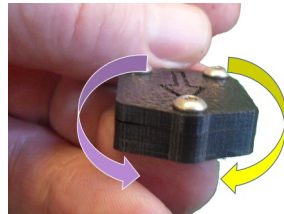
The Gyro Sensor can be configured to detect tilt in five different directions.

The detection direction is indicated by the background colour of the bar graph display whilst running.

Tilt Down : green
Tilt Up : blue



Tilt Right Down : yellow
Tilt Left Down : purple



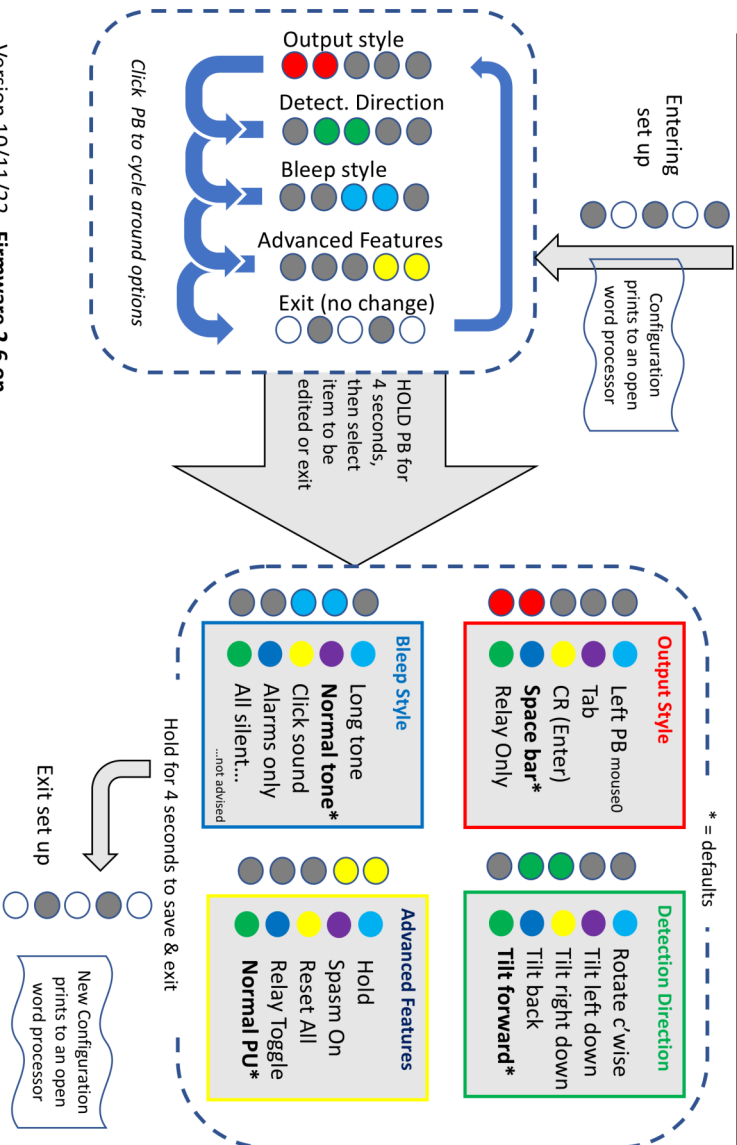
Rotate clockwise : cyan



3 Configuring

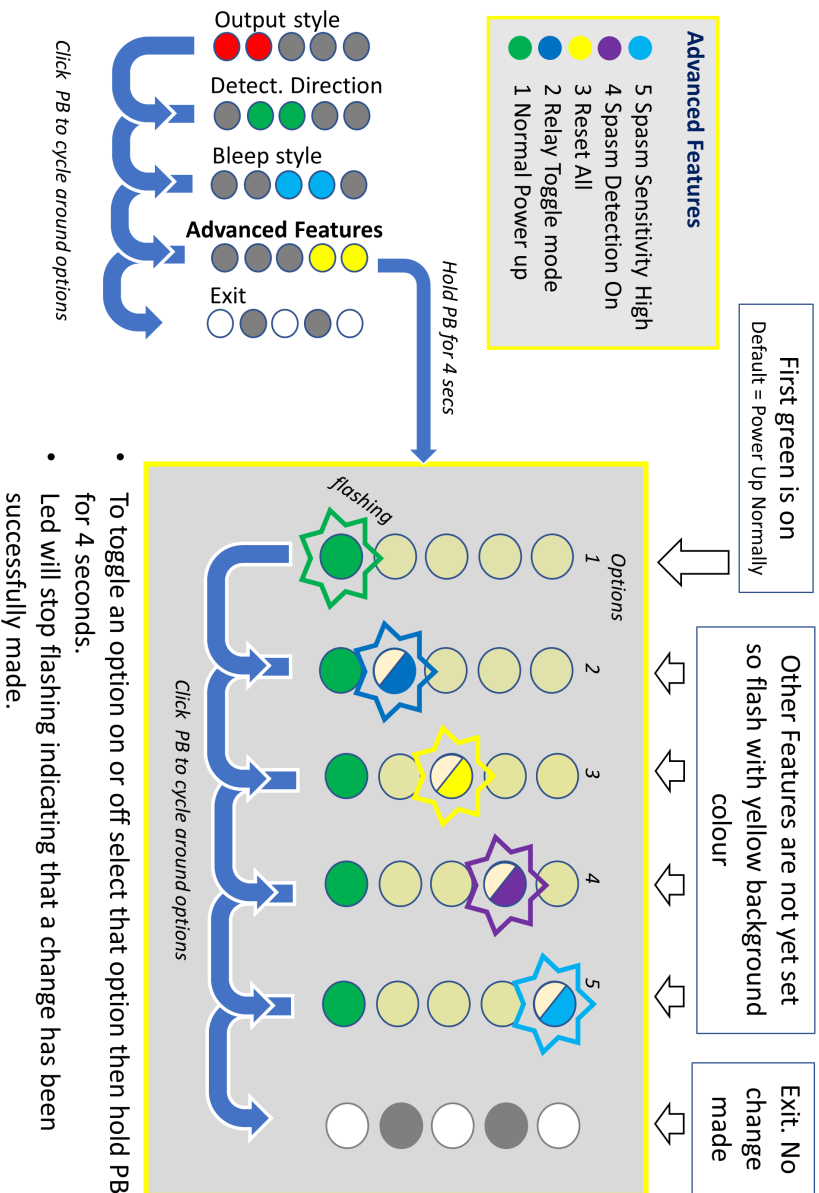
Configuring the G-Click (Revision 2 Firmware)

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



Version 10/11/22 Firmware 2.6 on

Advanced Features Editing (Revision 2 Firmware)



- To toggle an option on or off select that option then hold PB for 4 seconds.
- Led will stop flashing indicating that a change has been successfully made.

3.3 Output style

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.

3.4 Detection Direction

This selects the direction of tilt for the gyro to trigger an output.

See the Hardware section 2 above for illustrations.

3.5 Beep style

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

3.6 Advanced Features

Unlike the other configurations above where only one item can be activated, in the advanced Feature menus multiple items can be selected as on or off.

3.6.1 Power On Mode

Normal (green led on) : The Glick will start disabled and a user/ carer will activate the device by a single button press

Auto Run (green led off): The G-Click will power on in its running state

3.6.2 Relay Toggle mode

This selects the behaviour of the relay output from transient to toggling on-off-on-off with each clicks

3.6.3 Set to factory default

Reset all configurations back to factory defaults.

3.6.4 Spasm Detection

