

# TwistDx



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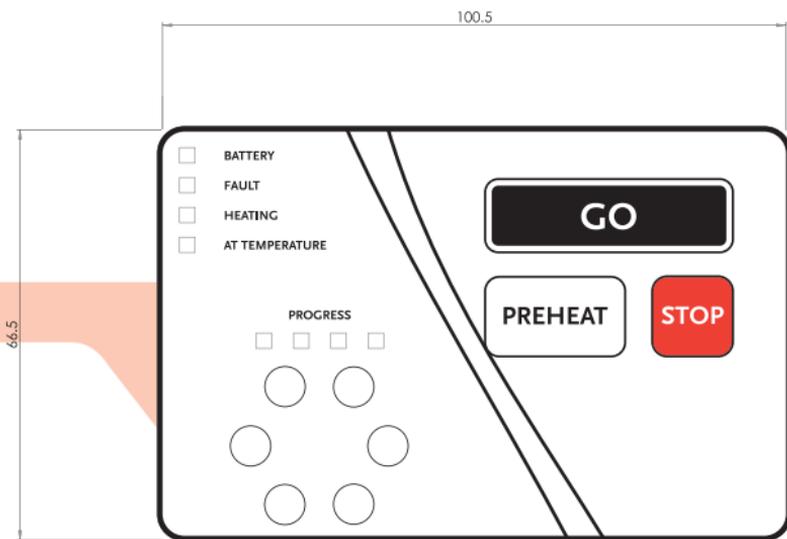
# Twirla™ Manual

User Instructions

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# Twirla™ User Instructions v1.1.



## DESCRIPTION AND FEATURES

The Twirla™ is a mixing incubator for end-point RPA reactions including lateral flow detection of RPA products using TwistAmp® nfo and/or gel electrophoresis detection using TwistAmp® Basic.

The Twirla™ will incubate up to six RPA reactions at a set temperature for up to 20 minutes. Mixing is achieved using a motor-driven magnet arrangement that agitates steel balls added to the RPA reaction.

The Twirla™ can be used on a variety of power sources including alkaline batteries, NiMH rechargeable batteries and 5V/2A micro USB PSUs. The Twirla™ is capable of charging batteries and will do so when plugged into a Power Supply Unit (PSU) or PC with 5V micro USB.

## BASIC USER INSTRUCTIONS

1. Press '**PREHEAT**'. The 'heating' LED will illuminate. Once temperature is reached the 'at temperature' LED will illuminate and the Twirla™ will beep twice.
2. Insert RPA reactions into Sample Holder
3. Press '**GO**' to start the incubation sequence. Progress through this sequence will be shown on the 'progress' LEDs. When complete the unit will beep four times and the 'progress' LEDs will remain illuminated.
4. Remove RPA reactions to chosen readout format and press '**STOP**' on the Twirla™

## POWER-UP MODES

The Twirla™ device can be powered from batteries (Alkaline or rechargeable NiMH AA cells) or from a 5V supply connected using a micro-USB type lead.

On first power up (inserting batteries or plugging in the USB lead when no batteries are inserted or plugging in the USB lead when the batteries are completely dead) the device LEDs will illuminate briefly before entering idle mode.

## ENABLING BATTERY CHARGING FUNCTION

By default, the device's battery charging function is disabled. This is to prevent the device from attempting to charge non-rechargeable, alkaline cells.

To enable the battery charging functions, press and hold down the '**STOP**' button whilst inserting the rechargeable batteries. Release the '**STOP**' button only after the batteries have been fully inserted. Provided that the batteries have enough power in them for the device to power up, the device will then enter charge mode when a USB 5V power source is connected to it.

If the batteries are completely flat then it may be necessary to press and hold the '**STOP**' button when inserting the micro-USB lead to put the device into charging mode.

## OPERATING MODES

The Twirla™ device can be in one of five modes of operation

1. Idle
2. Pre-heat
3. Incubation
4. Charging
5. Fault

### 1. Idle Mode

The device is placed into its idle mode after powering up. If it is powered up from batteries, the Twirla™ will put itself into a low-power idle mode.

If the device is powered by a micro-USB lead connected to a laptop or PC then it will be possible to program the incubation parameters using the TwistDx Incubator Settings Editor (see 'Software' section). NB Use of this software is currently unsupported and users wishing to use it do so at their own risk.

All LEDs on the Twirla™ will be off when in the idle mode.

If the battery charging function has been enabled and the device is plugged into a 5V source (from a laptop, PC or a power supply) then the device will change from its idle mode to the charging mode.

### 2. Pre-heat Mode

To perform an incubation cycle, the Twirla™ device must first be pre-heated.

Press the '**PREHEAT**' button on the Twirla™ device. The "heating" LED should illuminate.

