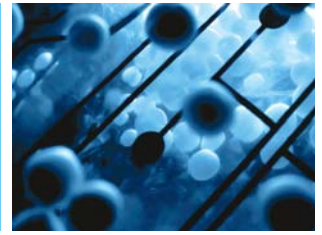


Maximum Convenience by Advanced Digital Technology

# Ultra-Low Temperature Freezer powered by Smart-Lab™ System



ULT Freezer is evolving like your Smart Phone in hand, and Smart TV at home.

SimpleFreez™ and DuoFreez™ ULT Freezers are the innovation of the freezers. It has been equipped with 7-inch full-touch screen controller and integrated the most extensively applied Android System and Internet Connectivity.

*No Button. No Knob. Simply Touch!!*

**Full Touch Screen Controller and Internet Connectivity!!**

The DAIHAN Smart-Lab™ Controller a lot of useful functions like self-diagnostic function, data recording function, and storage management function and so on.

These functions are unique and innovative in the laboratory equipments.

Also this controller is connected with researcher's smart phone, tablet or laptop computer through Internet, by WiFi, so scientists are able to check all the equipments in the laboratory at any time, and at any place.



## Smart-Lab™ Controller

- 7 inch full touch screen TFT LCD Controller of "Intuitive Use"
- Data Recording : On-Screen Temperature Chart and USB Storage for Recorded Data
- Internet Connectivity with WiFi
- Remote Monitoring and Control by WiRe™ Service
- Storage Management function : Record the location of samples in the chamber and find easily afterwards, on screen
- Self - Diagnostic Function : Automatic Check & Alarm for the Failures in Key parts

## WiRe™ App & Web Service

- Innovative Service by DAIHAN Scientific based on Mobile and Web technology
- Support all different kinds of Web browser by HTML5 Standards
- Available in all the PCs, Laptops and MACs
- Offering Android App and Apple iOS App for Smart phone and Tablet
- Almost same UI as the Touch Screen Controller on the Equipment is available

## Smart-Lab™ Controller of SMART Ultra Low Temp. Freezer



- ① USB port : Available Mounted WiFi Module or Data backup and program update of the controller
- ② Display of Present Temperature
- ③ Graph of Recorded Temperature
- ④ Configuration Setting with other functions
- ⑤ Display of Set Temperature
- ⑥ indicating the operation status
- ⑦ Offset Setting
- ⑧ Storage Function to note the sample information in the chamber
- ⑨ Start / Stop
- ⑩ LCO<sub>2</sub> Injection

## Features of Smart-Lab™ Controller



Main Display of Controller

### » Ergonomic Screen Design

- 7" Full Touch Screen TFT LCD
- Intuitive User Interface
- No-extra Button, Knob or Switch
- All the main Functions and Parameters are displayed on the Main Screen.
- Simple Touch to set the Temperature, Time and other Parameters.



Temperature Chart Display

### » Automatic Data Recording

- High Resolution Graphic Display.
- On-Screen Temperature Chart : Check the Temperature Record Graph on the Screen and could see the Details by Zoom-in & Zoom-out enabled at your finger tips.
- The Recorded Data could be transferred to PC by USB Memory.



Error Status Display

### » Self Diagnostic Function

- Automatic Check & Alarm for Failures in Key Parts of the equipment.
- Real-time Notification of any Failure in the Equipment to the User(s), to the Service Man and to Supplier, through WiRe™ Service.
- Implemented by LIN and empowered by WiRe™ Service.



Storage Management Function

### » Storage Management Function

- Record the location of samples in the chamber and find easily afterwards, on screen.
- Possible to easily and safely manage the location of sample in the chamber.
- Anyone could notice sample's history because it is possible to take memo of sample location.



### » Internet Connectivity with WiFi

- Internet Connectivity with WiFi
- WiRe™ App & Web Service : It is possible to monitor and control the freezer, through all smart phone, tablet on Web without restraint in time and place.

