Ultralow temperature and Cryogenic freezer

The representative product of OPERON Co., Ltd, -156℃ cryogenic freezer for preserving stem cell is the compression freezer which is used to preserve samples for a long time without deterioration and does never use liquid nitrogen. OPERON cryogenic freezer which overcame high cost, high risk, inconvenience and sample contamination occurring when using liquid nitrogen is registered to the international patent (the United States, Germany, China and Korea).

OPERON cryogenic freezer is applied with cryogenic cooling system, and it is an innovative cryogenic product with electric method replacing liquid nitrogen tank. The temperature range in which ice is not formed is called "AMORPHOUS", and the approximate range is -135℃~ -150℃. If the samples go through this temperature range rapidly, it is able to preserve the samples without deterioration from several years to maximum several decades because ice crystals are not formed. Other than this, we have various products like independent control type freezer with separate chambers, shelf-cooling type freezer which has powerful freezing and temperature uniformity, power plus freezer which is appropriate for surrounding temperature +40℃ and ultra safe (Twin Heart) freezer which has 2 compressors which maintain -90℃ during the operation, and when one compressor is broken down, another compressor maintains -80℃.

- Cryogenic freezer (CFQ)
- Ultralow-upright (DFU)
- Chest (DFC)
- Double door (DFUD)
- Shelf-cooling type (DFU-V/DFUD-V)
- Power plus (DFU-P/DFUD-P)
- Ultra safe-Twin Heart(DFU-CUS/DFC-CUS)

Cryogenic Freezer-CFQ

Cryo Freezer conqueror -156℃

Product features and specifications

- The world first freezer which makes maximum cryogenic -156℃ without liquid nitrogen
- Application of cryogenic cooling system (Auto cascade system) registered to the international patent
- Use of CFC-free special mixed refrigerants which OPERON Co., Ltd developed
- Application of aerodynamically designed pan wings equipped with huge capacity and high performance
- Hermetic compressor for LBP with excellent performance
- CE certification product for preserving cell
- Non scaling stainless chamber and round corner design for easy cleaning
- Use of 200mm high density urethane insulating materials to minimize cold air loss
- Chamber mold and double door with elegant design
- Strong structure frame and impact resistant powder coating finishing
- Filter cover for easy cleaning
- Chest type cabinet structure
- Temperature for hard condition resistant test +32℃
- Temperature measuring sensor: platinum PT-100Ω(Class A 0.15 grade)
- Prevention of frost with Rim Heating system
- RS-232 Data port and Interface which is available for store, control and monitor temperature data via user's PC

Items	OPERON ELECTRIC FREEZER	LIQUID NITROGEN FREEZER
Economic efficiency	It is available only with the lower cost electronic connection.	Expensive liquid nitrogen tank and the liquid nitrogen should be supplemented consistently.
Safety	It is safer from pollutants. When blackout, it secures safety with BACK UP SYSTEM if the temperature goes up.	It has a risk to be contaminated by bacteria or fungi inside the tank
Accuracy	Temperature difference between the upper part and the lower part inside is ±5℃, so the temperature is more even.	The temperature of the lower part inside the tank is -196℃, and the upper part is -70℃. The temperature difference is huge. This has a significant impact on viability of stem cell.
Convenience	Internal space can be used efficiently for keeping samples, and it is simple to perform work.	Rack for keeping samples is very inconvenient for sample work because of the liquid nitrogen tank's structure, and it is difficult to use the space inside the tank efficiently.

[References for reliability evaluation of Korean Institute of Machinery & Materials]
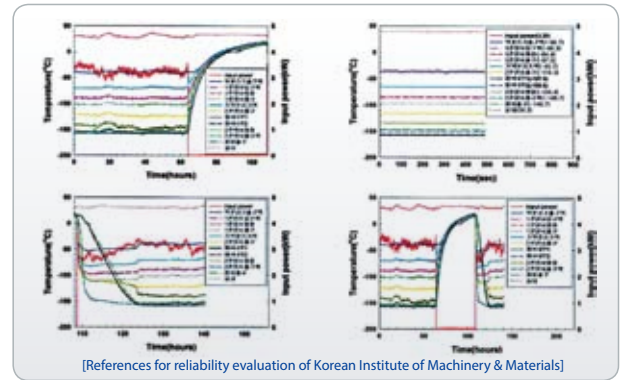
Stem cell needs long-term preservation for 10~20 years.

It's been stated on various papers that cell preservation using liquid nitrogen has lots of problems. OPERON products resolved the above problems perfectly.
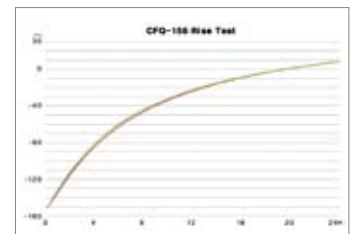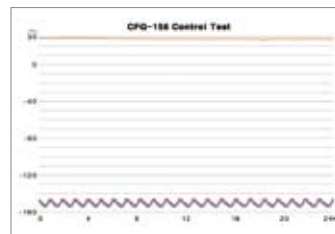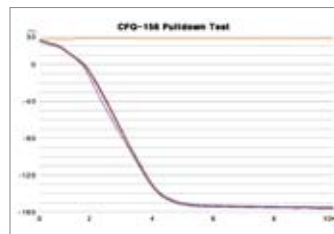
[References for reliability evaluation of cryogenic technology research center affiliated to OPERON]

