

Operating Manual

Model UF-150 *GENECHECKER*[®] Ultra-Fast Real-time PCR System



Release : February 2018
REF. 009150_D

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1. General Information

This operating manual contains basic instructions that should be followed during operation and maintenance of Model UF-150 GENECHECKER® Ultra-Fast Real-time PCR Systems (catalog number : 001150 and 001151). Accordingly, it is recommended that any user thoroughly reads this document before handling the instrument. This manual should be always kept at the operation site of the instrument for immediate reference when necessary.

For any inquiry which is not described in this manual, please contact Victory Scientific.

1.1 Product Description

Model UF-150 GENECHECKER® Ultra-Fast Real-time PCR System described in this manual is polymer chip based real-time PCR (polymerase chain reaction) detection instrument which is performing rapid amplification of genomic templates and real-time qualitative and quantitative analysis. This instrument integrates camera module inside and is to be used in connection with its dedicated software, GeneRecorder which is designed for run with Windows® operating system. Depending on system package, two options are available. Catalog number : 001150 includes system package and laptop computer where GeneRecorder which is installed and calibrated, while catalog number : 001151 includes system package only with GeneRecorder software license which is in the format of USB port connection. Using the instrument, user can make real-time detection of target DNA sequence. Post-reaction melting cycle is performed so that melt curve and peak are available with relevant Ct and Tm values. By defining the type of analysis, standard curve is also available for quantitation.

Model UF-150 GENECHECKER® Ultra-Fast PCR System has compact and portable design and can be carried to any location conveniently. This instrument adopts DC 12V power input and can be connected to general car power source or battery when optional car power connection kit or battery kit is equipped.

Key concept of this instrument can be summarized as follows.

- Microfluidic chip based PCR reaction for rapid DNA amplification
- Real-time detection and analysis through GeneRecorder software
- Portable characteristic allows POC(Point of Care) tests

Model UF-150 GENECHECKER® Ultra-Fast PCR System is recommended for following applications.

- Research and development in molecular diagnostics technology
- Laboratory PCR in biochemical and molecular biological study
- Field applications for veterinarian diagnostics
- GMO and food analysis(speciation)

- Environmental detection(Bio-threat detection)
- Pharmaceutical or biological quality control
- On-site pathogen detection (POC tests)

Model UF-150 GENECHCEKER® Ultra-Fast PCR System is not registered as a medical device outside Republic of Korea and cannot be applied to clinical applications without the approvals required outside Republic of Korea.

1.2 Technical Specification of product

Model UF-150 GENECHCEKER® Ultra-Fast Real-time PCR System	
Operating Mechanism	Precise Control of Peltier Element
Temperature Accuracy	± 0.5°C
Temperature Uniformity	± 0.5°C (Well to Well)
Temperature Stability	± 0.5°C
Ramping up Rate	8.0°C / second
Ramping down Rate	8.0°C / second
Range of Temperature Setting	30 ~ 65°C (1.0°C Increment) for RT Step 1 ~ 99°C (1.0°C Increment) for PCR
Sample Format	Polymer Based 3-Dimensional Chip*
Number of Samples per Run	10
Required Sample Volume	10µl
Typical PCR Duration	Approx. 12 minutes for 30 cycles (without RT Step)
Method of Detection	Analysis of Digitized Fluorescence Signal
Display	4 Line Text LCD
Integrated Memory	Saves up to 12 reaction protocols
Type of Excitation	High Brightness LED
Wavelength	465nm ± 10nm
Number of Detection Channel	1
Method of Fluorescence Measurement	Integrated Cameral Module
PC Connection	USB 2.0 A to B (PC to Device)
Power	AC 100-230V/50/60Hz (Input Power : DC 12V)
Power Consumption	70 W
Dimension	200mm (w) x 200mm (d) x 127mm (h)
Weight	Instrument : 2.2kg (Instrument Only)

* exclusive chip for GENECHCEKER® named Rapi:chip™

Rapi:chip™ PCR Chip for GENECHECKER®	
Dimension	38mm (w) x 25mm (d) x 6 mm (h)
Weight	3.56 g
Number of Wells	10 Wells
Volume of Each Well	10 µL
Aperture Diameter	0.6mm
Channel Height	0.5mm
Channel Length	8.0mm
Channel Width	2.0mm
Material	Transparent Polymer
Transparency	More than 95%

1.3 Dimensional Information

Figure 1 Dimension of the instrument as drawer is closed



Figure 2 Dimension of instrument as drawer is open



2. Safety Instructions

This instrument is equipped with peltier element of which surface temperature is sometimes elevated during instrument operation. Accordingly, caution is required to avoid possible damage caused by heat. This chapter of manual introduces general safety instructions and instrument user should comply with the instructions described in this chapter.

2.1 Safety symbols in this manual

GENECHECKER® Ultra-Fast PCR System is designed to meet recognized technical regulations and is built with state-of-the-art components. Nevertheless, risks to users, property and the environment can arise when this instrument is used carelessly or improperly. Safety instructions explained with following symbols represent danger to user :



Danger symbol



High temperature symbol



Caution symbol - Risk of damage to the instrument is possible unless user complies with the instruction marked with this symbol.

2.2 User qualification and training



The users operating, servicing and inspecting the instrument should be equipped with appropriate qualification to properly handle the instrument. This manual assumes that the users of instrument know how to handle biological samples including DNA, RNA and any other analytes to be introduced to the instrument and prepare them for PCR process. If the users do not have suitable knowledge to properly operate the instrument, they should be trained prior to use. Instrument supplier and manufacturer are not responsible for possible damage of instrument which is caused by inappropriate qualification of users. If necessary, instrument supplier can provide training for the users in order to have them get enough knowledge to operate the instrument.

2.3 General safety instruction for user



This instrument includes peltier element based heating plate in it of which temperature is elevated up to 100°C while the instrument is performing thermal cycling. In order to avoid possible damage caused by high temperature of heating plate, user should not open the chip drawer while the instrument is running. User can identify the status of instrument by LED indicator installed around jog-dial. If red LED is blinking, it means that the instrument is running and user should not open the chip drawer.

If the chip drawer is opened while instrument is running, a door sensor will be activated and the instrument will stop its operation with an alarm sounding, as a safety measure.



This instrument is delicate and sensitive electronic device and should be protected against dust, water vapor condensation, high humidity, splash of water, aggressive gases and liquids. Dusts can block air the ventilation holes of instrument, which may reduce cooling efficiency of the heating plate. Keep the air ventilation holes of instrument clean.



This instrument is delicate and sensitive electronic device and should be protected against strokes or external shocks. When the instrument is being transported for any purpose, please make sure the instrument is sufficiently protected with the materials offering cushioning effect. The design of original packaging of the instrument is optimized for the instrument. We recommend users to keep the original packaging of instrument for the case of transportation or long-time storage.



Install the instrument on the flat area and do not move this while the instrument is running. Chip drawer is opened and closed by physical locking mechanism and external stress could cause unintended opening of the chip drawer.



Only the electricity described in the chapter 1 should be applied to the instrument.



The power of instrument should be switched off before disconnecting power cable from the instrument. Also, the power switch should be at "O" position before connecting the power cable to the instrument.



Do not handle the instrument with wet hands as this will cause electric shock to the user.



Do not open the DC adaptor of instrument when the cover is opened because there is the risk of electric shock.



This instrument should be used with exclusive chip (Rapi:chip™) only and any other material should not be installed on the heating plate of the instrument for any purpose.



This instrument is designed and manufactured for the purpose of thermal cycling and fluorescence analysis of biological samples loaded in exclusive chip (Rapi:chip™). Any other use is considered improper and may result in damage to the instrument and/or unreliable analysis result.

3. Getting Started

Congratulations on your purchase of Model UF-150 GENECHHECKER® Ultra-Fast Real-time PCR System. This chapter of manual will introduce the way to have instrument ready from the point when the instrument is delivered. This chapter includes four topics :

- Unpacking of product
- Ins and outs of system
- Power and electrical considerations
- Cabling and placement

Please get familiar with the contents of this chapter before actual use of the instrument.

3.1 Unpacking product

This instrument uses eco-friendly bio-degradable packaging materials made of corrugated paper sheet and no plastic cushioning material is used for packaging of instrument. Only anti-scratch films and plastic bags are used for packaging instrument accessories.

Figure 4 Outer packaging of Model UF-150



Figure 4 is the image of outer packaging of instrument. Top side of the package can be opened to put the contents out.

Figure 5 Opening outer carton



Like Figure 5, simply pull the flap at the center of front surface of carton then carton can be opened.