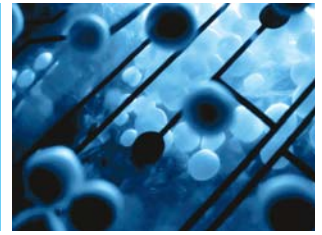


### » Eco-Friendly Green Freezer

- Dual SHFS™ models offer "Eco-mode", in which the freezer activates the two compressors by turns based on the preset period (8 to 99 days), after reaching down to the set temperature. This specially programmed operation results in dramatically lower energy consumption and much longer lifespan of the compressor.

Maximum Convenience by Advanced Digital Technology

# Simple, Efficient and Green - SimpleFreez™ Doubled Security and Power - DuoFreez™



## Innovation of Freezing System

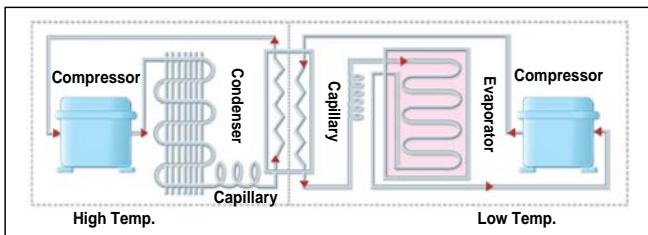
### DAIHAN SimpleFreez™ System (Simplified Hi-Efficiency Freezing System)

Most of the Ultra-Low Temperature Freezers has two compressors cooperating with each other to drop the internal temperature down to  $-86^{\circ}\text{C}$  as shown in the following figure and its overall freezing mechanism is very complicated.

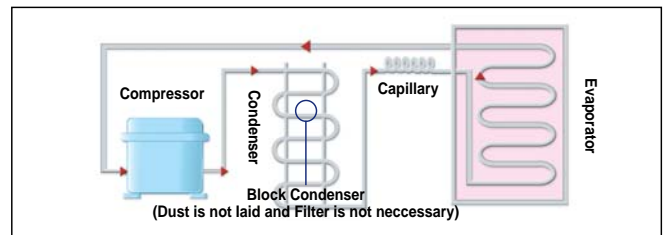
However, our new SimpleFreez™ uses only single compressor. Even though, single set of a compressor, a capillary tube, a condenser and an evaporator is incorporated, it ensures the temperature down to  $-86^{\circ}\text{C}$  by an advanced control technology of the compressor and the process of specially mixed refrigerants. SimpleFreez™ overcomes technical complexity of the typical cascaded double compressor system. Simplification of the freezing mechanism and electricity minimizes the noise, power consumption and failure of operation.

*High-Efficiency! User Safety! Energy Saving! Long Life time!*

## Simplified Hi-Efficiency Freezing System Mechanism : Easy Maintenance



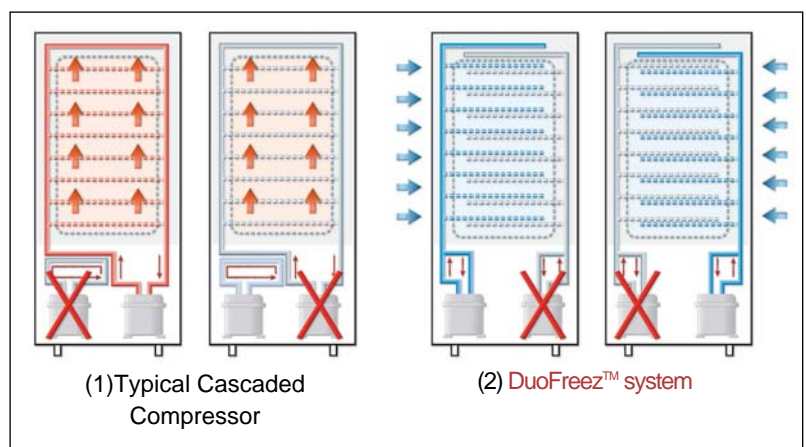
Typical Cascaded Compressor System  
Two Freezing cycles contribute Complicated mechanism



New SimpleFreez™ System  
Single freezing cycle works only!!