The spasm detection can be enabled and the sensitivity set to either Normal or High. See sections 4.7 for full details

3.6.5 Hold

Allows outputs to hold and is used primarily with Mouse PB output to allow for mouse drag function. See sections 4.6 for full details

4 Operation

4.1 Setting Up

It is very important to appreciate that the G-Click detects TILT not horizontal or vertical movements. The users optimal movements must be carefully considered such as the G-Click 'sees' the maximum TILT from the users best movement. This may be from any part of the body and the sensitivity adjusted to suit.

The Gyro Sensor can be configured to detect in one of five directions of tilt. The default is the tilt down. The direction programmed is indicated by the background colour of the bar graph display, the default being Green for tilt down. These options are:

Green:	Tilt forward — default
Blue:	Tilt backward
Yellow:	Right side down
Purple:	Left side down
Cyan (light blue)	Rotate clockwise

See the Hardware section 2

Setting the Sensitivity

The sensitivity knob should be fairly carefully set. If set too low (anti clockwise) it is easy to appreciate that it will not work. However if set too high the consequences are a little more subtle.

As the G-Click is using a rate of change of tilt then if the sensitivity is set too high for a given movement it will trigger and if the G-Click is continuing to move in the triggering direction then another click or more could occur.

Therefore it is important to set the gain appropriately for the clients needs and no higher.

***Tip: 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 Extreme movement detected—Auto Calibrating

The G-Click gyro has moved above the threshold that requires a minor adjustment and a full auto recalibration has been activated.