Incubation (and therefore pre-heating) can only be performed when the Twirla™ device is powered from batteries or is plugged into a 5V power supply. The Twirla™ will not enter the Pre-heat or the Incubating modes if the device is plugged into a laptop or a PC. If the device detects that it is connected to a laptop or PC when in Pre-heat or Incubating modes the device will enter its Fault mode with the “fault” LED illuminated.

In Pre-heat mode, the Twirla™ will heat up the sample holder to the temperature that is stored in its non-volatile memory. When the setpoint temperature has been reached, the “at temperature” LED will illuminate and the device will beep twice. Twirla™ will then continue to maintain the setpoint temperature and the “at temperature” LED will stay illuminated with the heating LED flashing on and off as it applies power to the heating coil.

At this point, the user is required to press the ‘GO’ button to start the incubation sequence.

If the ‘STOP’ button is pressed then the Twirla™ will cancel the incubation cycle and switch to idle mode.

If the setpoint temperature is not reached in 15 minutes then the unit will enter its Fault mode with its “fault” LED illuminated.

### 3. Incubation Mode

When the “at temperature” LED has been illuminated, the Twirla™ device is ready to start the timed incubation sequence. The user should now insert the sample tubes and press the ‘GO’ button. The first “progress” LED will flash to indicate that the timed sequence has started. The stirring motor might activate depending on the settings stored in its non-volatile memory (as preset by the Incubator Settings Editor).

The “progress” LEDs give a coarse indication of progress through the timed sequence. Each LED indicates a quarter of the total time and will be illuminated constantly when that quarter has passed. The flashing LED indicates the current quarter.

When the full time has elapsed, the unit will beep four times and the “progress” LEDs will remain illuminated. The stirring will stop and the heater will be disabled.

If the ‘**STOP**’ button is pressed during incubation then the Twirla™ will cancel the incubation cycle and switch to idle mode.

Note: - Although the heater is not powered after the incubation sequence has ended, the heater block will still be warm and will cool down slowly. If the samples are left in the heater block they will be kept warm by the slowly cooling heater block. For this reason there is a 10 minute timer that starts when the sequence ends. If the ‘**STOP**’ button has not been pressed after the end of the incubation time then when the 10 minute timer expires the “fault” LED will be illuminated.

#### 4. Charging Mode

If battery charging has been enabled, charging will start as soon as the Twirla™ device is plugged into a 5V source.

The charging is performed in three steps: conditioning, normal and trickle

- The “battery” LED will be flashing during the conditioning and normal charge steps.
- The “battery” LED will be constantly illuminated when in trickle charge mode

If the batteries’ terminal voltage does not reach 1V per cell during charging (indicating a damaged battery pack) or if the terminal voltage is too high (indicating that non rechargeable batteries have been fitted) then charging is stopped and the “fault” LED is illuminated.

A 2400mAh set of NiMH batteries should charge in about 10 hours.

Normal charge will end in one of three ways:

- If the change in battery voltage indicates that full charge has been reached
- If the charger is on for 16 hours or longer
- If the battery compartment temperature exceeds 45°C

After full charge has been detected the charger switches to a trickle charge rate to keep the cells topped up.

A fault state is reported if charging is attempted when the ambient temperature is out of range (lower than 14°C or greater than 41°C).

### 5. Fault Mode

Due to the limited user interface it is not possible to individually report all of the faults that may occur during the use of the Twirla™ device. A catch-all indication is provided in the form of an LED labelled “fault”.

If the “fault” and “battery” LEDs are illuminated together then this indicates that the battery is flat.

Other possible faults are noted in the above sections.

If the “fault” indicator is illuminated during incubation then the samples should be discarded.

Fault mode can be cleared by pressing the ‘STOP’ button.

To solve the problem that caused the fault it may be necessary to change the power source or move to an environment with a warmer or cooler temperature as appropriate.

## PRESET HEATING AND MIXING PARAMETERS

The Twirla™ is factory preset to the following parameters:

- 40°C incubation temperature
- 15 minute incubation period
- 30 second stirring interval, i.e. stirring occurs every 30 seconds
- 1 second stirring 'on' time, i.e. stirring lasts for 1 second

## SOFTWARE

Software is available on the TwistDx website that enables users to change the following parameters:

1. Temperature set-point (25°C – 42°C)
2. Incubation duration (5min – 20min)
3. Stirring Interval (1s – continuous)
4. Stirring 'on' time (1s – 5s)

THIS SOFTWARE IS CURRENTLY UNSUPPORTED. CHANGING THE MIXING PARAMETERS OF THE DEVICE MAY HAVE AN ADVERSE EFFECT ON RPA PERFORMANCE. USERS WHO CHANGE THESE PARAMETERS DO SO AT THEIR OWN RISK AND TWISTDX MAKES NO WARRANTIES REGARDING RPA PERFORMANCE ON TWIRLA™ DEVICES WITH MODIFIED SETTINGS.

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