## Doubled Security and Robustness! DuoFreez™

We offer an extraordinary high-stability system powered by two SimpleFreez™ System operating independently. Normally, both of the two compressors are running, and it drops the temperature inside the storage chamber down to  $-95^{\circ}\text{C}$ . Even if one SimpleFreez™ System fails in operation by a certain unexpected problem, the other SimpleFreez™ System still works and maintains ultra-low temperature down to  $-80^{\circ}\text{C}$ . It means one SimpleFreez™ System works as a 'backup' of the other SimpleFreez™ System. This innovative mechanism realizes doubled stability, robustness and fault tolerance, which are the most important feature of the ULT freezer needed by all the customers.



(1) Complicated mechanism

⇒ If one of compressor fails, temperature would go up

(2) Even if one of the two SimpleFreez™ systems fails to run, the other one is still running properly ⇒ Minimum  $-80^{\circ}\text{C}$

▶ The lowest temperature of  $-95^{\circ}\text{C}$  is ensured by DuoFreez™ system running independently and simultaneously

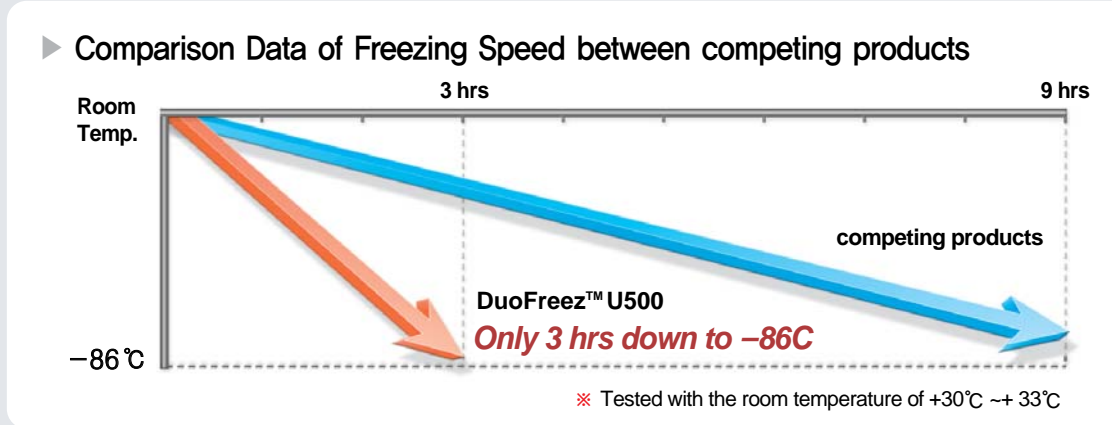
▶ Fault Tolerance System

- Realization of doubled stability and robustness

▶ Incomparable Fast and Powerful Freezing

- Fast Recovery of Target Temperature

## » Fastest Freezing by DuoFreez™ System



### ▶ Time Taken to Reach Down to Ultra Low Temperature

Temp.	DuoFreez™			SimpleFreez™				
	U300	U500	U700	U300	U500	U700	WUF-41	WUF-51
	308Lit.	503Lit.	683Lit.	308Lit.	503Lit.	82Lit.	375Lit.	438Lit.
	Upright Type			Chest Type				
- 80 °C				240min.	330min.	150min.	120min.	150min.
- 86 °C	160min.	180min.		270min.	420min.		210min.	270min.
- 90 °C			240min.			270min.		
- 95 °C	270min.	300min.						