There will be four bleeps and the gyro **should be held still until** this calibration has been completed signalled by one long bleep.



4.3 Using the G-Click: Freeze & Manual Calibrate

Whilst the device is indicating Freeze (two yellow leds) position the Gyro to suit the user, once in position press the reset button once. This will release the Freeze state & the G-Click will immediately calibrate itself to its current position (3 seconds - all leds red). The bleep, if enabled will sound four times when entering calibration and one longer bleep when calibration has successfully completed. During the calibration period the device should be held steady.

The device is now running.

Freeze can be applied again by a single button press and a recalibration by pressing twice. This is useful if the device was not steady during the previous calibration.

4.3 Using the G-Click:
Freeze & Manual Calibrate

Continued

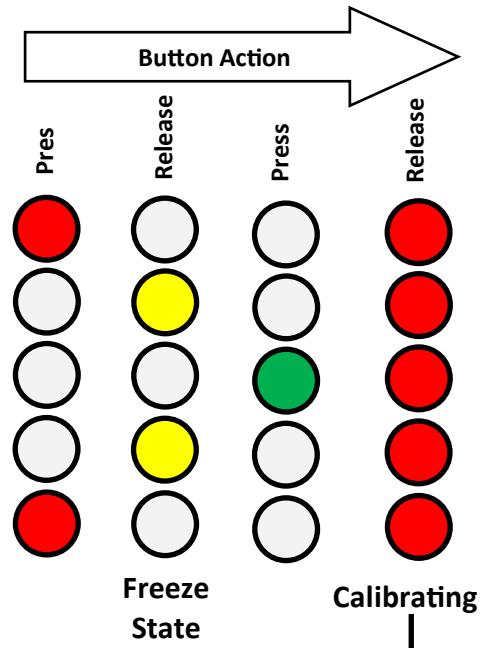
Freeze *two yellow leds*

G-Click will hold (no outputs)
awaiting second button press to
release

Calibrating *five red leds*

G-Click will calibrate to the cur-
rent position (about 3 secs)
and then run. see 4.4 below.

Tip: Hold gyro steady during
this time



4.4 Using the G-Click: Run

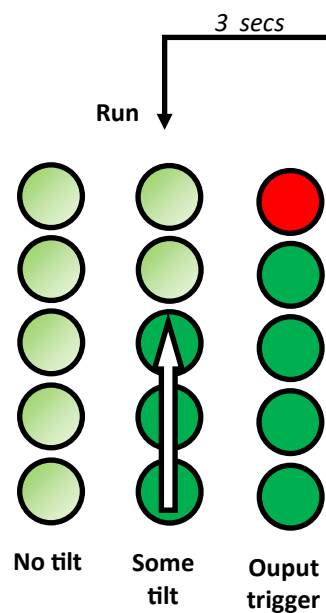
Following the calibration the G-Click will dis-
play a dim background. This colour repre-
sents the direction of tilt to be detected, the
default is Green as shown is for tilt down.

See section 2 Hardware for angles of detec-
tion.

As the gyro is tilted a bright led bar of the
same colour representing the magnitude of
tilt being detected is displayed.

