Novel coronavirus pneumonia Detection

Novel coronavirus （COVID-19 ）

- Coronaviruses are a group of pathogens that cause respiratory and intestinal diseases. There are many regularly arranged protrusions on the surface. The entire virus particle is like an emperor's crown, hence the name "coronavirus".

- Coronavirus is a single-strand RNA virus. The nucleic acid sequence information is sequenced at the first time, providing a basis for molecular detection and making it possible to quickly identify pathogens.
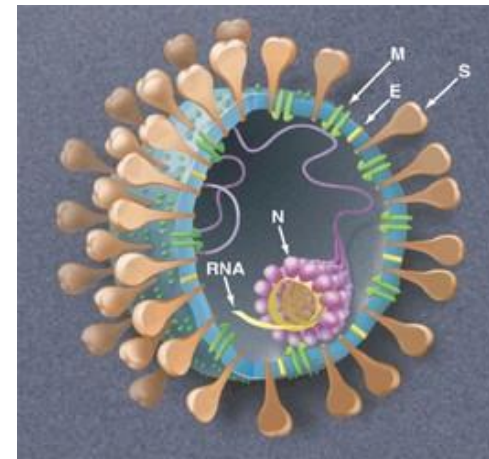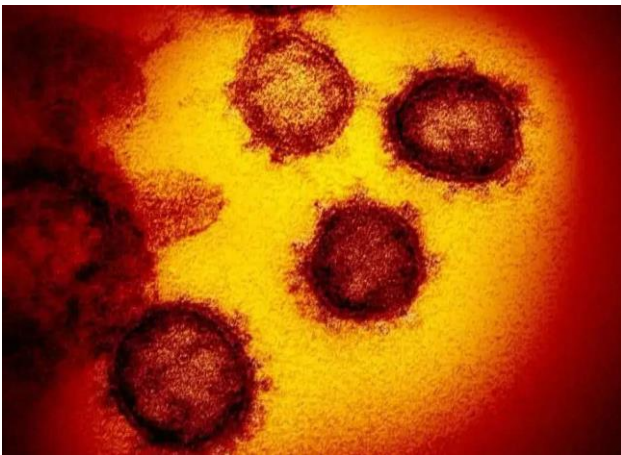
Detection method

RT-qPCR

Serological test

High-throughput sequencing

Others

RT-QPCR

Widely used detection methods.

Detection process

Sample collection
- Nasopharyngeal swabs / oropharyngeal swabs / blood / respiratory samples, etc.

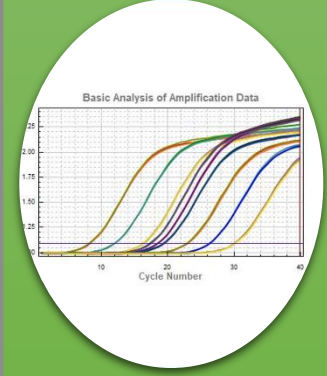**Pre-processing**
- Inactivation

Nucleic acid extraction
- Manual extraction
- Automatic nucleic acid extraction instrument

Nucleic acid amplification
- RT-qPCR
  - TaqMan probe type

Result analysis
- Negative or positive based on CT value

Pre-processing

- Inactivation at 56 ℃ for 30 ～ 45 min.

  - The coronavirus will lose its ability to infect people
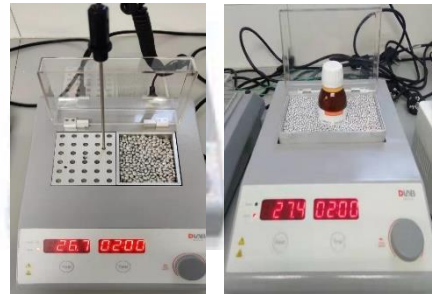
- Mixing with vortex mixer before nucleic acid extraction.