※ Tested with the room temperature of 30 ~ 33°C

## Real Green Technology for ULT Freezer

### » RoHs certified

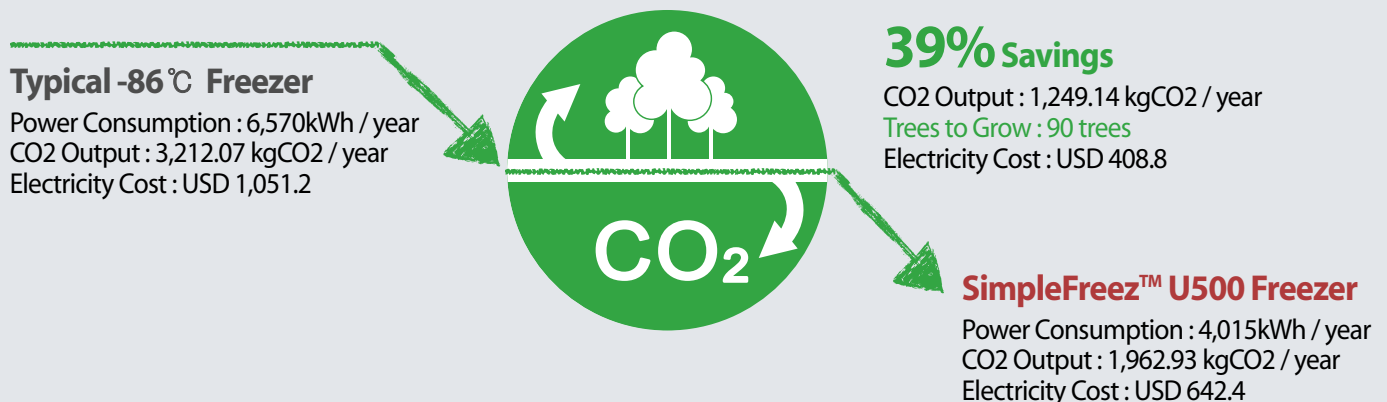
- The RoHS is the directive on the restriction of the use of certain hazardous substances (Pb, Cd, Hg, Hex-Cr, PBB, PBDE) commonly used in electronic and electronic Equipment (2011/65/EU). All the models of SimpleFreez™ and DuoFreez™ product line are RoHS certified.

### » Natural Refrigerants

- The commonly used HFC refrigerants like R-134a, R-404A and R-507, which are potent Greenhouse Gases, will be banned by European law soon. SimpleFreez™ system uses specially mixed refrigerants, which are mostly **Natural Refrigerants**.

### » Less Power, Less Money and More Green

- SimpleFreez™ system, extremely simplified freezing mechanism and electricity realize the **lowest power consumption**, leading to **less cost for electricity**. In the end, it also derives **maximum CO2 reduction**, for us to have **more trees** and wider green area.



\* Calculated by the electricity-specific emission factors sourced from the IEA (2011a).



# Ultra-Low Temperature Freezer

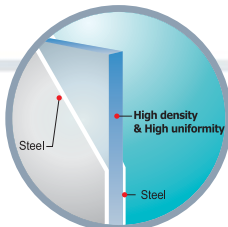
# Wisdom SMART Ultra



• Robust & Flexible Design of Power Door Handle with Locking function.



• Cable Port for external Temp. sensor



• Insulation Panel packed in housing and door ensures defrosting around outer surface



• Signal Terminal for External Temp. Alarm System

• Filter-Free Mechanism  
Significantly Lowers Heat Generated by the Compressor.  
Block Condenser (without pins)  
Realizes Filter Free Structures.



DuoFreez™ U300



• Automatic Vacuum Dissolver making door opening easy



• Triple Seal for Protection



Wisdom

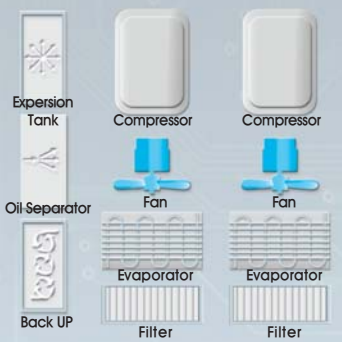
DuoFreez™

※ Design of pro

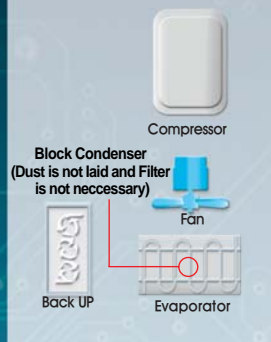


• Temperature Recorder (Optional)  
Large and vivid LED

## Comparison of Inside formation : SimpleFreez system New technology vs competing products.



### ► Complicated Cascaded System



### ► Innovative SimpleFreez system

- Simplified Hi-Efficiency Freezing System
- Much Simpler
- Oil separator free, Expansion tank free
- Block condenser against typical pin-type condenser - Dust free, Filter free

# Low Temp. Freezer



• **Multi-layer Gasket**  
- Perfect Insulation.



• **Inner Door Handle**  
- easily opened against frosting.



• **Inner door insulation material**

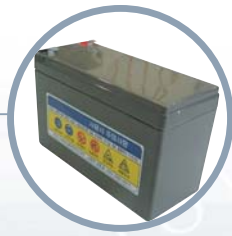


• **Smart-Lab™ Controller**  
- Easy setting, Temperature Graph, Storage function (USB interface), etc.

• **CFC-Free**  
HFC refrigerants are used.

• **Maintenance-free cooling device with fully Hermetic High-Capacity compressor.**

• **Alarm**  
Built in standard warning and alarm functions.

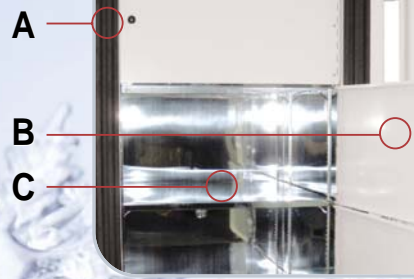


• **Standard Back up Battery System for Data logger and Alarm System.**



**C350**  
duct will be changed

## ▶ Rack System



**Inside Structure**

**A** High-quality molded thermal insulation material is filled between outer housing and inner chamber, of which structure ensures the stability of the internal temperature and minimizes the frost.

**B** Four inner doors are equipped for better thermal insulation and efficient use of the storage chamber. They are made of powder coated stainless steel, so it is stronger for anti-frost.

**C** One piece of internal storage chamber made of high-quality stainless steel is divided into four sub chambers by three shelves, so it's very convenient to efficiently fill the storage boxes inside.



• **Remote Wire/Wireless Alarm System (Optional)**  
- Set to be activated when the temperature inside the chamber goes up to -65°C.  
- Main controller signals to RWAS, if connected, at the alarm status, and then RWAS makes phone calls or send messages.  
- User could set and store multiple phone numbers and alarm statements.



• **LCO2 back up system (Optional)**  
- LCO2 Gas Tank is not included

**DAIHAN DuoFreez™ SMART Digital Ultra-Low Temp. Freezer, Upright-type, -95 °C ~ -65 °C** NEW  
 with Smart-Lab™ System, Non-Freon Refrigerants, Auto Vacuum Releasing System, Eco Mode, 308 -/393-/503-/714-Lit.



SMART Ultra-Low Temperature Freezer, "DuoFreez U300"

» DAIHAN WiRe™ App & Web Service



7" Full Touch Screen TFT LCD (Smart-Lab™ Controller)



WiRe™ App & Web Service

It is possible to monitor and control the Smart-Lab™ equipment through all smart phone, tablet and web without restraint of time and place.

- with Certificate & Traceability : Controlled by Serial Number, Certificate, Delivery-information, and Traceable Data Base System
- SimpleFreez™ System can freeze down to -86 °C : realize robust and long life time.
- DuoFreez™ System can down to -95 °C and High-stability system can be offered. : If one SimpleFreez System fails in operation, the other SimpleFreez System still works and maintains down to -80 °C
- **Smart-Lab™ Controller**                      ■ GD(Good Design)-mark
- **Eco Mode Function for Low Power-consumption.**
- **GMP Certified(Only "U500" Model)**
- **CE & RoHS Certified**                      ■ **PL(Product Liability) Insurance**
- \* Ergonomic 7" Full Touch Screen TFT LCD(Smart-Lab™ Controller)
- \* WiRe™ App & Web Service.                      \* Storage Management Function
- \* Self-Diagnostic Function                      \* Automatic Data Recording
- \* Internet Connectivity with WiFi                      \* Eco. Mode for Low Power Consumption
- \* Automatic Vacuum Breaker - Easy to re-open the Door.
- \* Robust & Flexible design of Door Handle
- \* Easy Monitoring and Control - Eye level Controller
- \* CFC-free Refrigerants are used                      \* External Temp. Sensor Hole
- \* Use of Block Condenser removes filter and causes of related failure.
- \* Filter-free Mechanism lowers heat generated by the compressor
- \* Easy Maintenance and Improved Performance
- \* High-quality Insulation Panel and Inner Doors ensure defrosting around outer surface.
- \* Built in Standard Warning and Alarm Functions
- \* RS232 Communication Link and a Remote Control Software are supported

Specification

Model	DuoFreez U300	DuoFreez U400	DuoFreez U500	DuoFreez U700	
Capacity	308 Lit.	393 Lit.	503 Lit.	714 Lit.	
Freezing System	DuoFreez™ System				
Temp.	Range	-95 °C ~ -65 °C		-90 °C ~ -65 °C	
	Sensor	at Room Temperature of 30 °C and Humidity of 70%			
		PT100 Sensor			
Compressor	Hermetic Type				
Condenser Type	Block Condenser, No Pin, Filter Free Mechanism				
Refrigerant	Natural ( CFC Free Refrigerant System)				
Controller & Display	7" Full Touch Screen TFT LCD (Smart-Lab™ Controller)				
Shelves	Included 3 Stainless steel Shelves				
Max. Q'ty of Racks	12pcs of 15(3×5)-Placed Rack (RFU3040)	16pcs of 15(3×5)-Placed Rack (RFU3040)	16pcs of 20(4×5)-Placed Rack (RFU50)	24pcs of 20(4×5)-Placed Rack (RFU50)	
Material	Internal	Stainless steel (#304)			
	External	Powder Coated steel Plate			
	Inner Door	Powder Coated Stainless steel (#304)			
Others	KGMP Certified, CE & RoHS Certified, GD-mark PL(Product Liability) Insurance, CFC-Free Refrigerants Touch-Screen TFT LCD Smart-Lab™ Controller Built in Standard Warning and Alarm Functions RS232 Communication Link, Remote Control Software				
Chamber Dimension (w×d×h)	Internal(mm)	470×500×1,310	600×500×1,310	600×640×1,310	880×620×1,310
	External(mm)	710×750×1,900	840×750×1,900	840×890×1,900	1,120×870×1,900
Net Weight	220 kg	260 kg	300 kg	320 kg	
Packing Size (w×d×h) (cm) & Gross Weight		110×110×222	116×116×222	116×124×222	140×140×221
		300 kg	352 kg	352 kg	442 kg
Power Consumption	Dual mode	398 Wh	474 Wh	507 Wh	596 Wh
	Eco. mode	352 Wh	373 Wh	458 Wh	503 Wh
Power Supply & Cord Plug*	1 Phase, AC 120V, 60Hz or AC 230V, 50 / 60Hz				

\* Other Specifications are available upon Customer's Request.