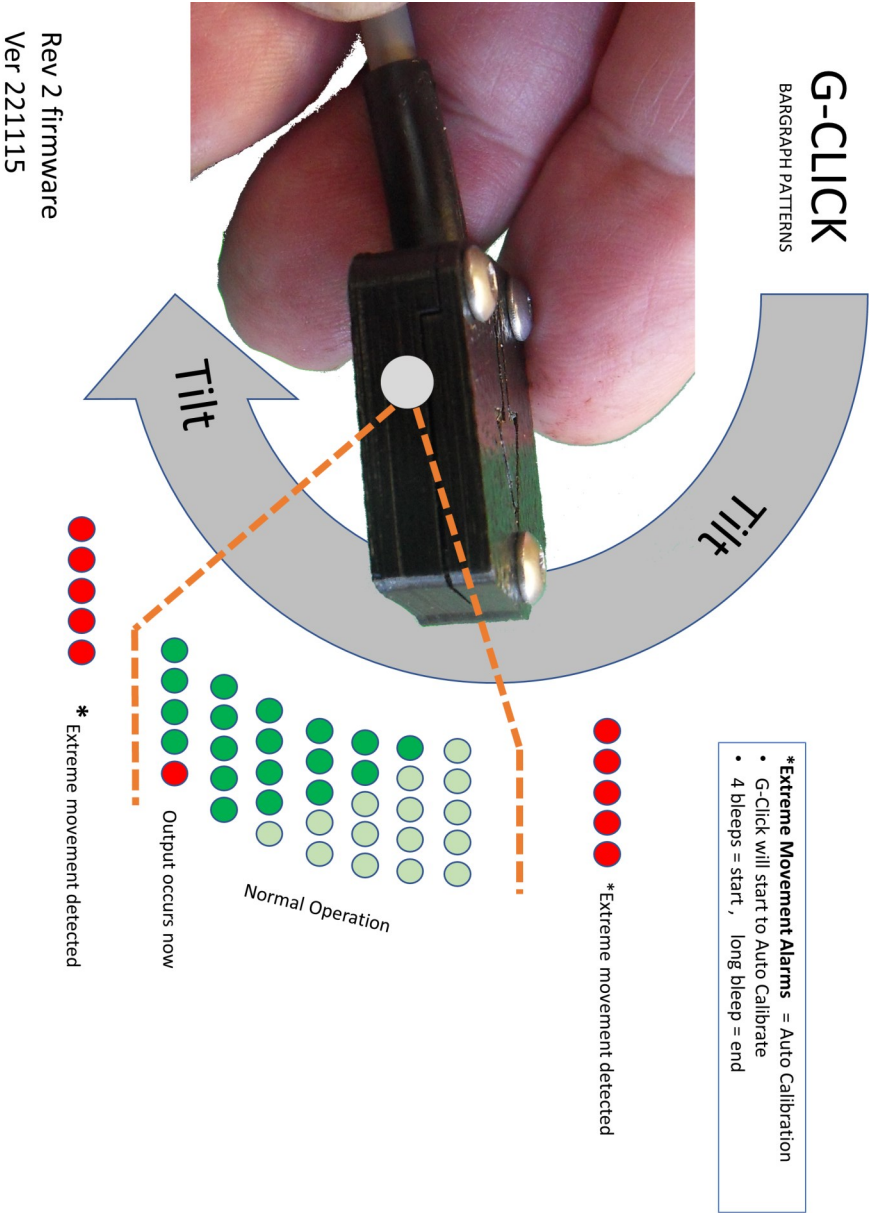
An output occurs when the top led turns red.

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



See section 4.2 for more details

4.5 Operating Bargraph Patterns



4.6.1 Using Mouse Click & Drag (Rev 2.6 firmware on)

See section 3 Advanced Features—Hold

A G-Click is normally used as a simple switch however it can be configured to act as a Left mouse click.

To enhance the use of a G-Click as a mouse button the additional feature of **Hold** is possible where the user can either :

- Click (on-off pulse) or
- Hold the left mouse button and thereby Drag items on the screen.

The G-Click is not providing the movement only the ability to click or hold the button and a conventional mouse/trackpad/joystick would be used to move the cursor. The Celtic Magic Feather joystick mouse controller is a good example.

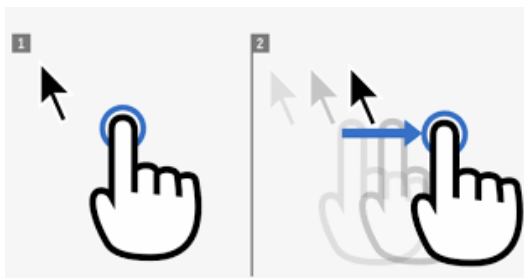
To Use:

To action a Drag the user moves to 100% of their comfortable range of movement and holds for a few seconds until the Drag feature activates as indicated by a long beep and TWO red leds instead of one.

To release click as normal.

Tip : Let the G-Click be at rest for a few seconds to fully calibrate to its position before trying this for the first time

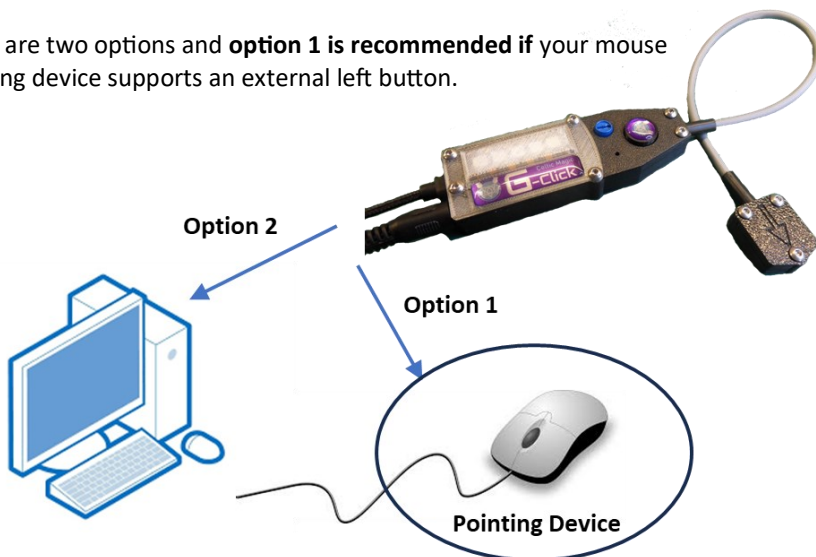
See next for Configuration information on the above