Control system

- Micro processer control system /Digital temperature indicator which adjust the temperature by 0.1℃
- Functions for setting double passwords to prevent access or control except administrators
- Data locking function

Alarm system and safety devices

- Alarm for filter cleaning period (Warm Condenser alarm)
- Alarm for high/low temperature of sight and auditory
- Equipped with pressure switch
- Equipped with overheating prevention switch ■ Auto return system after blackout

Cryogenic Freezer (Cryo freezer)

Model	CFQ-150	CFQ-152	CFQ-156	CFQ-232	CFQ-300
External size(mm)	W1614 x D890 x H1105	W1614 x D890 x H1105	W1614 x D890 x H1105	W1676 x D890 x H1105	W2170 x D900 x H1065
Internal size(mm)	W600 x D400 x H600	W600 x D400 x H600	W600 x D400 x H600	W770 x D460 x H665	W1050 x D470 x H610
Range for usage	-90℃ ~ -150℃	-95℃ ~ -152℃	-100℃ ~ -156℃	-90℃ ~ -156℃	-80℃ ~ -140℃
Inside measurement	144L			235L	300L
Electric capacity	Capacity necessary for installment AC220V 380V 3ph (50/60Hz)				
Weight	380Kg				450Kg

Options   Rack / Box / LN2 Backup system / 7"LCD touch screen and USB (3 years Data) - Basic -1channel (sensor 3channel, 6channel options) / U-system (remote alarm system and wireless control system – telecommunication subscription needed / Automatic voltage regulator / Cryogenic gloves / Battery backup (Control panel and alarm) / Recorder / VIP

Ultralow temperature freezer-DFC

Chest Type

Product features and specifications

- Realization of powerful and stable -86℃ freezing performance with application of Two stage Auto cascade system
- Use of CFC-free special mixed refrigerants
- Application of aerodynamically designed pan wings equipped with huge capacity and high performance
- Hermetic compressor for LBP with excellent performance
- Use of 130mm high density urethane insulating materials to minimize cold air loss
- Non scaling stainless chamber
- Strong structure frame and impact resistant powder coating finishing
- Round corner design for easy cleaning
- Prevention of condensation and the chill loss with two-layered packing
- Filter cover for easy cleaning and washable filter
- Chest type cabinet structure
- Temperature for hard condition resistant test +32℃
- Temperature measuring sensor: platinum PT-100Ω(Class A 0.15 grade)
- Prevention of frost with Rim Heating system
- RS-232 Data port and Interface which is available for store, control and monitor temperature data via user's PC

Control system

- Micro processer control system /Digital temperature indicator which adjust the temperature by 0.1℃
- Functions for setting double passwords to prevent access or control except administrators
- Data locking function

Alarm system and safety devices

- Alarm for filter cleaning period (Warm Condenser alarm)
- Alarm for high/low temperature of sight and auditory
- Equipped with pressure switch
- Equipped with overheating prevention switch ▪ Auto return system after blackout

Ultralow temperature freezer (Chest freezer)

Model	DFC-37			DFC-84			DFC-200			DFC-300			DFC-400			DFC-500			DFC-600		
Temperature range	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE
	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃
External size	W430 x D560 x H920			W700 x D653 x H1125			W1365 x D720 x H1101			W1665 x D720 x H1101			W1965 x D720 x H1101			W2265 x D720 x H1101			W2565 x D720 x H1101		
Internal size	W235 x D365 x H425			W437 x D387 x H500			W600 x D470 x H710			W900 x D470 x H710			W1200 x D470 x H710			W1500 x D470 x H710			W1800 x D470 x H710		
Inside measurement	37L			84L			200L			300L			400L			500L			600L		
Electric capacity	Capacity necessary for installment AC220V 1ph (50/60Hz)																				
Weight	40kg			150Kg			255Kg			290Kg			315Kg			340Kg			365Kg		

Ultralow temperature freezer (Power Plus model-Chest type)

- Chest type Power Plus model- the freezer appropriate for the surrounding temperature +40℃ and over

Model	DFC-200P			DFC-300P			DFC-400P			DFC-500P			DFC-600P		
Temperature range	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE
	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃
External size	W1365 x D720 x H1101			W1665 x D720 x H1101			W1965 x D720 x H1101			W2265 x D720 x H1101			W2565 x D720 x H1101		
Internal size	W600 x D470 x H710			W900 x D470 x H710			W1200 x D470 x H710			W1500 x D470 x H710			W1800 x D470 x H710		
Inside measurement	200L			300L			400L			500L			600L		
Electric capacity	Capacity necessary for installment AC220V 1ph (50/60Hz)														
Weight	255Kg			290Kg			315Kg			340Kg			365Kg		

Options Rack / Box / CO2 Backup system / 7"LCD touch screen and USB (3 years Data) - Basic -1channel (sensor 3channel, 6channel options) / U-system (remote alarm system and wireless control system – telecommunication subscription needed / Automatic voltage regulator / Cryogenic gloves / Battery backup (Control panel and alarm) / Recorder / VIP / ※**The minimum temperature of ultralow temperature freezer(C-type) is supplied with -91℃ performance if the customer requests.**