※ See page 6 ~ 11 for the Feature of Smart-Lab™ System

<Continued on next page>



<Continued from... **DAIHAN DuoFreez™** SMART Digital Ultra-Low Temp. Freezer, Upright-type >

## Ordering Information

DH.SWUF01300	Upright Type -95℃ Freezer, "DuoFreez U300", -95℃~-65℃, 308 Lit., <b>230V</b>
DH.SWUF01400	, "DuoFreez U400", -95℃~-65℃, 393 Lit., <b>230V</b>
DH.SWUF01500	, "DuoFreez U500", -95℃~-65℃, 503 Lit., <b>230V</b>
DH.SWUF01700	Upright Type -90℃ Freezer, "DuoFreez U700", -90℃~-65℃, 714 Lit., <b>230V</b>
DH.SWUF02300	Upright Type -95℃ Freezer, "DuoFreez U300", Same as Above, but only <b>120V</b>
DH.SWUF02400	, "DuoFreez U400", Same as Above, but only <b>120V</b>
DH.SWUF02500	, "DuoFreez U500", Same as Above, but only <b>120V</b>
DH.SWUF02700	Upright Type -90℃ Freezer, "DuoFreez U700", Same as Above, but only <b>120V</b>

*Optional Accessories*

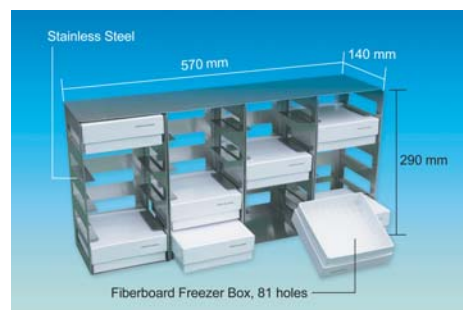
DH.RFU3040SD	(1) Rack, Sliding Drawer-type, SUS304, 15 places, "RFU3040SD", w140×d430×h290 mm, for "U300/400", without boxes
DH.RFU50SD	(1) Rack, Sliding Drawer-type, SUS304, 20 places, "RFU50SD", w140×d570×h290 mm, for "U500/700", without boxes
DH.RFU3040SA	(2) Rack, Side Access-type, SUS304, 15 places, "RFU3040SA", w140×d430×h290 mm, for "U300/400", without boxes
DH.RFU50SA	(2) Rack, Side Access-type, SUS304, 20 places, "RFU50SA", w140×d570×h290 mm, for "U500/700", without boxes
C11.001	(3) Hard Board Box, with Hard Board Divider, 81 Hole, 127×127×h52 mm
C11.002	, with PolyPropylene Divider, 81 Hole, 127×127×h52 mm
DH.KT622	(4) Temp. Chart Recorder, "KT622", with "C657" Chart Paper
DH.C657	(5) Chart Paper, "C657", 60 Charts, for 420 days recording
DH.P222	(6) Replacement Pens, "P222", 6ea Red color, for "KT622" Chart Recorder
DH.LCO2B	(7) LCO <sub>2</sub> Back up System, "LCO2B"
DH.RWAS	(8) Remote Wire/Wireless Alarm System, "RWAS"

*Validation (IQ, OQ) Service*

DH.SWUF31300	Validation Service(IQ, OQ), "SUFDV300", for "DuoFreez U300"
DH.SWUF31400	, "SUFDV400", for "DuoFreez U400"
DH.SWUF31500	, "SUFDV500", for "DuoFreez U500"
DH.SWUF31700	, "SUFDV700", for "DuoFreez U700"



(1) Sliding Drawer-type Rack, 15Places "RFU3040SD"



(2) Side Access-type Rack, 20Places "RFU50SA"

(3) Hard Board Box  
81 holes, w/cover(4) Temp. Chart Recorder,  
"KT622"(5) Chart Paper, "C657",  
60 charts for 420 days(6) Replacement Pens  
6ea, Red color,  
"P222", for Cart Recorder(7) LCO<sub>2</sub> back up system  
"LCO2B"(8) Remote Alarm  
System "RWAS"