4.6.2 Click & Drag Configuration

The G-Click can be connected to a digital device performing Mouse left button click AND Left button hold for dragging.

There are two options and **option 1 is recommended** if your mouse pointing device supports an external left button.



Option 1: Switch output to pointing device input

Output Style: **Relay only***

Advanced Features: Turn on the **Hold** feature

Connect a 3.5mm mono lead from the relay output of the G-Click to the left button input of your pointing device

**The USB lead can still be connected to the digital device for power or another external USB supply.*

Option 2: USB direct

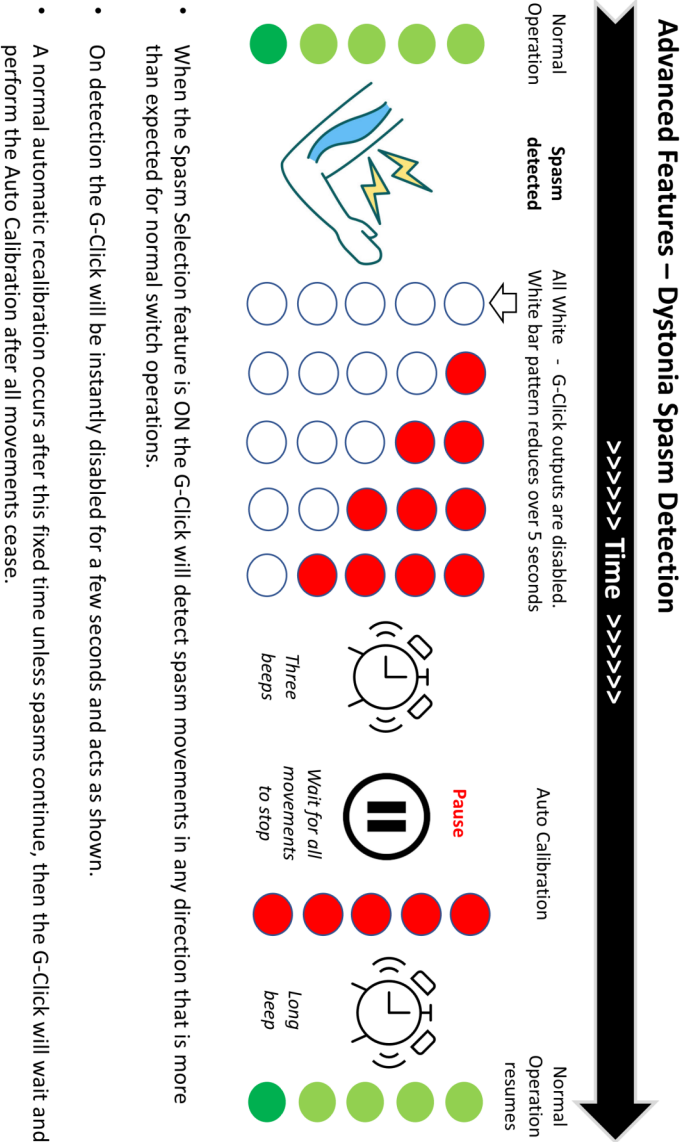
Output Style: **Left PB**

Advanced Features: Turn on **Hold**

Plug the G-Click USB lead into the device being controlled. If the device is a tablet and has only one USB connection then a Powered USB Hub is recommended, which will give multiple USB inputs and should also charge the tablet