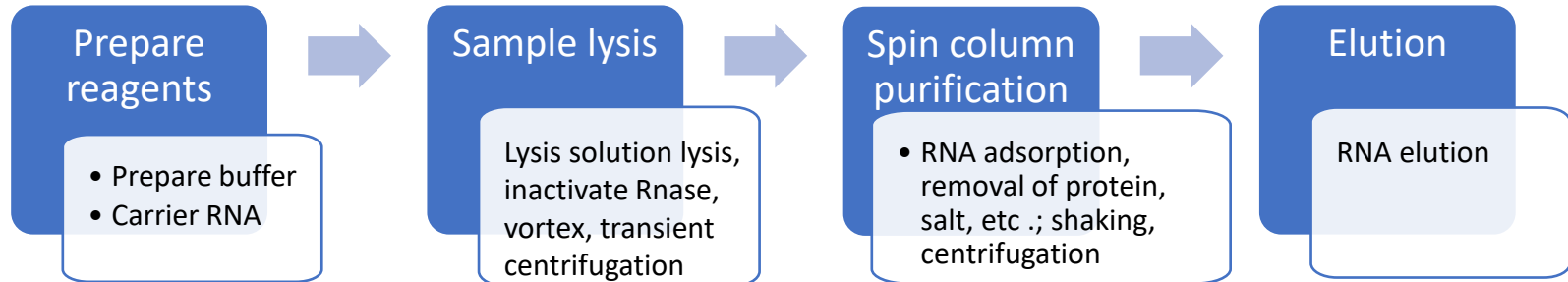| HB120-S	HB105-S1/S2	H100-Pro	MX-S/F
• High capacity • 16 types of optional blocks are available • Bead/water bath	• Single and double block configurations are provided • External temperature sensor PT1000 • Bead/water bath No more concern of tube sizes	• Customizable program with up to 6 sequential steps; • Temperature calibration function by user; • Heating time: room temp.-100°: 10-15min • Mount the heating block by magnet without any tools	• Touch+continous working modes • Robust aluminum-cast construction

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RNA extraction

- Manual extraction-viral RNA extraction kit (spin column)

Prepare reagents	→	Sample lysis	→	Spin column purification	→	Elution
• Prepare buffer • Carrier RNA		Lysis solution lysis, inactivate Rnase, vortex, transient centrifugation		• RNA adsorption, removal of protein, salt, etc .; shaking, centrifugation		RNA elution

MicroPette Plus	Levo Plus Pipette Filler	MX-F/S Vortex Mixer	D1008 Palm Centrifuge	D2012Plus High Speed Micro-Centrifuges	D1524R High Speed Refrigerated Centrifuge
• 121° fully autoclavable • Individual calibration certificate according to ISO8655 • Online calibration	• Powerful pump fills a 25ml pipette in < 5s • Suitable for 0.1-100ml pipettors • High capacity Li-ion battery for over 7 hours working, by 2-3 hours charging time	• Touch+ continous working modes • Robust aluminum-cast construction	• Instant centrifugation to eliminate air bubbles • Safe, endurable and robust rotor with clamp locking design. • PCR eight-row tube-	• Max. Speed : 15,000 rpm • Available use inside cabinet. • Short-time run function.	• Temp. range -20℃ to 40℃ • Automatic proximity locking mechanism • Close & Lock the chamber with single hand • Powerful compressor; • Eco-friendly

Nucleic acid amplification

Novel coronavirus nucleic acid detection kit （RT-qPCR）

- Reagent configuration
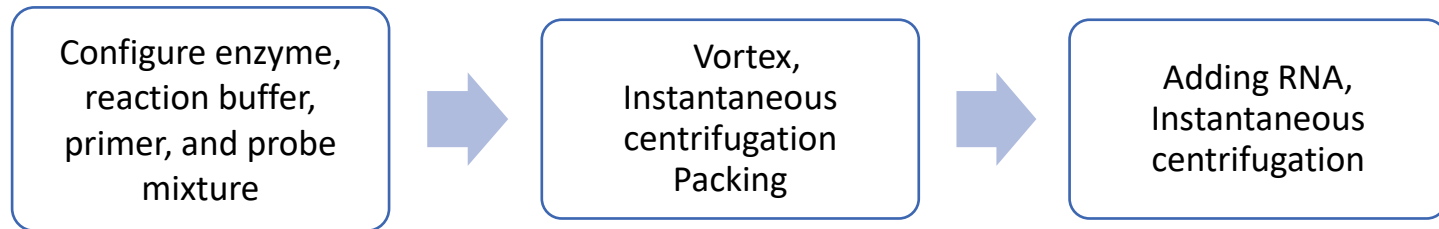
| Configure enzyme, reaction buffer, primer, and probe mixture | → | Vortex, Instantaneous centrifugation Packing | → | Adding RNA, Instantaneous centrifugation |