Ultralow temperature freezer-DFU

Upright type Single door

Product features and specifications

- Realization of powerful and stable -86℃ freezing performance with application of Two stage Auto cascade system
- The controller attached at the user's eye level
- Use of CFC-free special mixed refrigerants
- Application of aerodynamically designed pan wings equipped with huge capacity and high performance
- Hermetic compressor for LBP with excellent performance
- Use of 130mm high density urethane insulating materials to minimize cold air loss
- Non scaling stainless chamber and four stainless doors inside
- Strong structure frame and impact resistant powder coating finishing
- Round corner design for easy cleaning
- Prevention of condensation and the chill loss with three-layered wrinkle packing
- Filter cover for easy cleaning and washable filter
- Chest type cabinet structure
- Temperature for hard condition resistant test +32℃
- Temperature measuring sensor: platinum PT-100Ω(Class A 0.15 grade)
- Prevention of frost with Rim Heating system
- RS-232 Data port and Interface which is available for store, control and monitor temperature data via user's PC
- Equipped with the port for auto vacuum release

Control system

- Micro processer control system /Digital temperature indicator which adjust the temperature by 0.1℃
- Functions for setting double passwords to prevent access or control except administrators
- Data locking function

Alarm system and safety devices

- Alarm for filter cleaning period (Warm Condenser alarm)
- Alarm for high/low temperature of sight and auditory
- Equipped with pressure switch
- Equipped with overheating prevention switch   ■ Auto return system after blackout

Ultralow temperature freezer (Upright freezer)

Model	DFU-128			DFU-256			DFU-374			DFU-446			DFU-558			DFU-657			DFU-740			DFU-868		
Temperature range	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE
	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃
External size	W710 x D750 x H1390			W710 x D750 x H1990			W860 x D800 x H1951			W860 x D900 x H1951			W1010 x D900 x H1901			W1010 x D990 x H1901			W1010 x D1010 x H2001			W1010 x D1151 x H2001		
Internal size	W450 x D475 x H600			W450 x D475 x H1200			W600 x D520 x H1200			W600 x D620 x H1200			W750 x D620 x H1200			W750 x D730 x H1200			W750 x D750 x H1300			W750 x D891 x H1300		
Inside measurement	128L			256L			347L			446L			558L			657L			731L			868L		
Electric capacity	Capacity necessary for installment AC220V 1ph (50/60Hz)																							
Weight	210kg			300kg			370kg			380kg			400kg			420kg			450kg			500kg		

Ultralow temperature freezer (Power Plus model-Upright type)

- Upright type Power Plus model- the freezer appropriate for the surrounding temperature +40℃ and over

Model	DFU-128P			DFU-256P			DFU-374P			DFU-446P			DFU-558P			DFU-657P			DFU-740P			DFU-868P		
Temperature range	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE
	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃
External size	W710 x D750 x H1390			W710 x D750 x H1990			W860 x D800 x H1951			W860 x D900 x H1951			W1010 x D900 x H1901			W1010 x D990 x H1901			W1010 x D1010 x H2001			W1010 x D1151 x H2001		
Internal size	W450 x D475 x H600			W450 x D475 x H1200			W600 x D520 x H1200			W600 x D620 x H1200			W750 x D620 x H1200			W750 x D730 x H1200			W750 x D750 x H1300			W750 x D891 x H1300		
Inside measurement	128L			256L			347L			446L			558L			657L			731L			868L		
Electric capacity	Capacity necessary for installment AC220V 1ph (50/60Hz)																							
Weight	220kg			310kg			380kg			390kg			410kg			430kg			460kg			510kg		

Options   Rack / Box / CO2 Backup system / 7"LCD touch screen and USB (3 years Data) - Basic -1channel (sensor 3channel, 6channel options) / U-system (remote alarm system and wireless control system – telecommunication subscription needed / Automatic voltage regulator / Cryogenic gloves / Battery backup (Control panel and alarm) / Recorder / VIP / ※**The minimum temperature of ultralow temperature freezer(C-type) is supplied with -91℃ performance if the customer requests.**

Product features and specifications

- Realization of -90℃ freezing performance with application of patented Single Stage Auto Cascade Two compressor systems
- When one compressor is broken down, another compressor maintains -80℃ (with amb. +25℃/ +32℃)
- When exchanging or repairing the compressor, it does not need to cut off the power, and the samples do not have to be moved to another freezer, Also, welding is not necessary, so welding equipment is not needed. Vacuuming is not necessary, and the user can exchange the compressor within 30 minutes without trained engineers or special tools, so it can reduce the repair cost by 30~70% comparing to the previous product.
- The controller attached at the user's eye level
- Use of CFC-free special mixed refrigerants
- Application of aerodynamically designed pan wings equipped with huge capacity and high performance
- Hermetic compressor for LBP with excellent performance
- Use of 130mm high density urethane insulating materials to minimize cold air loss
- Non scaling stainless chamber and four stainless doors inside
- Strong structure frame and impact resistant powder coating finishing
- Round corner design for easy cleaning
- Prevention of condensation and the chill loss with three-layered wrinkle packing
- Filter cover for easy cleaning and washable filter
- Upright type canbinet structure
- Temperature for hard condition resistant test +32℃
- Temperature measuring sensor: platinum PT-100Ω(Class A 0.15 grade)
- Prevention of frost with Rim Heating system
- RS-232 Data port and Interface which is available for store, control and monitor temperature data via user's PC
- Equipped with the port for auto vacuum release