4.7 Spasm Detection

See section 3 for selecting this option



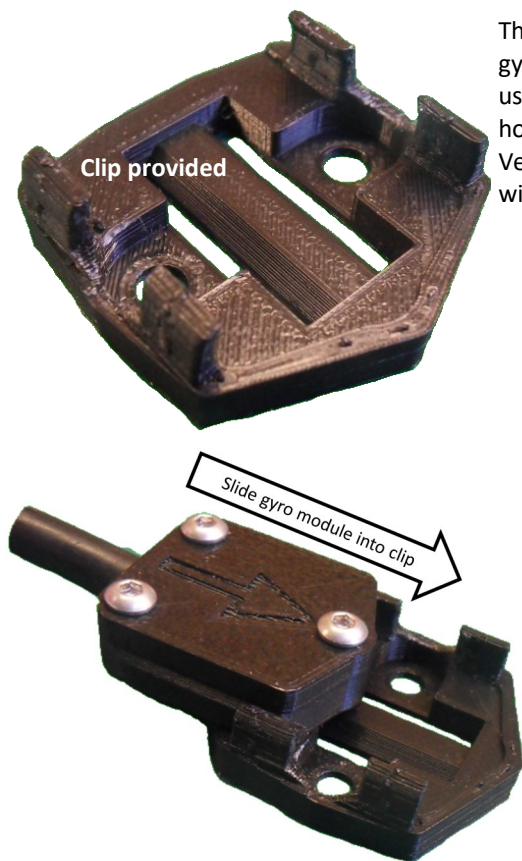
Version 10/11/22 Firmware 2.x

5 Mounting the Gyro Sensor

5.1.1 Using the clip supplied

There is no right or wrong method to mount the G-Click gyro sensor.

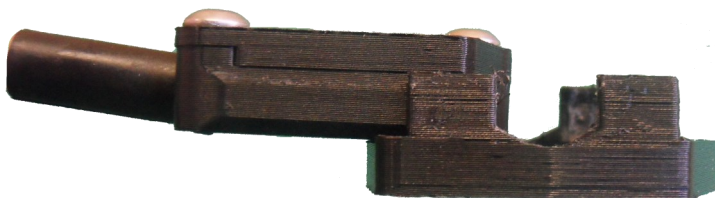
It is what works best for an individual. The G-Click is provided with a mounting clip that the gyro module can be slid into.



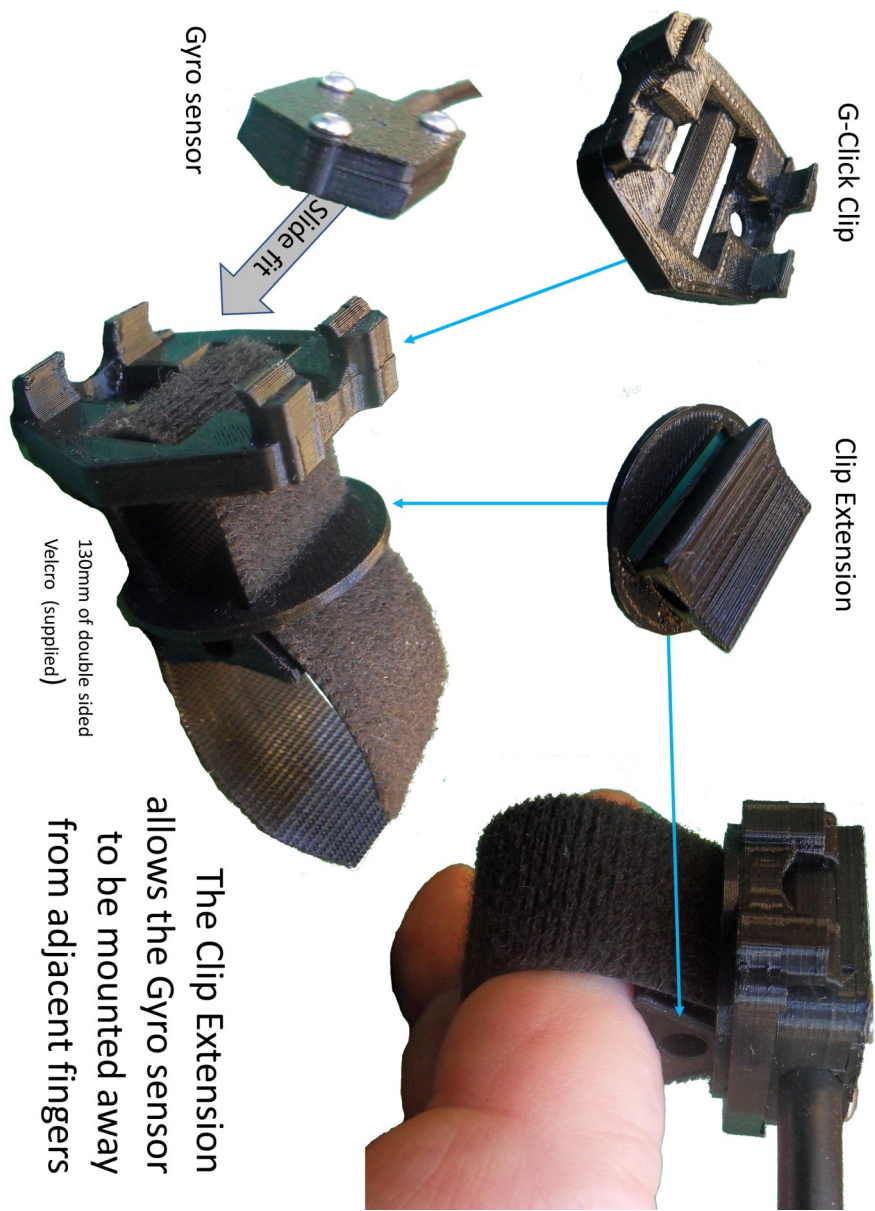
The clip provides a means to attach the gyro module using 2x 4mm bolts or using a 20mm wide double-sided hoop & loop strap. Recommend Velcro® ONE-WRAP® 20mm Strap with the soft face towards the skin.