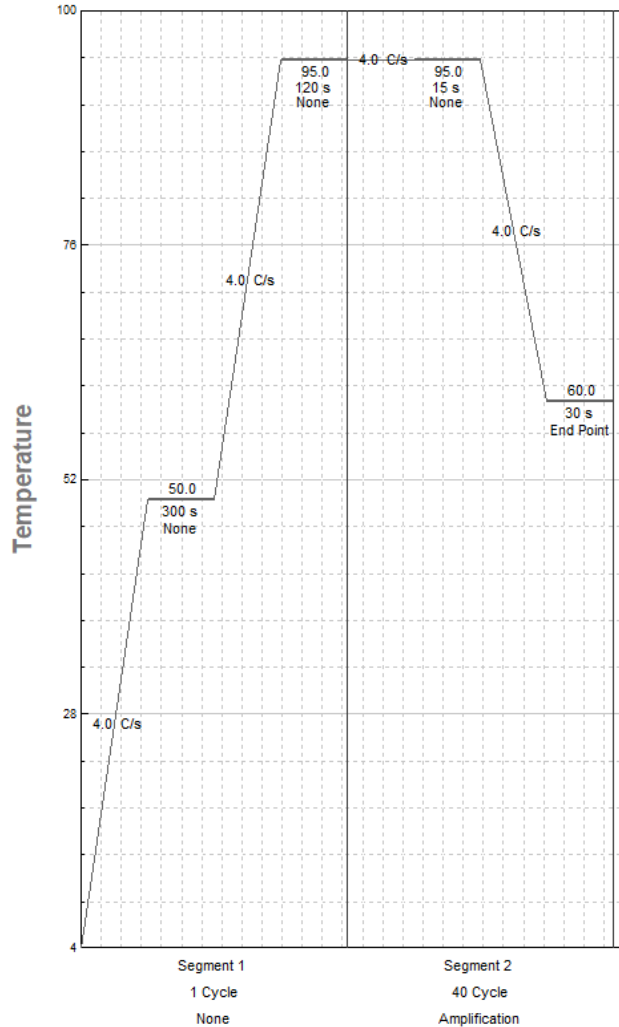| **dPette+** **Electronic Micropipette**	**MicroPette Plus** **12-Channel Pipette**	**MX-F/S** **Vortex Mixer**	**D1008** **Palm Centrifuge**
• Accurate & precise motor control • Light weight • Easy Operation • Pipetting,Mixing,Stepper and Dilution • Self calibration	• Improve efficiency for higher throughput • Direct autoclavable as one piece • Light weight 154g	• Touch + continous working modes • Robust aluminum-cast construction	• Safe, endurable and robust rotor with clamp locking design. • Instant centrifugation to eliminate air bubbles • PCR eight-row tube-4 rows

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Nucleic acid amplification

- QPCR instrument detection：Real-Time Quantitative PCR

  - The fluorescence signal was used to detect the change of the amount of amplification products in each cycle of the PCR amplification reaction in real time.