Control system

- Micro processer control system /Digital temperature indicator which adjust the temperature by 0.1℃
- Functions for setting double passwords to prevent access or control except administrators
- Data locking function

Alarm system and safety devices

- Alarm for filter cleaning period (Warm Condenser alarm)
- Alarm for high/low temperature of sight and auditory
- Equipped with pressure switch
- Equipped with overheating prevention switch ■ Auto return system after blackout

Ultralow temperature freezer (Ultra safe (twin Heart)® freezer)

Model (-90℃)	DFU-558CUS	DFU-657CUS	DFU-740CUS	DFC-200CUS	DFC-300CUS	DFC-400CUS	DFC-500CUS	DFC-600CUS
External size	W1010 x D900 x H1901	W1010 x D990 x H1901	W1010 x D1010 x H2001	W1365 x D720 x H1101	W1665 x D720 x H1101	W1965 x D720 x H1101	W2265 x D720 x H1101	W2565 x D720 x H1101
Internal size	W750 x D620 x H1200	W750 x D730 x H1200	W750 x D750 x H1300	W600 x D470 x H710	W900 x D470 x H710	W1200 x D470 x H710	W1500 x D470 x H710	W1800 x D470 x H710
Inside measurement	558L	657L	731L	200L	300L	400L	500L	600L
Electric capacity	Capacity necessary for installment AC220V 1ph (50/60Hz)							
Weight	410kg	425kg	455kg	255Kg	290Kg	315Kg	340Kg	365Kg

Options

1. Rack
2. Box
3. CO2 Backup system
4. 7"LCD touch screen and USB (3 years Data) - Basic -1channel (sensor 3channel, 6channel options)
5. U-system (remote alarm system and wireless control system – telecommunication subscription needed)
6. Automatic voltage regulator
7. Cryogenic gloves
8. Battery backup (Control panel and alarm)
9. Recorder
10. VIP

Upright type double door with double controller

Product features and specifications

- Creative upright type double door freezer by OPERON which is independently controlled
- Independent temperature adjustment and space usage according to the characteristics of samples
- To keep samples which are used frequently in the upper chamber, and to keep samples which need long-term preservation in the lower chamber
- More stable temperature with triple silicon gasket of the upper and the lower chambers
- Four inner doors which are two in the upper chamber and two in the lower chamber and two outer doors in the upper and the lower chamber

Ultralow temperature freezer(Double door / Double controller freezer)

Model	DFUD-558						DFUD-657						DFUD-740					
	AA	BB	CC	AA	BB	CC	AA	BB	CC	AA	BB	CC	AA	BB	CC	AA	BB	CC
Temperature in the upper chamber	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃
Temperature in the lower chamber	-40℃	-55℃	-86℃	-40℃	55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃
External size	W1010 x D900 x H1990						W1010 x D1030 x H1950						Customised item					
Internal size	W750 x D620 x H550						W750 x D770 x H530											
Inside measurement	511L						612L											
Door (inside/outside)	4/2						4/2						4/2					
Electric capacity	Capacity necessary for installment AC220V 1ph (50/60Hz)																	
Weight	420kg						430kg											

Upright type double door with single controller

It is an upright type double door freezer to minimize the cold air loss when taking out samples. As samples which are used frequently are kept in the upper chamber and samples which need a long-term preservation are kept in the lower chamber, it affects the temperature of other samples less.

Control system

- Micro processer control system /Digital temperature indicator which adjust the temperature by 0.1℃
- Functions for setting double passwords to prevent access or control except administrators
- Data locking function

Alarm system and safety devices

- Alarm for filter cleaning period (Warm Condenser alarm)
- Alarm for high/low temperature of sight and auditory
- Equipped with pressure switch
- Equipped with overheating prevention switch ■ Auto return system after blackout

Ultralow temperature freezer(Double door / Single controller freezer)

Model	DFUD-374			DFUD-446			DFUD-558			DFUD-657			DFUD-740		
Temperature range	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE
	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃
External size	W860 x D800 x H1951			W860 x D900 x H1951			W1010 x D900 x H1901			W1010 x D990 x H1901			W1010 x D1010 x H2001		
Internal size	W600 x D520 x H1200			W600 x D620 x H1200			W750 x D620 x H1200			W750 x D730 x H1200			W750 x D750 x H1300		
Inside measurement	347L			446L			558L			657L			731L		
Electric capacity	Capacity necessary for installment AC220V 1ph (50/60Hz)														
Weight	370kg			380kg			400kg			415kg			445kg		

Options Rack / Box / CO2 Backup system / 7"LCD touch screen and USB (3 years Data) - Basic -1channel (sensor 3channel, 6channel options) / U-system (remote alarm system and wireless control system – telecommunication subscription needed / Automatic voltage regulator / Cryogenic gloves / Battery backup (Control panel and alarm) / Recorder / VIP / ※**The minimum temperature of ultralow temperature freezer(C-type) is supplied with -91℃ performance if the customer requests.**

Ultralow temperature freezer

Upright type Validity(Shelf Cooling Type) – (DFU-V / DFUD-V)