Figure 6 Inside of outer carton – upper space



Inside the carton, you will find 1 PK of Rapi:chip™ PCR Chip for GENECHECKER® (catalog number : 002001), operating manual, power cable set, chip scrubbing cloth, USB communication cable and software license in USB storage format* along with GeneRecorder software in USB storage media* (* included in system package of catalog number : 001151). Depending on the country, Genesystem enclose appropriate power cord in the product package but you are requested to contact your local representative if power cord enclosed is not compatible with your local electric power consent.

Figure 7 Inside of outer carton - bottom space



Taking out Rapi:chip™ and power cable, you will see final packaging of GENECHECKER®. Remove upper cover and carefully take out the instrument.

Figure 8 All the components of GENECHCEKER® included in the packaging

Please check if all the components listed below are included in the product package.

- 1 SET of GENECHCEKER® Main Instrument
- 1 PK of Rapi:chip™ PCR Chip (Cat. No. : 002001)
- 1 EA of AC to DC Power Adaptor
- 1 EA of Power Cable Corresponding to Your Local Electricity
- 1 EA of USB Communication Cable
- 1 SET of Operating Manual (on USB flash drive)
- 1 EA of Pipetting Rack (PCR Chip Holder)
- 1 SET of Chip Scrubbing Cloth
- 1 EA of GeneRecorder software in USB storage media (optional – included in catalog number : 001151)
- 1 EA of GeneRecorder License in USB storage format (optional – included in catalog number : 001151)
- Packaging Materials

Three steps of inspection are performed at Genesystem prior to shipping instrument. However, for any possibility of missing or damaged components, it is highly recommend that you open the carton and check the components as soon as the instrument is delivered. In case any missing or damaged part is found, contact your local representative immediately for corrective actions.

3.2 Ins and Outs of Instrument

GENECHECKER® has intuitive and user-friendly interfaces for day-to-day PCR tasks in laboratory and even at the site. However, it is recommended that you get more familiar with the functions of each part of GENECHCEKER® through this topic before you operate the instrument and perform PCR test, in order to avoid possible mishandling of instrument.

Figure 9 Ins and Outs of GENECHECKER®**① RUN/STOP button**

Selected PCR protocol is executed when this button is pressed. Currently performed PCR cycle can be stopped when this button is pressed while instrument is running.

② LCD display

4 line text LCD offers clear identification while protocol setting and status monitoring.

③ Jog dial

Rotating jog-dial rightwards or leftwards adjusts set values and pressing jog-dial selects what cursor indicates.

④ LED indicator

LED indicator is illuminated in two different colors, blue or red. Blue LED indicates that the instrument is idle and ready for use. Red LED indicates that the instrument is in use, i.e. PCR cycles are being performed.

⑤ Chip presser

Automatically presses upper surface of chip when the chip drawer is closed so that the bottom surface of the chip is securely in contact with heating plate. This part is intended for automatic movement and it is not recommended to touch this part.

⑥ Heating plate

This is the point where the chip is loaded for PCR cycles.

⑦ Air ventilation holes

Holes which air flows into the instrument through

⑧ Chip drawer

This is the part transporting chip into the instrument. Mechanically stable and robust design offers soft movement and maintenance-free features of this frequently used part.

⑨ PUSH bar

Chip drawer is gently opened and chip presser automatically moves up when this bar is softly pressed.

⑩ Groove for easy handling

This part is to enhance portability of instrument.

⑪ MENU button

Main menu screen is displayed when this button is pressed.

3.3 Power and electrical considerations

GENECHECKER® adopted DC power driven operation in order to apply instruments to versatile applications. In order to secure stable operation of instrument, your electrical preparation should meet the following requirements.

- Input Voltage : AC 100-230V (50/60Hz)
- Input Current : 2.0A

For your information, the output power of AC to DC adaptor to GENECHECKER® is as per following specification.

- Output Voltage : DC 12V
- Maximum Current Load : 10.0A

3.4 Cabling and placement

As introduced in section 3.1, there are AC to DC power adaptor and power cord compatible with the customer's power consent in the instrument package. Connect power adaptor and power cord like Figure 10.

Figure 10 Connecting cable to DC adaptor



Figure 11 Connecting DC adaptor and USB cable to instrument

Then, place the male 4-pin power jack of AC to DC adaptor to the female power socket at back side of instrument and apply slight pressure forward to connect power jack to the instrument. Pay attention to the direction of power jack when you connect this to the instrument. Flat surface of power jack (with marked arrow) should face the bottom and round surface of power jack should face the top. Applying pressure with wrong direction of power jack could possibly damage the socket. For the communication with software, connect enclosed USB cable to the port located upper part of power socket. The round shaped side should face top.

Figure 12 Back side of GENECHCEKER® with power cable and USB cable connection

There should be more than 15cm of clearances around the sides of GENECHCEKER® in order to adequately cool the system. Never block air ventilations holes at front and back side of instrument because this can lead to malfunction of instrument and cause physical damage to heating system of GENECHCEKER®.

Now, GENECHCEKER® is ready for operation.

Go to the next chapter to learn how to operate the instrument.

4. Operation

This chapter will describe what kinds of steps are needed to conduct experiment and how to set the instrument to properly perform ultra-fast PCR tests. Following topics are introduced in this chapter.

- Tools needed to perform test
- Sample and enzymes for PCR test with GENECHCEKER®
- How to handle Rapi:chip™
- Setting and saving protocols
- Data analysis using GeneRecorder software
- Collection of samples for additional treatment
- How to use car power kit and battery kit (optional)
- Instrument alarms
- Shut down and storage

4.1 Tools needed to perform test

GENECHECKER® requires several tools used for general biological experiments. Before starting PCR task, please check below items and have them ready.

Tools that should be ready before using GENECHCEKER®		
Adjustable Volume Micropipette	Pipetting Range : 0.5-10µL	1 EA
Pipette Tip	Volume : 10µL	As required
Tweezers	Straight or Curved	1 EA
Parafilm or Tubes	To prepare sample mixture	As required
Vortex and/or Centrifuge	For mixing and spinning down sample mixture before loading into PCR chip	1 EA

Based on the assumption that you are familiar with PCR preparation process, this manual doesn't describe the details how to prepare PCR samples. In order to mix samples with enzyme and etc., general micropipette and tips are needed for accurate volume handling and general small volume mixing tools like parafilm or tube (with vortex and/or centrifuge) is needed to mix the sample properly. Tweezers having straight or curved tip is needed to handle sealing tapes which is quite thin and small to deal with finger. If you are equipped with these things, you are set to start experiment with GENECHCEKER®.

4.2 Sample and enzyme for PCR test with GENECHCEKER®

Nucleic acid extraction and purification

We do not require any specific method of sample preparation (extraction and purification) for use with GENECHCEKER®. General methods of sample preparation used for conventional PCR task are acceptable for GENECHCEKER®.

PCR Enzyme

As you may be familiar with, GENECHCEKER® has two key features which are extremely fast thermal cycling and capability of real-time detection in connection with dedicated software, GeneRecorder. In order to make best use of these key benefits and minimize trial and errors in the enzyme selection, we

recommend users to use following master mixes supplied by Genesystem which are optimized for use with GENECHCEKER®.

Cat. No.	Description	Pack Size
004001	Rapi:Detect Master Mix with Fluorescent Dye	2 x 1ml Tube
004002	Rapi:1-Step Onestep RT-PCR Kit with Fluorescent Dye	2 x 1ml Tube
004005	Rapi:Spec Probe Mix	2 x 1ml Tube
004007	Rapi:Spec Probe Mix for Onestep RT-PCR	2 x 1ml Tube

Series of master mixes of Genesystem are 2x concentrated, ready-to-use reaction cocktail containing all components, except primers and template, for ultra-fast PCR tasks. These premixes include a novel antibody-mediated hot-start DNA polymerases with improved speed compared to other commercial polymerases, as a standard. The master mix for real-time detection includes a double strand DNA specific-binding fluorescent dye and the one with reverse transcriptase is available for one-step RT-PCR applications. Master mixes optimized for probe applications are also available.

For the customers who want to use their own enzymes for reaction, it is recommended to source those with similar features of what is supplied by Genesystem and green intercalating dye such as SYBR Green II, EvaGreen should be included for detection. For probe applications, FAM labeled probe can be used.

Recipe of sample mixture

There is no fixed recipe to prepare reaction sample and it is recommended for users to find their own recipe optimized for GENECHCEKER® through actual experiments. However, user can start with following example of sample recipe. Please note that final volume of sample should always be 10µL.