- TaqMan probe
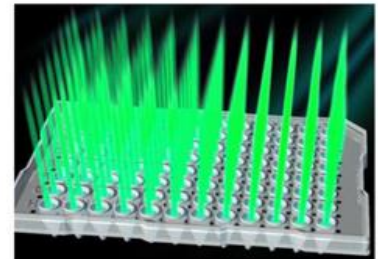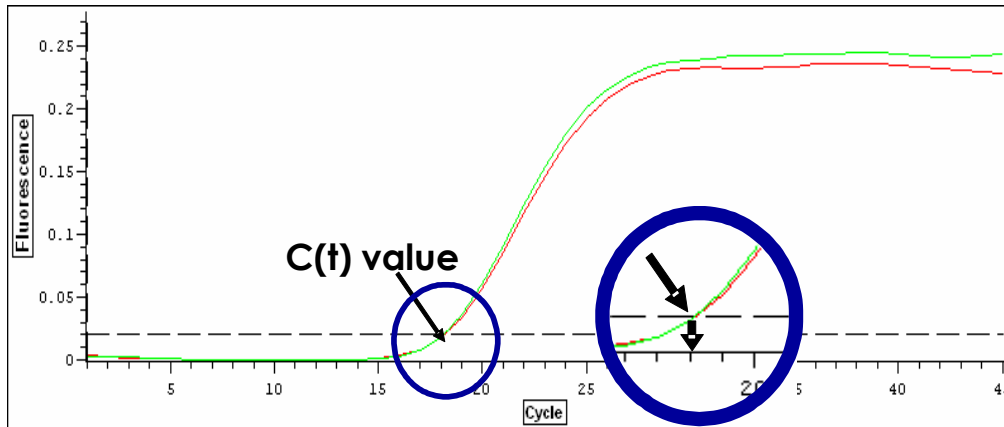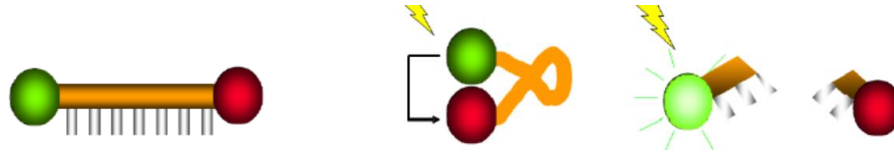
Nucleic acid amplification

Program Setting

Reverse Transcription + PCR

Sample Setting

- Fluorescence channel：FAM、VIC/HEX、ROX、Cy5、Cy3

One positive control
Three negative controls （randomly placed in different positions）

Nucleic acid amplification

Accurate 96-x4/x6

Sectional view of optical detection

- PMT
- Emission filter
- LED
- Fresnel Lens
- Dichroic mirror
- Excitation filter
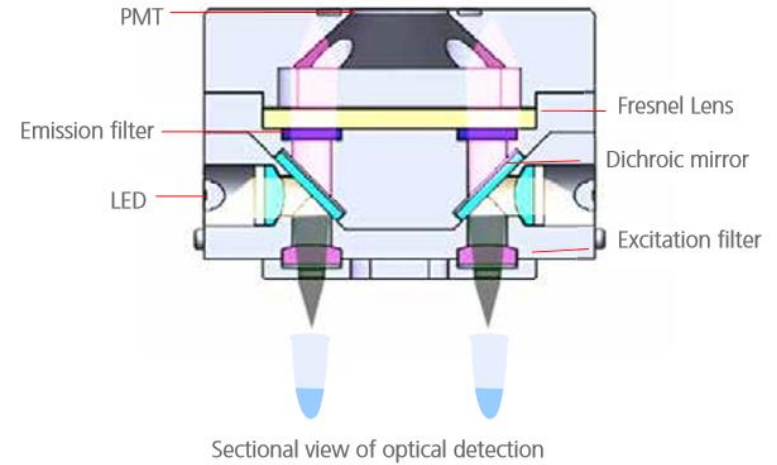
Channel 6		Channel 5		Channel 4
NED™ /Cy3/ TAMRA™		ROX™ /Texas Red®		FAM™ /SYBR
VIC®/ HEX™ /TET/ JOE™		Cy5®/Quasar® 670		FAM™ /SYBR
Channel 3		Channel 2		Channel 1

Nucleic acid amplification

Accurate 96-x4/x6

New optical scanning detection system

Efficient PMT detector →
- **Sensitive and fast, high resolution**
  - Lower cycle threshold value for higher detection sensitivity

Efficient LED light source →
- **Specific, efficient, long life**
  - Maintenance-free

Emission light lens based on Fresnel lens
Hole-by-hole time-resolved scanning method →
- **Effectively reduce multi-color crosstalk and edge effect**
  - Reliable multiplex PCR results

Temperature Control System

Uniform space temp. control system →
- **Precise temperature control**
  - Easier experimentation

Unique edge temperature compensation technology →
- **High temperature uniformity**
  - High repeatability for each well position
  - Accurate melting curve analysis

Software

- **Real time show the histogram of fluorescence amplification ratio for each well**
  - Observe the amplification of each sample more clearly

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Result analysis

- Target gene
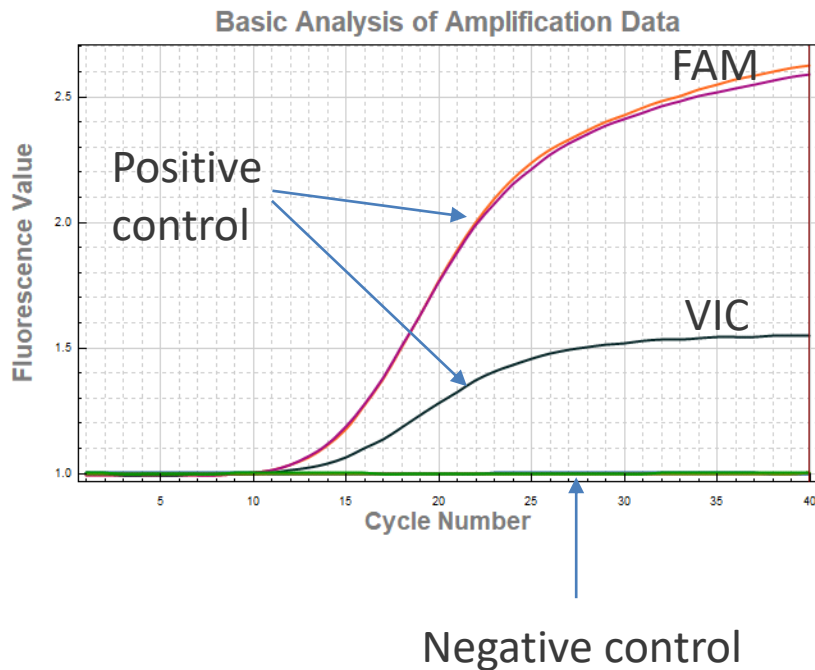 - ORF1ab gene、N gene、E gene .etc

Negative：

Fluorescence channels don't display Ct or Ct value=40

Positive：

The amplification curves are typical S-shaped, and Ct values are <37

Gray Zone：

Fluorescence channel：37 ≤ Ct <40. The result is in the gray zone and need re-test. If the results are same and show typical S-shaped curves, it is judged as positive, otherwise it is negative.

SEROLOGICAL TEST

Antibody detection and nucleic acid detection can be combined with each other, which will greatly improve the accuracy of Novel coronavirus pneumonia.

Detection method-IgG/IgM antibody

- Antibodies are the products of a humoral immune response after the body is infected with a virus.

- IgM antibody are produced early and quickly after infection, with short maintenance time and rapid disappearance, which can be used as indicators of early infection.

- IgG antibody are produced late, last for a long time, and disappear slowly, and can be used as indicators of infection and previous infections.

- Samples: serum, plasma, venous whole blood
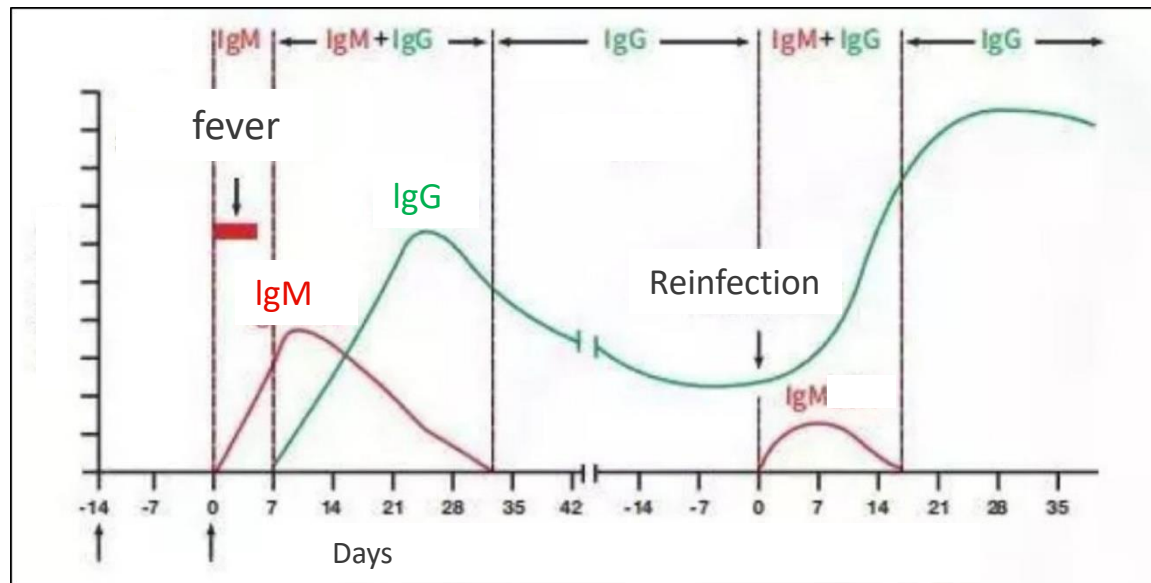
Detection method

Colloidal gold immunochromatography	Enzyme-linked immunosorbent assay	Chemiluminescence method

Reagent / instrument development

| dPette+ Electronic Micropipette	MX-T6-Pro/S Tube Roller	SK-R30D-E Long Deck Rocking rotators	DM0424/0408 Low Speed Centrifuge	HCM100-Pro Thermo Mix
• Accurate & precise motor control • Light weight • Easy Operation • Pipetting,Mixing,Step per and Dilution • Self calibration	• Gentle rolling of blood sample to avoid coagulation	• Max. for 16pcs 5~10ml tubes each layer, total 32pcs, or 6pcs 50ml tubes each layer, total 12pcs	• Three customizable routine programs（Blood, Urine & Faecal） • Low-maintenance, long-life brushless DC motor	• Immunoassay incubation of antibody and antigen. With rigorous mixing function. • Temperature calibration function • Heating &Cooling & Mixing

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HIGH-THROUGHPUT SEQUENCING

Detection method

Pre-processing → Nucleic acid extraction → **Library preparation** → High-throughput sequencing
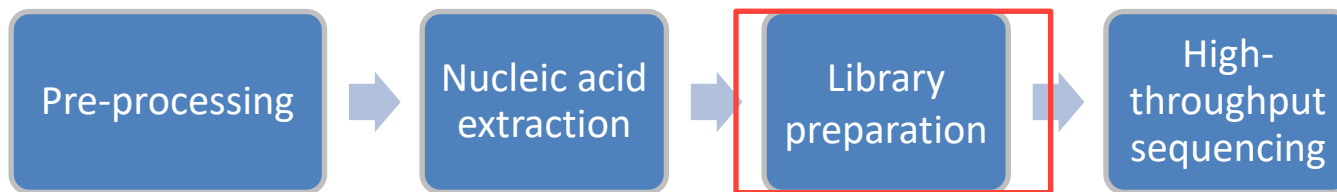
- Reverse Transcription——PCR amplification—— Fragment purification

MicroPette Plus 12-Channel Pipette	MX-F/S Vortex Mixer	HCM100-Pro Thermo Mix	D1008 Palm Centrifuge	TC1000-G/S PCR Thermo Cycler	GelSMART Image Box
• Improve efficiency for higher throughput • Direct autoclavable as one piece • Light weight 154g	• Touch+continous working modes • Robust aluminum-cast construction	• Heating&Cooling&Mixing • Programmable • Temperature calibration function	• **Safe, endurable and robust rotor with clamp locking design.** • Instant centrifugation to eliminate air bubbles • PCR eight-row tube-4 rows	• High performance long life Peltier • Auxiliary heating mechanism diminishes the edge effect • Touchdown PCR, Long PCR • Free touch screen pen	• With epi-blue Easy acquisition of DNA gel electrophoresis images。 • Coomassie blue stained SDS-PAGE and colony dishes can be observed with the white light plate mounted.

Laboratory Safety

SAFEVAC Vacuum Aspiration System

Liquid level sensor

Self-closing connector

Bottle +handle stand

4L PP Bottle

- Default 8 adapters +adapter bracket

- ▪ SafeVac is designed for laboratory waste recovery and separation of liquid and solid. It is widely used in cell culture, DNA extraction, microplate handling, and many other liquid separation or recovery applications.

- It is suitable for cell culture dish, microplate, flask, tube, etc.

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