Product features and specifications

■ Realization of strong cooling power with installment of copper pipes in each shelf and accurate and even temperature profile inside

Ultralow temperature freezer (Shelf cooling type Validity freezer)-Single door

Model	DFU-128V			DFU-256V			DFU-374V			DFU-446V			DFU-558V			DFU-657V			DFU-740V			DFU-868V		
Temperature range	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE
	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃
External size	W710 x D750 x H1390			W710 x D750 x H1990			W860 x D800 x H1951			W860 x D900 x H1951			W1010 x D900 x H1901			W1010 x D990 x H1901			W1010 x D1010 x H2001			W1010 x D1151 x H2001		
Internal size	W450 x D475 x H600			W450 x D475 x H1200			W600 x D520 x H1200			W600 x D620 x H1200			W750 x D620 x H1200			W750 x D730 x H1200			W750 x D750 x H1300			W750 x D891 x H1300		
Inside measurement	128L			256L			347L			446L			558L			657L			731L			868L		
Electric capacity	Capacity necessary for installment AC220V 1ph (50/60Hz)																							
Weight	210kg			300kg			370kg			380kg			400kg			420kg			450kg			500kg		

Ultralow temperature freezer (Shelf cooling type Validity freezer)-Double door

Model	DFUD-374V			DFUD-446V			DFUD-558V			DFUD-657V			DFUD-740V			DFUD-1080V			DFUD-1215V		DFUD-1260V	
Temperature range	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	AE	BE
	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-40℃	-55℃
External size	W860 D800 H1951			W860 x D900 x H1951			W1010 x D900 x H1901			W1010 x D990 x H1901			W1010 x D1010 x H2001			W1460 x D1010 x H1990			W1610 x D1010 x H1990		W2260 x D1010 x H1583	
Internal size	W600 D520 H1200			W600 x D620 x H1200			W750 x D620 x H1200			W750 x D730 x H1200			W750 x D750 x H1300			W1200 x D750 x H1200			W1350 x D750 x H1200		W1400 x D750 x H1200	
Inside measurement	347L			446L			558L			657L			731L			1080L			1215L		1260L	
Electric capacity	Capacity necessary for installment AC220V 1ph (50/60Hz)																					
Weight	380kg			390kg			410kg			425kg			455kg			500kg			520kg		540kg	

Upright-Double door type Power plus model

Product features and specifications

■ The freezer appropriate for the surrounding temperature +40℃ and over

Ultralow temperature freezer (Power Plus model-Double door Upright type)

Model	DFUD-374P			DFUD-446P			DFUD-558P			DFUD-657P			DFUD-740P			DFUD-1080P			DFUD-1215P		DFUD-1260P	
Temperature range	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	CE	AE	BE	AE	BE
	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-86℃	-40℃	-55℃	-40℃	-55℃
External size	W860 x D800 x H1951			W860 x D900 x H1951			W1010 x D900 x H1901			W1010 x D990 x H1901			W1010 x D1010 x H2001			W1460 x D1010 x H1990			W1610 x D1010 x H1990		W2260 x D1010 x H1583	
Internal size	W600 x D520 x H1200			W600 x D620 x H1200			W750 x D620 x H1200			W750 x D730 x H1200			W750 x D750 x H1300			W1200 x D750 x H1200			W1350 x D750 x H1200		W1400 x D750 x H1200	
Inside measurement	347L			446L			558L			657L			731L			1080L			1215L		1260L	
Electric capacity	Capacity necessary for installment AC220V 1ph (50/60Hz)																					
Weight	380kg			390kg			410kg			425kg			455kg			500kg			520kg		540kg	

Control system

■ Micro processer control system /Digital temperature indicator which adjust the temperature by 0.1℃
■ Functions for setting double passwords to prevent access or control except administrators
■ Data locking function

Alarm system and safety devices

■ Alarm for filter cleaning period (Warm Condenser alarm)
■ Alarm for high/low temperature of sight and auditory
■ Equipped with pressure switch
■ Equipped with overheating prevention switch   ■ Auto return system after blackout

Options   Rack / Box / CO2 Backup system / 7"LCD touch screen and USB (3 years Data) - Basic -1channel (sensor 3channel, 6channel options) / U-system (remote alarm system and wireless control system – telecommunication subscription needed / Automatic voltage regulator / Cryogenic gloves / Battery backup (Control panel and alarm) / Recorder / VIP / ※**The minimum temperature of ultralow temperature freezer(C-type) is supplied with -91℃ performance if the customer requests.**

Accessory

Full Storage Capacity

Operon Chest freezer's Storage system(Rack & Box)

Model	Eight stage	The number of box	Ten stage	The number of box	Twelve stage	The number of box
DFC-84	6EA	48	-	-	-	-
DFC-200	12EA	96	12EA	120	12EA	144
DFC-300	18EA	144	18EA	180	18EA	216
DFC-400	24EA	192	24EA	240	24EA	288
DFC-500	30EA	240	30EA	300	30EA	360
DFC-600	36EA	288	36EA	360	36EA	432
CFQ-150	8EA	64	8EA	80	-	-
CFQ-152	8EA	64	8EA	80	-	-
CFQ-156	8EA	64	8EA	80	-	-
CFQ-232	15EA	120	15EA	150	-	-
CFQ-300	21EA	168	21EA	210	-	-