Item	Volume
Master Mix (2x)	5 µL
Primer (Reverse and Forward)	2 µL
RNAase/DNAase Free Water	2 µL
Template	1 µL

Size of target sequence of DNA template

There is no limit on the size of target sequence of DNA to be used with GENECHCEKER® but it shows maximum(fastest) performance and efficiency when its size is not longer than 1,000 bp. However, GENECHCEKER® can run with target DNA sequence larger than 1,000 bp by optimizing the protocol (increasing duration of annealing time or number of PCR cycles).

Concentration of primer

Concentration of primer is one of key factors affecting to the result of analysis. Annealing becomes inefficient if the concentration of primer is too low while primers can non-specifically bind to undesired section of the template or bind to each other if concentration is too high. There is no recommended molar concentration of primer but it is recommended to start with 1µM concentration

because well-designed primers that works perfectly with GENECHCEKER® is in the range of concentration of 1 μ M or under.

4.3 How to handle Rapi:chip™

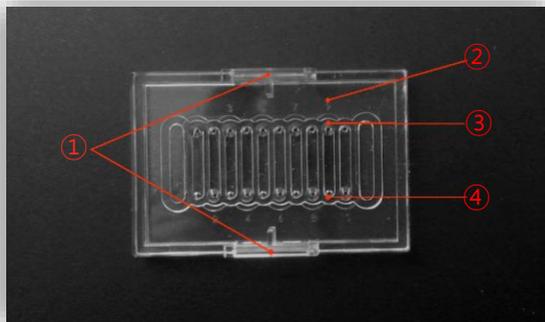
Rapi:chip™ is the key component to achieve ultra-fast PCR result using GENECHCEKER®. There are several tips to make best use of Rapi:chip™ without error or poor reaction outcome.

- Bottom surface is key part to achieve ultra-fast PCR result and this part should be always kept clean. Any dust or particle existing on the bottom surface can disrupt the heat transfer.
- Rapi:chip™ requires a little different pipetting technique. You should inject the sample into the wells of chip and never drop the sample on the chip surface. For this, you should insert end of pipette tip into the apertures of chip wells. This point is very important because Rapi:chip™ is small device and the distance between adjacent ports are very close, i.e. this chip is open to the possibility of cross contamination.
- Basically, user can freeze Rapi:chip™ containing samples in each well. However, please keep in mind that, in some cases, bottom surface of the chip made of thin film can burst when Rapi:chip™ gets frozen, owing to volumetric expansion of sample existing in each well.

If you have kept in mind above tips, you are now set to start actual experiment with Rapi:chip™ in connection with GENECHCEKER®. Please get familiar with each part of Rapi:chip™.

Figure 13

Getting familiar with Rapi:chip™



① Wings

These parts are used for picking up Rapi:chip™ with fingers or tweezers.

② Printed Well Numbers

Well numbers from "1" to "10" are printed on the upper surface of the chip. Odd numbers of well (1, 3, 5, 7 and 9) are printed on the top and even numbers of well (2, 4, 6, 8 and 10) are printed on the bottom of the well.

③ Inlet Hole

The holes neighboring with printed well numbers are inlet hole of each well where pipette tip is inserted for injecting reaction sample into the well.

④ Outlet Hole

The hole at opposite side of each well's inlet hole is outlet hole through which air existing inside the well is going out while reaction sample is loaded into the well. Excess volume of each well volume (10 μ l) run over through this hole.

Figure 14 Rapi:chip™ packaging



Figure 14 shows standard packaging of Rapi:chip™ (Cat. No. : 002001). This package contains 48 pcs in it but Rapi:chip™ is also supplied in different package as follows.

Cat. No.	Description	Pack Size
002001	Rapi:chip™ PCR Chip, Small Pack	48/PK
002002	Rapi:chip™ PCR Chip, Medium Pack	384/PK
002003	Rapi:chip™ PCR Chip, Large Pack	768/PK

Catalog number : 002002 comes with 8 PK of catalog number : 002001 and catalog number : 002003 comes with 16 PK of catalog number : 002001.

Carton of Rapi:chip™ with wrapped with plastic film. You can open the carton after removing wrapping film.

Figure 15 Inside the Rapi:chip™ packaging



Rapi:chip™ is placed inside the rack in 4 rows and 12 chips are stacked in each row of the rack. Besides the chips, there are sealing tapes in each carton. Sealing tapes are used for sealing apertures of Rapi:chip™ after samples are loaded in each well. In order to seal 10 wells of Rapi:chip™, one piece of tape is needed (One tape per a Rapi:chip™). Sealing tape is in white color and user can make memo on it using laboratory marker if necessary.

Figure 16 Peeling plastic film inside the package



Upper surface of stacked chips are sealed with plastic film in order to prevent possible contamination. This film can be easily peeled using fingers like shown in Figure 16. For storage of remaining chips, you may seal the upper surface of the rack using the same film. Rapi:chip is manufactured in clean room area but not sterilized. If sterilization is needed, please use ETO gas sterilization method only. Autoclaving is not recommended due to the possibility of transformation.

Figure 17 Picking up Rapi:chip™ out of the packaging



For easy transportation using tweezers or fingers, Rapi:chip™ has two wings at its sides. Using general tweezers (straight or curved), hold either side of wings and move the chip out of the packaging as Figure 17.

Figure 18 Sample loading into Rapi:chip™

After preparing reaction sample, aspirate this with micropipette and vertically place the tip in the inlet hole like shown in Figure 18. Inlet hole is neighboring with printed well number and diameter of this hole is a bit bigger than that of outlet hole (Refer to Figure 13). The hole on the opposite side of inlet hole is outlet whole where existing air in the well and excess volume of sample is going out.

While sample loading, make sure that the end of tip is securely fit into the inlet hole of the well and apply slight force downward and then, slowly dispense the sample into the chip. You can observe the sample flow inside the well while loading.

Rapi:chip™ is designed to accommodate exact volume of 10µL in each well and the sample flow should stop without overflowing unless there is any error in pipetting process. If you observe that dispense of sample is not completed although the sample flow reaches opposite aperture of the well, you should stop dispensing sample.

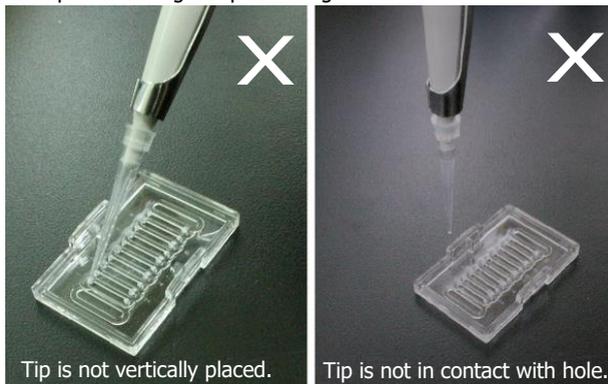
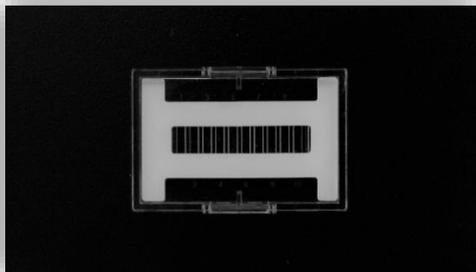
Figure 19 Examples of wrong sample loading

Figure 19 shows wrong examples of sample loading. As introduced earlier, pipette tip should be inserted to the aperture of Rapi:chip™ and its direction should be vertical.

Figure 20

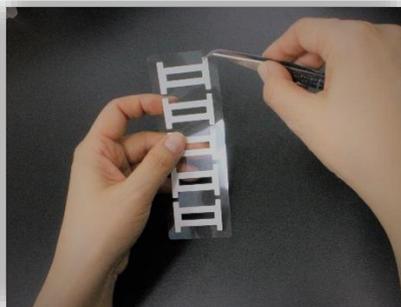
Sealing Rapi:chip™



After sample loading process, every hole of the wells should be sealed using enclosed precut sealing tapes. This is to prevent contamination as well as vaporization of reaction samples during thermal cycling. Every hole of the chip should be sealed with one piece of tape like Figure 20.