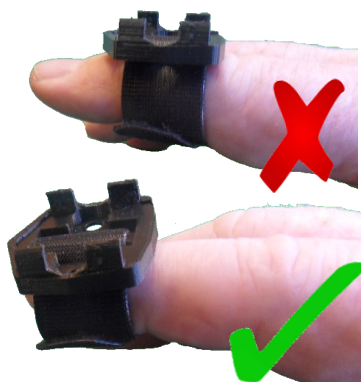
Such a strap may be used to form a loop around a finger, hand or wrist. Ensure a suitable hygiene regime appropriate for the user is considered.



5.1.2 Using the Clip Extension piece



Finger tip
=
More tilt
=
Often Better



5.1.3 Mounting Considerations

With every installation the Controller Module will be 600mm from the Gyro sensor and it should be supported appropriately to avoid its weight pulling the Gyro sensor.

When choosing a location on a user think...

*“What movement from this person will cause the sensor to **tilt**”*

Initially look for tilt down at the front of the sensor as this is the default direction of detection. If necessary this can be changed. See the Hardware & Configuration section 2 for details.

Tip: Do not look for horizontal or vertical movement, as such motion will not be reliably detected. IT MUST BE TILT

Typical locations may be:

Fingers / Back of hand: Use the provided clip and Velcro ONE-WRAP 20mm strap. Use the clip extension if mounted from a finger to reduce interference from other fingers. See previous page.

Watch: A watch face can be used as a convenient flat face to mount the gyro if the user can rotate their wrist.

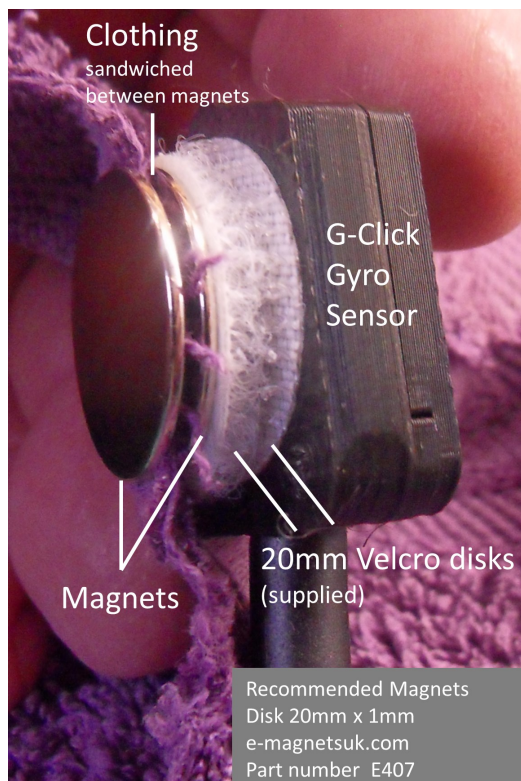
Spectacles: Form a Velcro hoop tag around the spectacle right* leg arm and attach the G-Click sensor flat to this tag whilst setting the G-Click to respond to left or right tilt.

5.2 Mounting using magnets

For tricky mounting positions it is occasionally useful to use small disk magnets to locate the G-Click sensor, without using the clip, on to the surface of clothing such as for shoulder operation.

Although Celtic Magic can provide magnets on request they are not routinely supplied with a G-Click and this information is for guidance only. See photo below for supplier.

Caution when using magnets— Ensure user has no pacemaker fitted and beware that small magnets can become a choking hazard for children.