Operon Upright freezer's Storage system(Rack & Box)

Model	The number of shelf	Rack (stage X row)	2"box+Cell divider	Micro tube (81 hole)	Micro tube (100 hole)
DFU-128	3	9EA (3x3)	81	6561	8100
DFU-256	4	12EA (5x3)	180	14580	18000
DFU-374	4	16EA (5x3)	240	19440	24000
DFU-446	4	16EA (5x4)	320	25920	32000
DFU-558	4	20EA (5x4)	400	32400	40000
DFU-657	4	20EA (5x5)	500	40500	50000
DFU-740	4	15EA (5x5) + 5EA (6x5)	525	42525	52500
DFU-868	4	10EA (6x6) + 10EA (5x6)	660	53460	66000
DFUD-1080EV	4	24EA (5x5) + 8EA (5x4)	760	61560	76000

Upright rack

Sliding rack

Chest rack

Poly Carbonate Box (2")

Vacuum Insulation Panel (V.I.P)

U-System
(remote alarm, wireless control system)

Frost remover

Cryogenic gloves(Cryo gloves)

Circular 7 days chart recorder

Konics recorder(KRN-50)-2ch
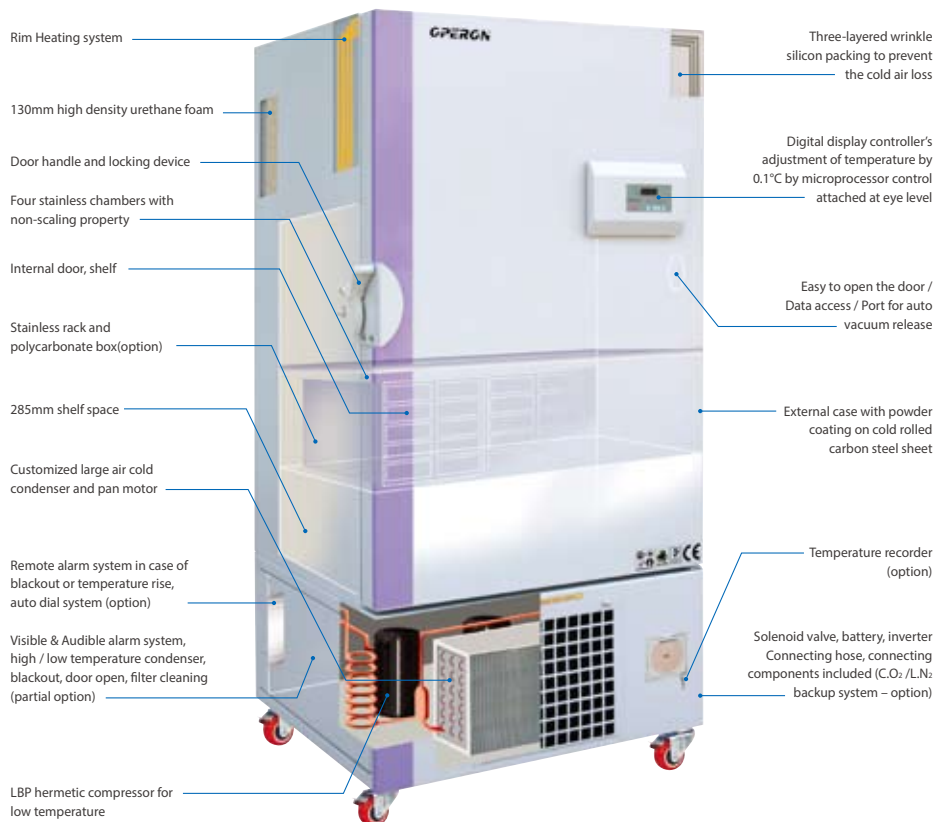

Paperless recorder(2ch~12ch)

Yokogawa recorder SR-10006(1~6ch)

Description

Controller 1 (LCD controller: option)

Dual cooling system which does not need an oil separator (Auto cascade system)

Rim Heating system

130mm high density urethane foam

Door handle and locking device

Four stainless chambers with non-scaling property

Internal door, shelf

Stainless rack and polycarbonate box(option)

285mm shelf space

Customized large air cold condenser and pan motor

Remote alarm system in case of blackout or temperature rise, auto dial system (option)

Visible & Audible alarm system, high / low temperature condenser, blackout, door open, filter cleaning (partial option)

LBP hermetic compressor for low temperature

Three-layered wrinkle silicon packing to prevent the cold air loss

Digital display controller's adjustment of temperature by 0.1°C by microprocessor control attached at eye level

Easy to open the door / Data access / Port for auto vacuum release

External case with powder coating on cold rolled carbon steel sheet

Temperature recorder (option)

Solenoid valve, battery, inverter Connecting hose, connecting components included (C.O₂ /L.N₂ backup system – option)

LED controller (standard)

- Data Lock function: Set-point security password
- The temperature is set by 0.1°C, and setting temperature and low/high temperature alarm can be entered. Control circuit chooses safety circuit when operated again after blackout to protect the device in case of auto power return.
- When choosing remote alarm system, alarm messages about abnormal temperature and blackout are sent to maximum four users.
- RS-232 PC communications program is available for monitoring and setting temperature such as accumulated time/temperature recording/graph presentation.
- Text description and LED flickering while sending auditory alarm are presented about abnormal temperature and abnormal condensation.