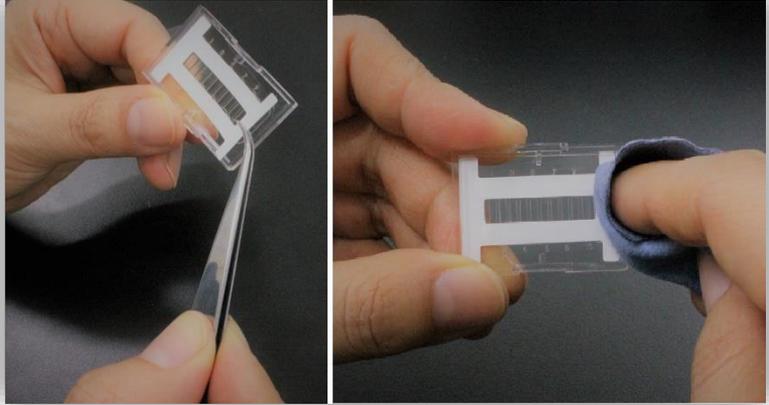
Figure 21

Preparing sealing tapes



In the box of Rapi:chip™ (catalog number : 002001), there are 10 strips of sealing tape and each strip contains 5 pieces of sealing tape, i.e. total 50 pieces of sealing tape comes with Rapi:chip™ (actual quantity needed : 48 pieces based on 48 chips).

Taking out one strip of sealing tape from the plastic bag in the box, peel one piece of sealing tape from the strip using tweezers like shown in Figure 21.

Figure 22 Sealing holes with sealing tape

Like Figure 22, place one end of sealing tape alongside one end of Rapi:chip™ and seal entire holes. Then, scrub the surface of sealed points using finger, tweezers or enclosed scrubbing cloth.

Figure 23 Loading samples on the heating plate

Once every apertures of Rapi:chip™ is securely sealed with sealing tape, you can proceed with Rapi:chip™ loading process. Like Figure 23, gently push the button on the front side of instrument. Then, the instrument drawer is opened and you can find rectangular space at the center which is heating plate. This is the place where prepared Rapi:chip™ is loaded. Using finger or tweezers place the prepared Rapi:chip™ on the heating plate. Check up the direction of the chip when loading. Odd numbers of wells should be up and even numbers of well should be down. Make sure that Rapi:chip™ is flatly loaded on the heating plate because failing which will not allow the door get properly closed and possibly damage the components inside the drawer. Then, close the drawer by pushing front surface of drawer until you hear the sound of “click” which indicates that the drawer is properly closed. Never try to open the drawer and withdraw the chip while instrument is performing thermal cycling. This can cause heat damage to user. Opening the drawer during thermal



cycling process will stop the instrument running as door sensor is activated when the drawer is opened.

Now, you are set to start instrument operation. At the next chapter, you will be guided to set reaction protocols and start operation.

4.4 Setting and saving protocols

GENECHECKER® has simple user interface which enables user to intuitively set reaction protocols and run PCR cycles. User can control GENECHCEKER® with three parts which is jog dial, "MENU" button and "RUN/STOP" button. Refer to Figure 9 in page 13 to get familiar with each part of instrument. Basic functions of these three control interfaces are as follows.

Jog Dial

- Rotating jog dial leftwards indicates upper menu in MENU screen.
- Rotating jog dial rightwards indicates below menu in MENU screen.
- Rotating jog dial leftwards decreases indicated number.
- Rotating jog dial rightwards increases indicated number.
- Pressing jog dial selects indicated menu.
- Pressing jog dial inputs indicated number and indicates the next parameter to set.
- Rotating jog dial leftwards or rightwards moves the screen to previous or next screen in case selected menu consist of multiple screens (ex. Setting and loading protocol screens).
- Pressing lengthily saves the protocol in integrated memory.

MENU button

- Pressing this button at initial screen moves the screen to MENU screen.
- Pressing this button moves the screen to previous screen.
- Pressing this button while adjusting parameter escapes from the parameter that user was setting.

RUN/STOP button

- Pressing this button at initial screen moves the screen to MENU screen.
- Pressing this button starts instrument operation when this button is pressed at the protocol screen
- Pressing this button makes the screen display "Are you sure to stop?" when this button is pressed while instrument is running.
- Pressing this button stops instrument operation when this button is pressed while "Are you sure to stop?" is displayed in the screen.

Jog dial is surrounded by LED lamps which illuminates in different colors depending on instrument status. This is to have users identify the status of instrument from a distance without checking the screen.

Lamp Color	Status
No	Instrument completed operation and now it is idle.
Blue	Instrument is idle and waiting for instruction.
Red (Blinking)	Instrument is running.

Figure 24

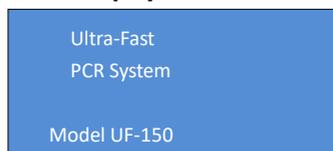
Power switch of GENECECKER®



GENECHECKER® has its power switch on the back of instrument. The switch shown in Figure 24 is two position power switch. "O" is off position and "I" is on position. User can switch on GENECECKER® by setting the switch to "I" position and off GENECECKER® by setting the switch to "O" position. Never touch the switch with wet hands.



Initial Display



This is displayed on the screen when the instrument is switched on. Model number and instrument name is displayed.

MENU



When "MENU" button or jog dial is pressed from initial display, screen displays the left where you can select the menu you want to perform. Blinking menu is what can be chosen once jog dial is pressed and you can move up and

down by rotating jog dial leftwards or rightwards. Pressing jog dial selects the blinking menu and proceeds to next screen. This screen returns to initial screen unless there is user's adjustment for 30 seconds. Basic description of each menu is as follows and details on how to set is explained later.

- **Set Protocol** : You can program your own reaction protocol in this menu. You can set temperature, duration of each step and set number of cycles (denaturation – annealing – extension) to be repeated.
- **Load Protocol** : You can load the reaction protocol which was saved in integrated memory of instrument.
- **Set Chip** : You can turn on and off the LED lamp of the instrument. This menu is intended for displaying well status on the GeneRecorder software to adjust camera angle or the location of fluorescence signal reading box. LED lamp of the instrument is turned on when this menu is selected then description of this menu is changed to "LED On". When "LED On" is selected the LED of the instrument is turned off and description of menu returns to "Set Chip". Details on this menu is explained in later chapter on GeneRecorder software.

Setting Protocol

```
[RT-PCR Setting]
Step RT           50°C  15Min
Step Melt        ON
```

Left screen is displayed when you select "Set Protocol" from the menu screen. This screen is for setting RT (Reverse Transcriptase) PCR cycle when the experiment handles RNA template. If you press jog dial, the number 50 in left screen starts to blink.

This number is the temperature you can maintain for RT-PCR cycle. You can adjust this number by rotating jog dial leftwards or rightwards. Range of number (temperature) you can set is from 35 to 65. If you press jog dial after temperature adjustment, adjusted number is set as temperature and the number "15" in left screen starts to blink. This number is the running time (minutes) for which you can maintain the set temperature. User can adjust this number from 0 to 30 using jog dial and selected value is saved by pressing jog dial. If you do not have to fulfill RT-PCR cycle, the time should be set at "0". Then, the step RT is skipped. Next line is for setting melting cycle. Default setting is "ON" and the instrument runs melting cycle right after amplification process. By pressing jog dial and rotating it, you can skip melting cycle, when the display of "ON" is changed to "OFF". By pressing jog dial, melting cycle is set and the screen proceeds to next screen.

```
Step1 95°C 30sec
Step2 95°C  4sec
Step3 95°C  4sec
Step4 95°C  4sec
```

Left screen is displayed when you complete setting RT-PCR cycle. Step1 through step4 displayed in the screen represent pre-denaturation, denaturation, annealing and extension cycle respectively. Temperature and running

time can be adjusted and set by the same method used in RT-PCR setting.

```
Step5 72°C  0sec
No.Cycles: 30
Total:11min51sec
Save                               P00
```

Left screen is displayed when you slightly rotate jog dial rightwards at initial screen of protocol setting or presses jog dial after adjusting temperature of step 4. This screen includes step 5 which is post-extension cycle and this can be set by the

same method described above. "No. Cycles" indicates the number of cycles you can repeat and you can set this number from 0 up to 50. The range of temperature and running time that can be set for each step is as follows.

Step	Cycle	Temperature Range	Duration
RT	Reverse Transcriptase	35~65 °C	0 ~ 30 minutes
1	Pre-denaturation	1~99 °C	1 ~ 900 seconds
2	Denaturation	1~99 °C	1 ~ 60 seconds
3	Annealing	1~99 °C	1 ~ 60 seconds
4	Extension	1~99 °C	0 ~ 60 seconds
5	Post-extension	1~99 °C	0 ~ 60 seconds

Step 4, extension step can be set at "0", which is to have this instrument perform 2-step thermal cycling when needed.

You can also set the time of repeating "denaturation – annealing – extension" cycle (step 2 through 4 of protocol setting screen). Number of cycles can be set from 0 to 50. "Total" indicates total running time including melting cycle based on currently set protocol which is automatically calculated.

"Save" is blinking if you complete setting number of cycles. If you desire to save set protocol in integrated memory, the screen proceeds to new screen by pressing jog dial, where you can save the set protocol. If you don't want to save, instrument immediately starts currently set protocol by pressing "START/STOP" button.

"P00" in the screen indicates the address where current protocol is saved. "P00" means that this protocol has no address and can be saved if user wants. If the protocol is loaded from integrated memory, the address of the loaded protocol is displayed in place of "P00" of the screen (for instance "P01"). GENECHECKER® has integrated memory where up to 12 protocols can be saved and its address is displayed in format of "P00" such as "P01", "P12" and so on.

Saving Protocol

```
[ P01:          ]
  P02:
  P03:Mike#7
  P04:BetaDNA
```

Left screen is an example of display which is shown when you press jog dial while "Save" of protocol setting screen is blinking. Cursor moves up and down by rotating jog dial and you can save the set protocol by pressing jog dial and staying

for 3 seconds at the address which cursor indicates. Then, you can name the protocol by combination of following characters.

Item	Character
Alphabets	A B C D E F G H I J K L M N O P Q R S T U V W X Y Z
Numbers	1 2 3 4 5 6 7 8 9 0
Signs	. () * # -
Others	Spacing

By rotating jog dial, you can see above characters in order and set desired character by pressing jog dial. You can input up to 7 characters for naming and the protocol is automatically saved if you input the last 7th character.

If you want to name the protocol with the characters less than 7, the protocol is saved by pressing jog dial and staying 3 seconds after entering the last character. If you save the protocol in the address where other protocol already exists, old protocol is replaced by newly saved protocol.

Loading Protocol

```
[ P01:JIM          ]
   P02:A-DNA
   P03:B-RNA
   P04:0812-13
```

Left screen is an example of what is shown when you select "Load Protocol" from menu screen. You can select the protocol which already exists in each address of memory by locating the cursor with jog dial and select desired protocol

by pressing jog dial. Once protocol is selected, selected protocol is displayed in the screen and you can run loaded protocol by pressing "START/STOP" button. Parameter of protocol can be changed and newly saved with updated parameters.

Starting and Stopping Operation

```
Run.. P01
StepRT (RT Mode)
Cycles to Go 30
Timer:29min50sec
```

```
Run.. P01
S1 S2 S3 S4 S5
Cycles to Go 30
Timer:29min50sec
```

Left screen is an example of what is shown while RT-PCR cycle is performed. "StepRT" blinks while this cycle is performed. After RT-PCR cycle is finished, the screen is changed to below screen which shows set PCR protocol consisting of 5 steps. You can recognize which step GENE CHECKER® is currently performing by because currently performed step ("S1" through "S5") blinks. For example, "S2" blinks if instrument is performing step 2 - denaturation cycle. "Cycles to Go"

means the total remaining cycles (denaturation – annealing – extension) to complete currently running PCR cycle and indicated time after "Timer" is total remaining time to finish entire PCR cycle being performed. All five steps ("S1" through "S5") are blinking together while melting cycle is performed.

PCR Cycles is Completed

```
Ending.. P01
S1 S2 S3 S4 S5
No.Cycles 00Cyc
Timer: 0min 0sec
```

An alarm rings "beep-beep-beep-beep-beep" and the result of reaction is displayed on GeneRecorder software. This screen is kept until user's intervention.

4.5 Data analysis using GeneRecorder software

Model UF-150 GENECHECKER® Ultra-Fast Real-time PCR System adopted two-track operation, i.e. setting parameters and running/stopping instrument are locally performed on the instrument while data analysis is remotely performed through Windows® based external computer using GeneRecorder software. GeneRecorder is easy-to-use and user-friendly data analysis software to be used with Model UF-150 GENECHECKER® Ultra-Fast Real-time PCR System. For the system package of catalog number : 001150, GeneRecorder is installed on the Windows® 10 based laptop computer included in the system package while software license in the USB storage format and GeneRecorder software in separate USB storage media are included in the system package for catalog number : 001151.

In order to record and analyze the reactions of Model UF-150 GENECHECKER® Ultra-Fast Real-time PCR System, the instrument should be always connected to the computer using enclosed USB cable.

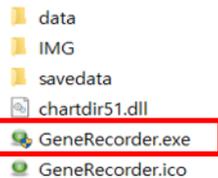
Running GeneRecorder software

Please follow below procedures to run GeneRecorder software.

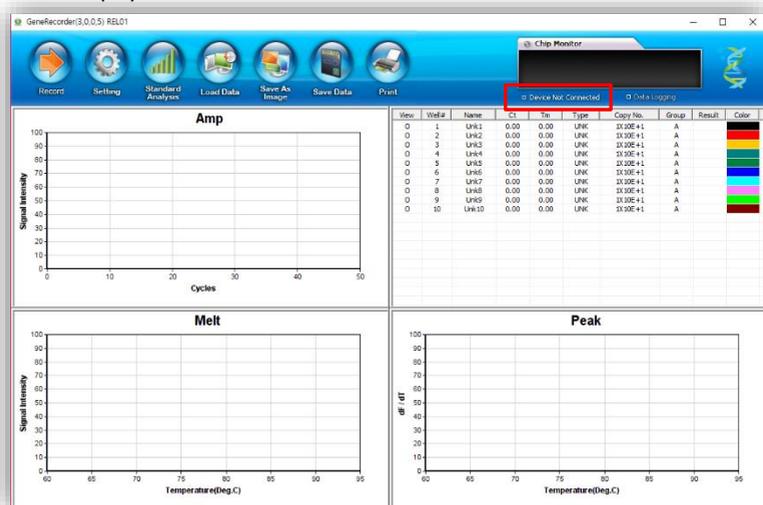
- 1) Turn on the power of main instrument while analysis computer is turned on and ready for use after booting process.
- 2) Make sure the connection of main instrument and laptop computer through USB communication enclosed in the package of instrument. In case you purchased catalog number : 001151, please make sure that you have transferred GeneRecorder software file in the enclosed USB storage media to the computer and connected USB license to the USB port of the computer.
- 3) Double click below shortcut icon on the desktop of the PC and run GeneRecorder software.



Other option for running GeneRecorder is navigating the folders and running "GeneRecorder.exe" file (the file in red box of below screenshot).



- 4) When GeneRecorder is successfully loaded, software window should be displayed like Figure 25. Software window can be enlarged to full screen by clicking full screen box or double clicking title area of the software screen.

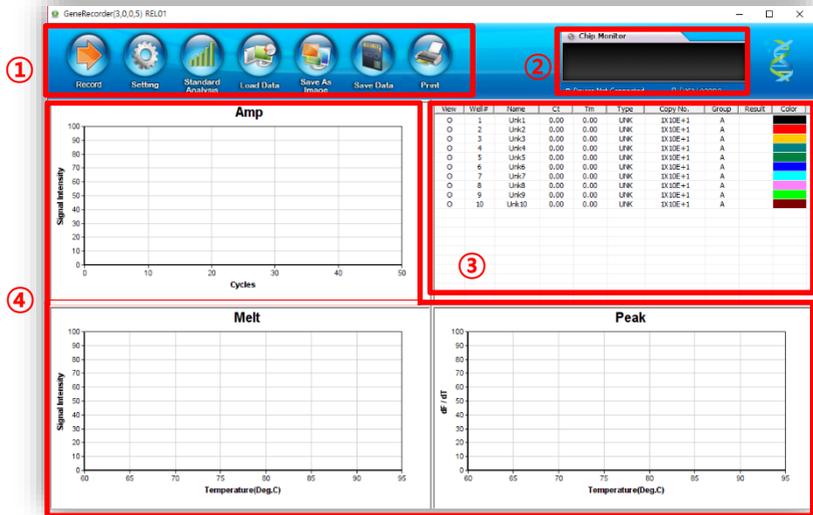
Figure 25 Initial display of GeneRecorder software

The red square on the left of "Device Connected" indication (the part in red box of Figure 25) blinks when the computer and main instrument is properly connected and communication is established.

- 5) By clicking "Setting" button on the top of the screen, adjust camera focus and the location of signal reading box of each well (Refer to page 34 through 35 of this manual for setting).
- 6) Set the PCR protocol at the main instrument (Refer to "Setting protocol" section in the page 26 of this manual).
- 7) By pressing 'START/STOP" button of main instrument, run PCR cycles. Recording and analysis procedures of GeneRecorder software are automatically performed.
- 8) The instrument alarms when the PCR cycles are finished and result of analysis is displayed on the software screen.
- 9) For the other features like advanced standard analysis, please refer to later sections of this manual.

Getting familiar with GeneRecorder software

Figure 26 Sections of main screen of GeneRecorder



Main screen of GeneRecorder consists of four sections. Functions of each section are as follows.

- ① **Top Menu**
User can set the parameters of the software using each menu in this section
- ② **Chip Monitor**
User can visually monitor the status of amplification. Displayed image is real-time status of chip surface (detection area).
- ③ **Well Property**

Figure 27 Well Property Section of GeneRecorder

View	Well#	Name	Ct	Tm	Type	Copy No.	Group	Result	Color
O	1	CH1	15.58	75.23	STD	2X10E+5	A	-	Black
O	2	CH2	19.54	74.58	STD	2X10E+4	A	-	Red
O	3	CH3	24.15	74.26	STD	2X10E+3	A	-	Yellow
O	4	CH4	28.14	73.94	UNK	2.22X10E+2	A	-	Green
O	5	CH5	31.19	73.94	UNK	4.31X10E+1	A	-	Light Green
O	6	CH6	34.92	73.94	UNK	5.79X10E+0	A	-	Blue
O	7	CH7	36.04	73.94	UNK	3.17X10E+0	A	-	Cyan
O	8	CH8	0.00	0.00	UNK	8.15X10E+8	A	-	Magenta
O	9	CH9	0.00	0.00	UNK	8.15X10E+8	A	-	Light Blue
O	10	CH10	0.00	0.00	UNK	8.15X10E+8	A	-	Dark Red

1) View : You can select and deselect the sample you want to display in the charts. When the sample is deselected, "O" marking is cleared. By clicking or dragging, you can choose the samples you want to display. By locating mouse pointer in

each cell of "View" column and pressing right mouse button, you can select or

deselect all the samples at once. You can select and deselect all the samples by clicking the title cell of the column ("View").

2) Well : Well number is displayed (not changeable).

3) Name : Sample name can be typed. By double-clicking each cell, you can enter the name. As an existing data file is loaded, the names in that file is displayed here.

4) Ct : Ct value (after reaction or in the data file) is displayed.

5) Tm : Tm value (after reaction or in the data file) is displayed.

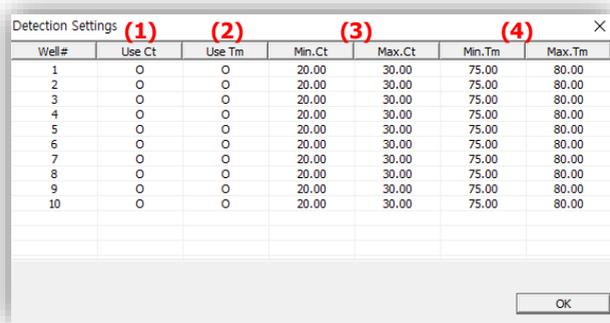
6) Type : You can define the sample type – standard (STD) or unknown (UNK). By locating mouse pointer in the cell and pressing left button of mouse, you can define the sample as standard or unknown. By locating mouse pointer in the cell and pressing right button of mouse, you can set all the samples below the cell as standard or unknown at once.

7) Copy No. : If the sample is set as standard(STD), you can input the copy number directly (in the format of "numberAX10E+numberB" or "numberA,numberB". In case the sample is unknown(UNK), analyzed data or the value in data file is displayed in this column.

8) Group – You can choose group of standard analysis. You can set the group of sample as A or B. By setting group of samples, the unknown samples are analyzed on the basis of the copy numbers of standard samples in the same group. By locating mouse pointer in the cell and pressing right button of mouse, you can set all the samples below the cell as A or B at once.

9) Result – Based on the set detection parameters, the sample is defined as one of positive (+) or negative (-). By clicking left button of mouse while mouse pointer is in any cell in this column, a window is popped-up as Figure 28 where you can set detection parameters for each well. You can use Ct and/or Tm as detection parameter(s).

Figure 28 Pop-up window for detection settings



- You can use Ct value as detection parameter. By clicking with left button

of mouse you can select or deselect the samples. By clicking with right button of mouse you can select or deselect all the samples at once.

- You can use T_m value as detection parameter. By clicking with left button of mouse you can select or deselect the samples. By clicking with right button of mouse you can select or deselect all the samples at once.
- By double-clicking with left button of mouse, set minimum and maximum Ct values. As the analyzed Ct value is between these minimum and maximum data, the result is defined as positive.
- By double-clicking with left button of mouse, set minimum and maximum T_m values. As the analyzed T_m value is between these minimum and maximum data, the result is defined as positive.

10) Color – You can set the color of the samples in the charts.

④ Charts(Graphs)

GeneRecorder provides four types of curves on its window which are “Amp”, “Standard”, “Melt” and “Peak”. “Amp” stands for “Amplification” and real-time amplification curve is displayed in this section. “Melt” stands for “Post-Reaction Melting Curve” and melting curve is displayed in this section. By changing display mode, this curve can be switched to “Standard” which stands for “Standard Curve”. “Peak” is the section to display peak data of each melting curve for easier identification of results. As mouse pointer is located in the chart areas and right button of mouse is clicked, a pop-up window is created where you can choose the curve that you want to display in the area or save currently chosen curve as an image file.

Figure 29 Pop-up window for displaying different types of curve



Top Menu of GeneRecorder

There are 7 menu buttons on the “Top Menu” section of GeneRecorder. Function of each menu is as follows.

Figure 30 “Top Menu” of GeneRecorder



① This menu indicates whether the camera of the main instrument is connected or not. GeneRecorder starts with the camera is connected, i.e. initial display of main screen shows “Stop”.



Camera of main instrument is onnected and recording is in process. By pressing you can disconnect the camera.

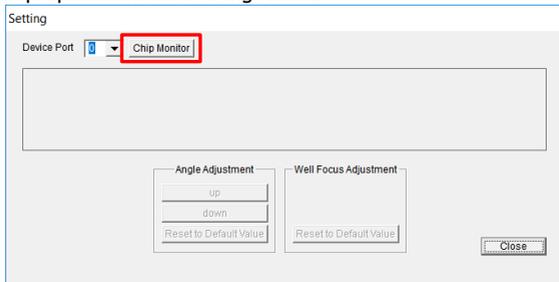


Camera of main instrument is not connected. By pressing your can establish connection and start recording.

② Setting

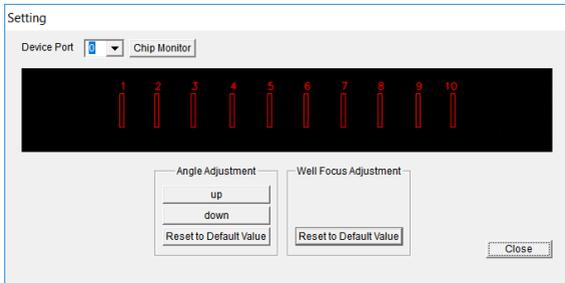
This menu is for setting the camera of main instrument. The process of setting camera should be performed at every test in order to make sure the accurate analysis. The window of Figure 31 is displayed when this menu is clicked.

Figure 31 Pop-up window of "Setting" menu



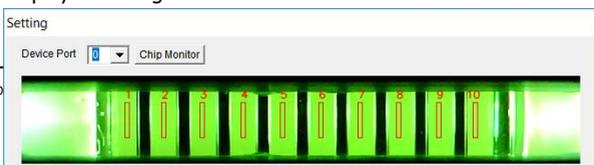
By clicking "Chip Monitor" button (the button in red box of Figure 31), you can display the wells of the Rapi:chip™ which is currently loaded in the instrument.

Figure 32 Display in setting window as "Chip Monitor" button is clicked.



Go to the main instrument and have the LED of the instrument turned on. LED is turned on when jog dial is pressed with "Set Chip" menu of main display is blinking. Then, the setting window will display the surface of Rapi:chip™ currently loaded in the instrument like Figure 33.

Figure 33 Display in setting window as LED of main instrument is turned on



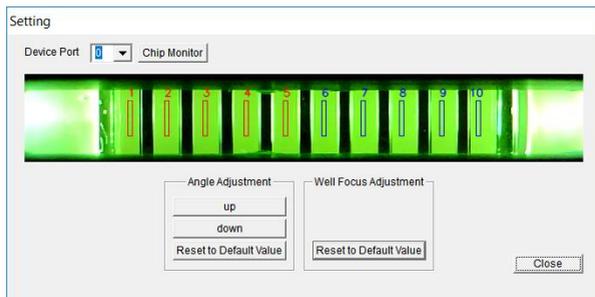


Using the "Angle Adjustment" section of the window (the buttons in red box of Figure 33), adjust the camera angle of the main instrument so that the wells of Rapi:chip™ is properly displayed in the middle. The red rectangles below well numbers are the areas in which fluorescence signals are detected. You can adjust the locations of these rectangles so that they can be located in clean areas without bubble or dusts on chip surface.

You can choose certain rectangle by clicking that rectangle with right button of mouse. By dragging with right button of mouse is pressed, you can choose multiple rectangles. By clicking or dragging with right button of mouse while "Ctrl" button of keyboard is pressed, you can choose discrete well(s). Once rectangle(s) is(are) chosen, user can move the location(s) of chosen rectangle(s) by one of following methods.

- 1) Click chosen(blue) rectangle with left mouse button is pressed and move to desired location.
- 2) Using arrow keys of keyboard, move to desired location.

Figure 34 Display when well #6 through 10 are chosen for adjusting location



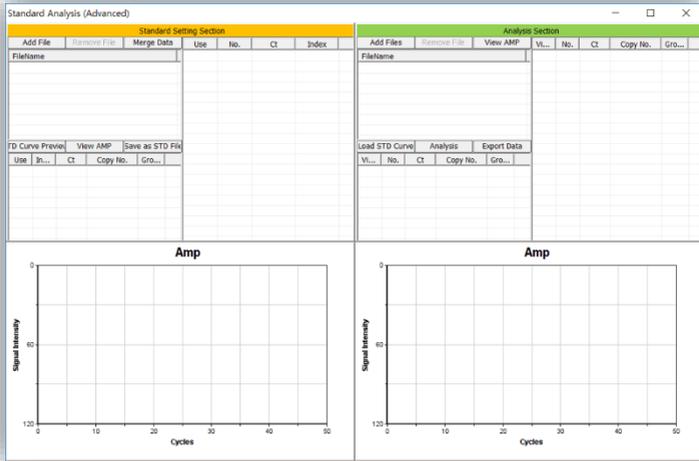
After everything is set as desired, turn the LED of main instrument off and close the setting window by clicking "Close" button. Please note that this setting window is not closed without turning off LED of main instrument. This process of setting the locations of fluorescence signal detection areas should be performed every time when new Rapi:chip is loaded for reaction and analysis.

③ Standard Analysis

This menu is for advanced standard analysis which is the tool for more

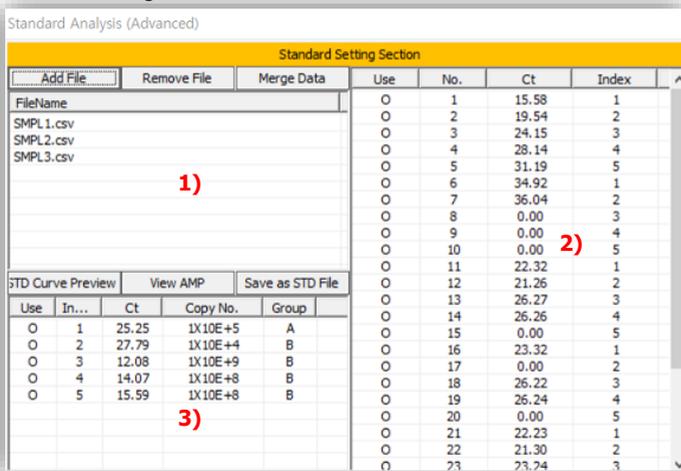
precise quantitation of DNA copies using the standard curve made from more number of reaction curves. When this button is pressed a window like Figure 35 is popped up which consist of two sections, standard setting section and analysis section.

Figure 35 Standard analysis window



In the standard setting Section, you can create standard curve and save that as a file in *.std format for quantitation by loading and merging already existing analysis data. In the analysis section, you can analyze and quantitate the DNA copies by loading standard curve data and the results of the reactions to analyze.

Figure 36 Standard setting section for creation of standard curve



1) This section is for loading already existing results and merging them to create standard curve. The functions of each button are as follows.

- Add File : You can load up to 5 files of standard curves (known samples in serial dilution)
- Remove File : You can remove the files in the list of files by selecting the file you want to remove and clicking this button.
- Merge File – You can merge the data in the loaded files by clicking this button. The merged data is displayed in the section 3) of Figure 36.

2) This section is for displaying the data of loaded files. Data is displayed in the order of loading the files. The functions of each button are as follows.

- USE : You can select and deselect the samples which you want to use for merging and creating standard curve data.
- Ct : Ct value of the sample is displayed.
- Index : You can index the samples for data merging. The samples in the same index is to be merged. You can use the number from 1 to 10 to index a well.

3) This section is for displaying the result of creating standard curve after data merging. The functions of each button are as follows.

- STD Curve Preview – You can view created standard curve.
- View AMP : You can view amplification curves.
- Save STD File : You can save merged standard curve as standard file in *.std format so that you can load this file for quantitation in analysis section of the window at any time.
- Use : You can select and deselect the samples for standard curve.
- Index : The name of index which was indexed in section 2).
- Ct : Average merged Ct. value
- Copy No. : You can input copy number here.
- Group : You can set the sample as standard A or B here.

Figure 37 Analysis section for quantitation

Analysis Section							
Add Files	Remove File	View AMP	View	No.	Ct	Copy No.	Group
FileName			<input type="radio"/>	Unk. 1	22.32	5.84X10E+5	A
SMPL2.csv			<input type="radio"/>	Unk. 2	21.26	1.24X10E+6	A
			<input type="radio"/>	Unk. 3	26.27	3.53X10E+4	A
			<input type="radio"/>	Unk. 4	26.26	3.57X10E+4	A
				Unk. 5	0.00	0.00X10E+0	A
			<input type="radio"/>	Unk. 6	23.32	2.86X10E+5	A
				Unk. 7	0.00	0.00X10E+0	A
			<input type="radio"/>	Unk. 8	26.22	3.68X10E+4	A
			<input type="radio"/>	Unk. 9	26.24	3.63X10E+4	A
				Unk. 10	0.00	0.00X10E+0	A
Load STD Curve	View STD/Analysis	Export Data					
View	No.	Ct	Copy No.	Group			
<input type="radio"/>	Std. 1	25.25	1X10E+5	A			
<input type="radio"/>	Std. 2	27.79	1X10E+4	A			
<input type="radio"/>	Std. 3	12.08	1X10E+9	A			
<input type="radio"/>	Std. 4	14.07	1X10E+8	A			
<input type="radio"/>	Std. 5	15.59	1X10E+8	A			

1) This section is for loading the reaction data that you want to analyze and quantitate. The functions of each button are as follows.

- Add Files : You can load up to 5 already existing reaction data (You can analyze up to 50 samples at a time.)

- Remove File : You can remove the files in the list of files by selecting the file you want to remove and clicking this button.

- View AMP : You can view amplification curves of loaded reaction data.

2) This section is for loading standard curve which you want to use as the parameter for analyzing and quantitating the reaction data loaded in section 1) of Figure 37. For analysis, you have to load standard curve file in *.std format first. The data of loaded standard curve is displayed here. The functions of each button are as follows.

- Load STD Curve : You can select and load standard curve file by clicking this button.

- STD View / Analysis : Prior to loading the samples for analysis (adding files) in section 1) of Figure 37, you can view loaded standard curve by clicking this button. By clicking this button after loading the samples for analysis (adding files) in section 1) of Figure 37, analyzed (quantitated) data is displayed in this section.

- Export Data – You can export the analyzed data.

3) This section is for displaying analyzed data. Each column stands for the followings.

- View : You can select and deselect the sample to analyze.

- Ct : Ct value of sample is displayed.

- Copy No. : Calculated copy number is displayed.

- Group : You can set the sample as either group A or B.

④ Load Data

By clicking this menu, you can load either the reaction data or environment (analysis parameter) data saved in the hard disk or any other storage media. In order to properly load analysis data, user should choose *experiment.csv* file (not *experiment_melt.csv* or *experiment_summary.csv*) when loading. In order to load analysis parameter data, user should choose *parameter.dat* file. This type of files includes every parameters such as sample name, type of sample, copy number (in case of standard sample), detection parameters, colors and so on.

⑤ Save As Image

By clicking this menu, user can save currently displayed analysis charts – Amp, Melt and Peak as image file (JPG format) at desired location.

⑥ Save Data

You can save either reaction data or environment (analysis parameter) data at desired location. Once reaction is completed, three kinds of reaction data files in csv format : *yyyy-mm-dd[hh-mm-ss].csv*, *yyyy-mm-dd[hh-mm-ss]_melt.csv* and *yyyy-mm-dd[hh-mm-ss]_summary.csv* are automatically created in the route of GeneRecorder > userdata > save folder in

“yyyymmdd” format > test folder in “test(AM or PM)hhmmss” format”. The data files, yyyy-mm-dd[hh-mm-ss].csv and yyyy-mm-dd[hh-mm-ss]_melt.csv contain fluorescence data of amplification and melting cycle respectively. The data file, yyyy-mm-dd[hh-mm-ss]_summary.csv contains summary of reaction data. The image file in JPG format is final display of the charts of the test. However, from this menu, user can save currently displayed analysis data in desired location. In case of environment (analysis parameter) data, it is not automatically saved and you have to choose the route for saving if you want to save this data.

⑦ Print

By clicking this menu, user can print out screenshot of currently displayed GeneRecorder window.

Other Tips

Please be informed of following tips to efficiently use GeneRecorder software without errors.

- 1) For proper analysis, GeneRecorder should keep its communication with the instrument. Please note that the communication is failed if the mode of computer is switched to energy saving mode, which will spoil currently performed test. To prevent communication failure, it is recommended not to activate energy saving mode in analysis computer.
- 2) GeneRecorder may fail to automatically detect and make connection to the camera module of the instrument if any other camera is already installed or connected to the analysis computer. Please refer to following instructions in case GeneRecorder is not connected to the camera module of instrument.

Camera Detection	Status Display	Required Action
Instrument camera is detected.	Device Connected	Proceed with test.
Other camera is detected.	Device Connected	Click Setting from top menu of GeneRecorder. Change device port and press “Chip Monitor” button. Change this process until GeneRecorder detects the camera of instrument.
No camera is detected.	Device Not Connected	Disconnected USB communication cable and reconnect the cable to refresh communication.

- 3) Please note that screen size of GeneRecorder is changed to its original size as soon as test is finished, when the software is running with full screen size.

- 4) Zooming in and out curves : Rolling scroll wheel of mouse while mouse pointer is located within the chart area will zoom in or zoom out the chart. Rolling forward direction will zoom in the chart and backward direction will zoom out the chart.
- 5) Highlighting specific curve and figures : User can highlight specific curve on the chart as well as figures in the well property area by simply placing mouse pointer on the curve in the chart area or figures in the well property area.

4.6 Collection of samples for additional treatment

The user who wants to perform gel electrophoresis can collect the sample in the Rapi:chip™ as follows.

- Remove sealing tapes.
- Insert pipette tip to aperture of each well of Rapi:chip™ while the pipette is ready for aspiration, and aspirate sample.
- Make sure that pipetting volume should be 10 µL or larger.
- Bring sample to electrophoresis or other additional treatment.

4.7 How to use car connection power kit and battery kit (optional)

GENECHECKER® adopted DC 12V power input which enables users to apply instrument to versatile PCR applications. GENECHCEKER® can be operated using car power jack using car connection power kit (P/N : 003001). Car connection power kit has DC voltage regulator which stabilizes unstable output voltage from car power jack and supply appropriate power to GENECHCEKER®. Simply connect car connection power kit to back of instrument and connect the other end to car power jack. Battery kit (P/N : 003002) is also available to run the instrument on site. Connect the battery kit to back of instrument and run the instrument. Fully charged battery kit can run the instrument for about 60 minutes. Once instrument is connected either car connection power kit or battery kit, just follow general method of using GENECHCEKER® described earlier chapters.

4.8 Instrument Alarms

Sound	Status
Short "beep-beep"	Instrument is turned on
Short "beep" at high tone	MENU button or jog dial is pressed. Jog dial is rotated rightwards
Short "beep" at low tone	START/STOP button is pressed. Jog dial is rotated leftwards.
"Beep-beep-beep"	Prompted PCR cycle has been finished and Well-Viewer is going to be turned on after 8 seconds.
"Beep-beep-beep-beep-beep"	Well-viewer is turned off and instrument is waiting for user's intervention to proceed with other jobs.
Endless "beep-beep- ..."	Peltier or temperature sensor is out of order. User should immediately contact your local representative.
Endless "beep-----"	Heat limit sensor is activated and instrument is shut down for protection.

4.9 Shut down and storage

In order to turn off GENECHCEKER®, switch off instrument while GENECHCEKER® is in idle status (When LED of jog dial has no color or is in blue color).

Simply set the switch on the back of instrument to "O" position then, every power connected to instrument will be shut off. For long term storage, it is recommended to disconnect power cord and put the instrument into original carton. It is recommended that the instrument is kept in dry and cold space in order to protect the instrument.

5. Maintenance

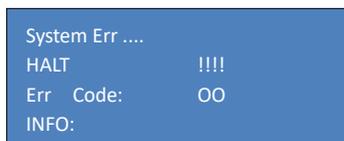
GENECHECKER® is maintenance free instrument which requires user's minimized actions to keep the instrument in good conditions. In order to ensure proper operation of GENECHECKER®, please read the followings and perform the recommended.

- The key parts to secure 100% of efficiency of instrument are heating plate and bottom surface of Rapi:chip™ and these two parts should kept always clean. In order to have entire bottom surface of Rapi:chip™ securely in contact with the surface of heating plate, remove dust or any other materials from the heating plate or bottom surface of Rapi:chip™ using manual air blower. Use soft cloth or dust-free wipes to clean heating plate. Never use alcohol or solvent to clean heating plate as it will damage the surface coating of heating plate. Only small volume of water is recommended for wiping surface of heating plate.
- GENECHECKER® has air ventilation holes at three faces which are front, bottom and the back. Air ventilation holes at front face are air Intake holes and the holes at other two faces are for exhausting air. Every hole should be kept always clean in order to secure efficiency of air ventilation.
- Please keep in mind of the details on alarming sound of GENECHECKER® introduced in chapter 4.8 and contact your local representative for service in case of any instrument failure.
- It is strictly prohibited for users to disassemble the instrument without prior approval of Genesystem. Disassembling or modifying the instrument without approval of Genesystem will void warranty.



6. Error screen and troubleshooting

- Error screen



Left image is error screen that is shown when the instrument has an error in it. If error code of "F0" or "F2" is displayed, it means that there is something wrong at temperature sensor. If error code of a number between 31 and 38, it means

that there is something wrong at heating plate. Please return instrument to the supplier if this type of screen is displayed.

- Troubleshooting

Trouble	Cause	Solution
Nothing is indicated on the screen when instrument is switched on.	Power failure	Check if the lamp of DC adaptor is in green color. Check if power jack is properly connected (Check the direction.).
Chip drawer is not closed.	Error in chip loading	Place the chip on the heating plate flatly and securely.
Chart is not generated on the GeneRecorder.	Intended interval	Please wait until the chart is displayed as it takes some time depending on the PC environment.
The curve on GeneRecorder doesn't show any signal value.	Sample recipe and /or PCR protocol is not optimized.	Adjust the sample recipe and PCR protocol
Instrument is alarming	Component failure	Refer to chapter 4.8 for detail
Abnormal screen is shown	Component failure	Contact local representative.
Dots are shown in the wells when Rapi:chip™ is observed through setting window of GeneRecorder.	Bubbles are formed due to poor sealing of apertures. Sample volume is less than 10µL.	Securely seal the apertures by firmly scrubbing sealing tapes. Dispense precise volume of sample into wells of Rapi:chip™
Chip is wetted after thermal cycling	Holes of Rapi:chip™ are sealed poorly.	Securely seal the holes by firmly scrubbing sealing tape.
Stains along the chip well position are shown on the heating plate.	Heat generated during thermal cycling	Wipe the plate. If it is not completely removed use as it is. It doesn't effect to instrument performance at all.

7. Service and Warranty

Warranty of GENECHCEKER® is extended against defects of materials and/or workmanship and its period is 1 year from purchase. If any defect should occur during warranty period, Genesystem repairs defective part on the free charge basis or replaces defective unit. However, warranty voids at the following cases.



- Disassembling GENECHCEKER® without prior approval of Genesystem.
- Damage of warning labels that seal each part of instrument.
- Defects caused by improper operation
- Deliberate or accidental misuse.
- Damage caused by use of improper samples
- Damage caused by disasters

8. Ordering information

Cat. No.	Description	Pack
001150	Model UF-150 GENECHHECKER® Ultra-Fast Real-time PCR System	1 SET
002001	Rapi:chip™ PCR Chip for GENECHHECKER® – Small Pack	48/PK
002002	Rapi:chip™ PCR Chip for GENECHHECKER® – Medium Pack	384/PK
002003	Rapi:chip™ PCR Chip for GENECHHECKER® – Large Pack	768/PK
003001	Car Connection Power Kit	1 SET
003002	Batter Kit	1 SET

9. Contact Points

For any technical questions on the instrument, please contact Victory Scientific using following contact details or its local representative.

Victory Scientific
PO Box 307
Sewell, NJ 08080

phone : 856-530-9990
Email : cs@victoryscientific.com
Website : <http://www.victoryscientific.com>