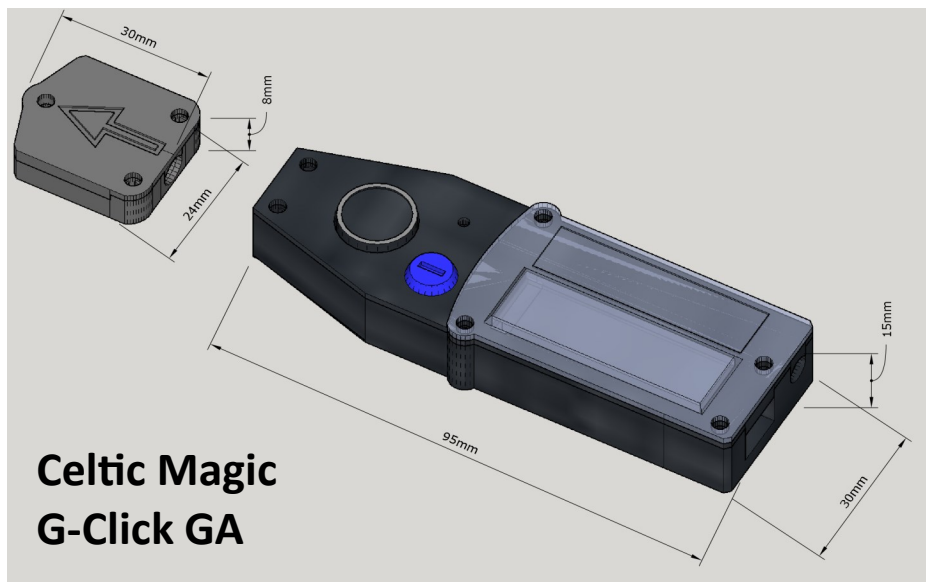


Tips for shoulder mounting

- Mount the G-Click as high as possible on tight fitting clothing as shown above
- With the cable coming downwards set to trigger to detect Tilt Up (Blue background). See section 2 of this handbook

6 Specification & Support

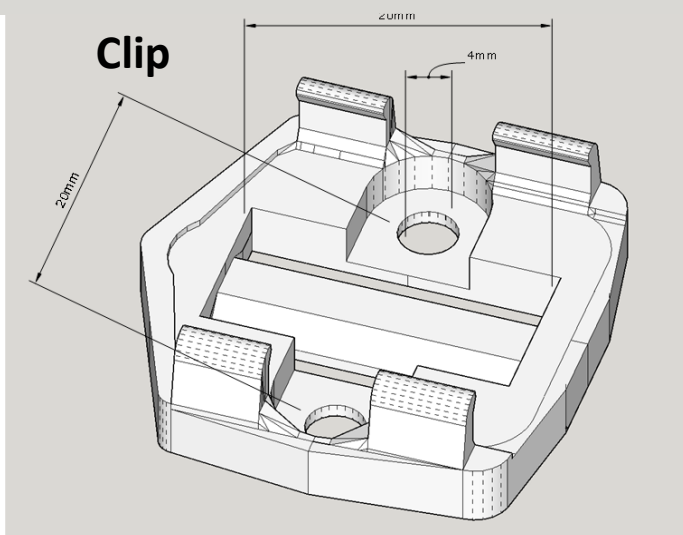
6.1 Dimensions



Celtic Magic G-Click GA

6.2 Support

For the latest support information please visit the support webpage www.celticmagic.org/G-Click



6.3 Specifications

Electrical	
Connection to computer	USB
USB Max load	85mA
USB Lead length	1m
Fixed lead to Gyro	600mm
Relay connection	3.5mm mono jack
Relay Output rating	24v @ 750mA ac/dc
Relay pulse time	250mS
Audio bleep	>80dB @ 100mm
Sensor technology	Solid state gyro
Angular resolution	0.2 degree
Mechanical	
Weight	Sensor 10g All 100g
Ingress rating	IP40
Operating temperature	5C—35C
Storage Temperature	-15C—40C

6.4 How Does it Work (a bit technical)

The G&I Click devices are momentary switches and work with assistive software such as Grid3

The reason they must be momentary is at 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 auto calibration 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 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 1.4.2) was always in the design to allow a click for on and a second click for off.

6.5 Legal & Conformity

On the advice of the UK Medicines & Healthcare products Regulatory Agency (MHRA), the G-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: G-Click - Gyroscopic tilt 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



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6.6 Celtic Magic G-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.

6.7 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.