START/STOP	Start/stop
MODE	Save data or Move to the next stage
	High temperature alarm/Low temperature alarm/Remote alarm
	LN2.CO2 back up alarm
	Data lock, set point security
	Setting password etc
SHIFT	Move the digit
INC	Increase of numbers
ALARM ON/OFF	Alarm ON/OFF

New controller

- 7"Color TFT-LCD, Touch Screen Panel
- Setting the temperature by 0.1°C and entering setting temperature and low/high temperature alarm, set-point security and password security
- Control section(Touch screen panel) includes data acquisition function, so additional recorder devices are not necessary.
- Data acquisition and backup of collected data using USB are easy, and save them as an excel file.
- Validation Support System presents maximum six temperature and graphs (including control sensor) at the same time and is available for setting save period from per a minute to per an hour recording maximum 3 years. Also, real-time monitoring is available performing the function of validator (OQ, PQ, Paperless Recorder, etc). (Deluxe Pack)
  (Option for additional sensors), 1-(Basic Pack control 1), 2-(Ice Crystal Pack control1, ice crystal temperature of samples monitoring 1, Abnormal condensation 1), 3-(Deluxe Pack control1, shelf3, abnormal condensation1, outdoor temperature1)
- Real-time graph can be checked on graph monitoring mode, so control state of products can be checked at a glance.
- Energy saving function is set to realize energy saving
- Visual alarm screen is made, so various alarm and warning messages are presented on Touch Screen Panel in the form of graphics or texts. Information on abnormal high temperature, low temperature or blackout is sent to the user.
- If UPS is chosen, it supplies the power to control section and sends information on blackout and various alarms to the user. Saving data during blackout is available. Automatic return to already saved set value in case of power return after blackout. (When choosing U-System, alarm messages are sent to the mobile)

LCD(7") touch screen controller (option)

(It may be different from the actual image)

Controller & Alarm system – LCD touch screen control panel (option)

- Ultralow temperature freezer communicates with PC using U-system through RS-485 in the remote area which make monitoring, control and alarm available. One system controls maximum twelve ultralow temperature freezers.
- CDMA of U-system makes the user control twelve ultralow temperature freezers, monitor the current state of the device, receive alarm message(text message) and backup accumulated alarms with the mobile by wireless realizing safer sample management.

Code classification

Temperature Code

CODE	TEMPERATURE
A	-40℃
B	-55℃
C	-86 ℃
D	-120℃
CRYO	-150℃~-203℃

DFUD-558CEV

- Validity Model
- Economy Controller
- Performance -66℃
- Capacity
- Double Door
- Type : Deep freezer upright
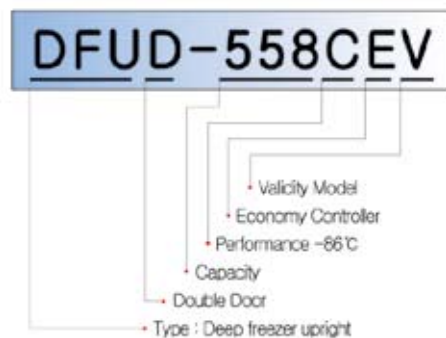
Model Code

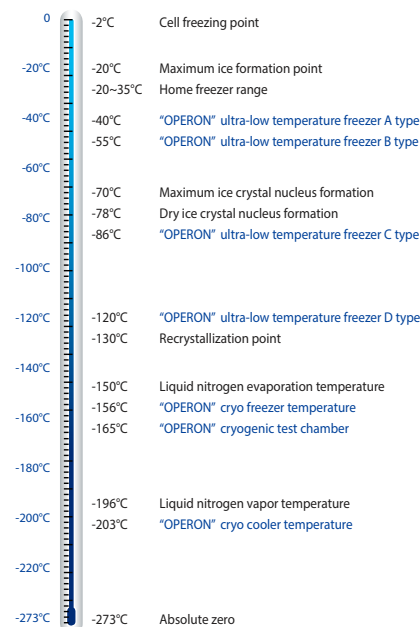| Code	Model	REMARKS
DFU	Deep Freezer Upright type	DFU-128/256/374/446/558/657/740L
DFU-V	Deep Freezer Upright type with Validation	Plumbing each shelves
DFUD-V	Deep Freezer Upright type Double door with Validation	DFU-374/446/558/657/740/1080/1260L
DFUD-E	Deep Freezer Upright type Double door	Single controler(same as DFU)
DFUD	Deep Freezer Upright type Top chamber:-86℃/-55℃/-40℃ Bottom chamber:-86℃/-55℃/-40℃	Double controller DFUD-558CC/558AC/558BB/558BC/558AA DFUD-657CC/657AC/657BB/657BC/657AA
DFUP	Deep Freezer Upright Power plus up	Frequently door open or poor environment
DFC	Deep Freezer Chest type	DFC-84/200/300/400/500/600L
CFQ	Cryo Freezer Conqueror	CFQ-150/-152/-156/-300/-232
FDB	Freeze Dryer Bench top type	FDB-5503
FDU	Freeze Dryer Upright type	FDU-7003/7006/7012/7024/8603/8606/8612/8624
FDG	Freeze Dryer Glass type	FDG-120/105/90
FDS/FDTS	Freeze Dryer Stoppering type	FDS-12012/12006/8612/8606/7003/5503 , FDTS(For Production)
FDT	Freeze Dryer Bulk Tray type	FDT-86111/55111/8650/8632/8612/8606/12050/12032/12012/12006
FDCF	Freeze Dryer Chemical Free	FDCF-12012/12006/12003
SVQ	Speed Vacuum concentrator	SVQ-120/-95, MSVQ-20
IMC	Immersion Cooler	IMC-120/-86
SF	Shell Freezer-Cryo bath	SF-40/CB-80
VWCP	Water Vapor Cryo Pump	WVCP-1500/1650
CT	Cold Trap (Glass type/Coil type/Probe type)	CT-120/-90/-70/-55 , CTL/CTM/CTI
CH	Industrial Ultra Low Temp.of Chiller	CH-40/-55/-86/-120
CTC	Cryogenic Test Chamber	CTC-165 /MTC
GR	Gas Recycler	GR-120/86/40/20
CnH	Circulation Bath(cooling & heating)	CnH-2505/2510/2520/2530/2540/2550/4005/4010/4020/4030/4040/4050
HC	Circulation Bath (heating)	HC-20005/20010/20020/20030/20040/20050
IC	Industrial chiller	IC-4020/6020/9020/4035/6035/9035
FDUT	Freeze Dryer (Combi)	FDUT-12012/12006/12003/8612/7012/8606/7006/8603/7003
MPS	Multi Purpose System	MPS-55
CUS	Ultra Safe (twin heart) Freezers	DFU-CUS/DFUD-CUS/DFC-CUS
ATC/VTC	Altitude-Temperature-Vacuum test chamber	ATC-100/200/300 , VTC-100/200/300

Controller Code

Code	Type	Model	Remarks
C/E	Compact/Economic	All kinds of freezer DFC-84/IMC/CT/SF-40	For freezer
E	Economic Standard	Basic control panel for freeze dryers	For Freeze Dryer
P	Programmable	FDT-additional drying program	
N	Premium Network	All Models(option), Touch screen with Memory card & Tele-communication	

Application Code

Classification	Model	Remarks
Freezer for sample preservation	DFC/DFU/DFUD/DFUV/DFUP/CUS	
Epoxy freezer / Ice pack freezer	DFUD-1080EV/1260EVtype	
Plasma Freezer	DFU-446/CFQ-156	
STEM CELL Freezer	CFQ	
Compact Freezer for personal use	DFC-84	
Freeze Dryer for laboratory	FDB/FDU/FDT/FDCF/FDG/FDS/MPS	
Freeze Dryer for food and medicines (Cooled & Heated shelf)	FDT, FDUT	
Freeze Dryer for collect of organic solvents like ethanol	FDG/FDCF	
Cryo pump for semiconductor/Sputtering/Coater	WVCP-1500/WVCP-1650	Order made
Concentrator for analysis of DNA/RNA/PROTEINS	SVQ, MSVQ-20	
Cooler for a partial cooling	IMC	
Ultra-low chiller for industrial use	CH-40/-55/-86/-120	Order made
Quick Freezer	LT-40	Order made
Ciyogenic test chamber(Strength)	CTC-165/150/130 , MTC-150/130	Order made
Circulation Bath for a reaction unit or distillation unit, chiller	CnH/HC/CH/IC	Order made
Collecting Vapor, Gas, Organic Solvent	CT-50/70/90/120, CTL/CTM/CTI	
Altitude-Temperature-Vacuum Test chamber	ATC-100/200/300, VTC-100/200/300	Order made

Ultra-Low Temperature Range

0	-2℃	Cell freezing point
-20℃	-20℃	Maximum ice formation point
	-20~35℃	Home freezer range
-40℃	-40℃	"OPERON" ultra-low temperature freezer A type
	-55℃	"OPERON" ultra-low temperature freezer B type
-60℃		
	-70℃	Maximum ice crystal nucleus formation
-80℃	-78℃	Dry ice crystal nucleus formation
	-86℃	"OPERON" ultra-low temperature freezer C type
-100℃		
-120℃	-120℃	"OPERON" ultra-low temperature freezer D type
	-130℃	Recrystallization point
-140℃		
	-150℃	Liquid nitrogen evaporation temperature
-160℃	-156℃	"OPERON" cryo freezer temperature
	-165℃	"OPERON" cryogenic test chamber
-180℃		
-200℃	-196℃	Liquid nitrogen vapor temperature
	-203℃	"OPERON" cryo cooler temperature
-220℃		
-273℃	-273℃	Absolute zero

Vacuum Relief Port-Builtin

Rim Heating Systems-Builtin

Type	Data Setting								Alarm						MEMORY CARD
	MICRO PROCESSOR	TEMPERATURE	ALARM TEMP.	ACCESS PASSWORD	DATA RESET PASSWORD	DATALOC	PRINT SET	C.02 BACKUP SET	BUZER& LED LAMP	POWER FAILURE	WARM CONDENSER	CLEAN FILTER	ROOM TEMP.	R.T.M.	
E-Type	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	OPTION	OPTION	OPTION	OPTION	OPTION	-
N-Type	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes