

# Preservation

sub-zero

## ULT Chest Freezers

SANYO Ultra-Low Temperature Chest Freezer lineups for ultra-low temperature storage needs to support the forefront of life science researches.



# The Ideal $-152^{\circ}\text{C}$ , $-86^{\circ}\text{C}$ Freezing Environment in Capacities from 86 L to 701 L

Ideal for long term preservation of biologicals, blood components and various cell line, Panasonic preservation systems employ microprocessor control to maintain a high-precision temperature environment. They are not affected by ambient temperature, minimizing uneven temperature distribution within the chamber, and a temperature rise during door opening.

## $-152^{\circ}\text{C}$ Ultra-Low Temperature Chest Freezer

For stable long-term storage

### MDF-1156/1156ATN

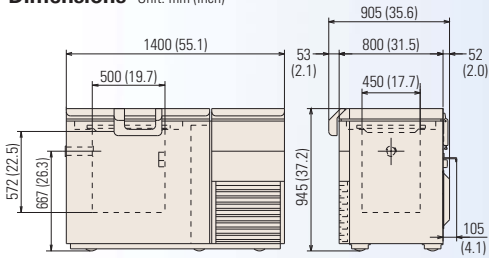
TEMPERATURE

EFFECTIVE CAPACITY

$-152^{\circ}\text{C}$  **128 L (4.5 cu.ft.)**



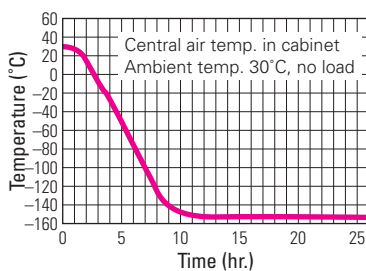
Dimensions Unit: mm (inch)



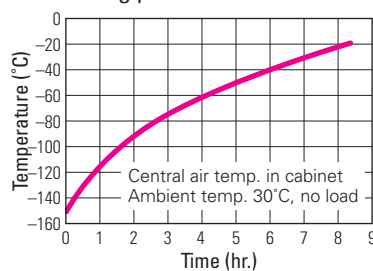
MDF-1156

### Performance Data

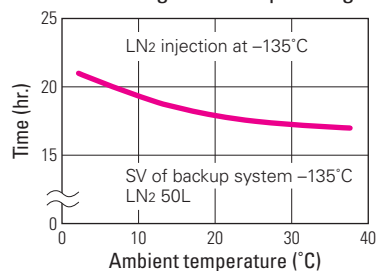
Pull-down characteristics under no-load condition



Pull-up characteristics during power failure



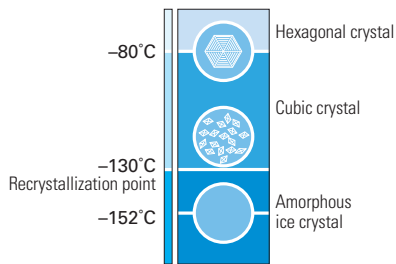
Effect of ambient temp. on holding time of liquefied gas



## For MDF-1156/1156ATN

### Why Freeze to $-152^{\circ}\text{C}$ ?

Recrystallization Mechanism (Artist's Concept)



### World's lowest $-152^{\circ}\text{C}$ freezer ensures stable cell and tissue preservation

An important factor to consider when preserving cells or tissue at ultra-low temperatures is to prevent amorphous ice crystals from recrystallizing within and outside the cells. Samples that are maintained in an ultra-low temperature freezer at  $-152^{\circ}\text{C}$  which is far lower than the recrystallization point ( $-130^{\circ}\text{C}$  for pure water) can be preserved semi-permanently. Preservation at ultra-low temperatures maintains vitrification without crystallization occurring inside and outside cells. In contrast to conventional liquid nitrogen preservation containers, freezer preservation has numerous advantages: no sample contamination, no sudden liquid eruptions, as well as low operational costs. Panasonic's MDF-1156 and 1156ATN make long-term storage below the recrystallization point easier and more stable than ever before.

### Specially designed compressor and cascade refrigeration system

Specially designed for rugged ultra-low temperature applications in a laboratory environment (HFC refrigerants only).



### Micro-processor Temperature Control with LED Digital Display

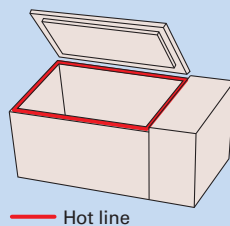
Extremely accurate, easy-to-read display. The temperature inside the freezer can be set and monitored easily by means of a microprocessor temperature control with an LED digital display. The thermostat incorporates a platinum resistor (Pt.  $100\Omega$ ), precision and durability.

### Integrated Cabinet Design

High-performance refrigeration system with foamed-in-place cabinet insulation maximizes interior temperature uniformity and protects against fluctuating ambient temperatures.

### Hot line for secure sealing

Moisture condensation at the top edges of the cabinet due to differences in temperature inside and out causes frost and icing problems that may reduce heat insulation efficiency and obstruct door movements. These problems are prevented by the "hot line" by means of which hot gas from the higher temperature circuit is circulated through the problem areas.



Hot line

## Advanced Features

### Self-diagnostic function

The temperature sensor, filter sensor and cascade sensor monitor operation conditions continuously. Should abnormality be picked up, an error code and the current temperature will be displayed in turn.

### Ring back function

The alarm buzzer can be silenced by pressing the BUZZER key on the control panel. (The remote alarm signal is not cancelled.) Should the alarm condition continue after a certain suspension, the alarm buzzer sound will resume.

### Easy Maintenance

(MDF-193/193AT have no filters)

Filter check lamp notifies the user of a clogged condenser filter. The condenser filter is situated at the front panel to make filter removing and cleaning easier.



**Note:** The position of the filter check lamp is shown on the control panel (see photo shown at the bottom of this page).

### Standard casters and levelling feet

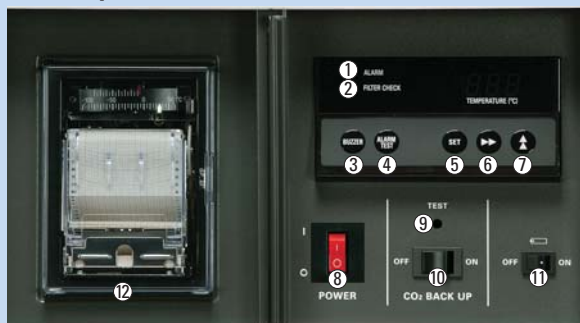
Standard-equipped heavy duty casters make it easy to move a freezer when necessary. The levelling feet keep a freezer level and firm on the floor.

## Safety Device

### Built-In Temperature & Power Failure Alarms (Lamp/Buzzer)

In case of power failure or an irregular rise in temperature, a rechargeable battery-operated indicator lamp and alarm will be activated. A compact recording unit which automatically records the inside temperature, and a backup system with liquefied  $\text{CO}_2$  or  $\text{N}_2$  which is selfactivated when a power outage occurs are also available separately. This equipment helps insure that the contents will be protected in the event of any power failure or mechanical trouble.

## Control panel



- ① Alarm lamp and buzzer
- ② Filter check lamp
- ③ Buzzer key
- ④ Alarm test key
- ⑤ Mode setting key
- ⑥ Digit shift key
- ⑦ Numerical value shift key
- ⑧ Power switch
- ⑨  $\text{CO}_2$  back-up test switch (AT type only)
- ⑩  $\text{CO}_2$  back-up switch (AT type only)
- ⑪ Battery switch
- ⑫ Temperature recorder

MDF-394AT

# -86°C Ultra-Low Temperature Chest Freezers

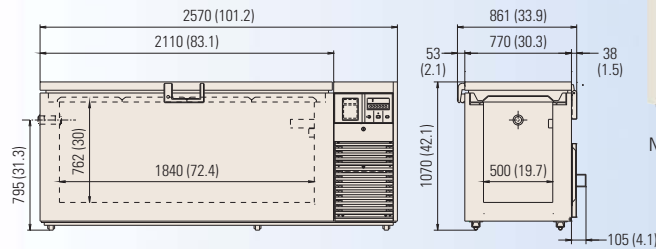
Ideal for large-capacity preservation

## MDF-794/794AT

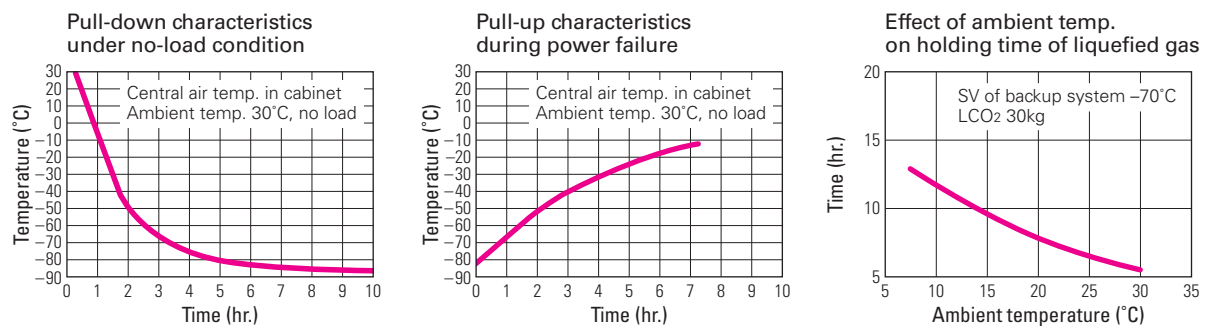
TEMPERATURE EFFECTIVE CAPACITY

**-86°C 701 L (24.8cu.ft.)**

Dimensions Unit: mm (inch)



### Performance Data



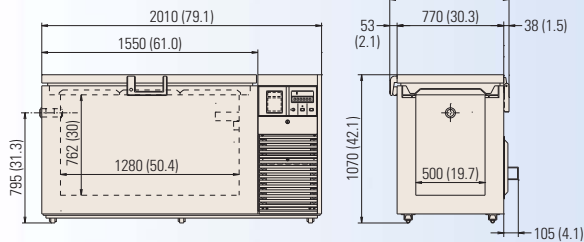
Ideal for middle-sized installation space

## MDF-594/594AT

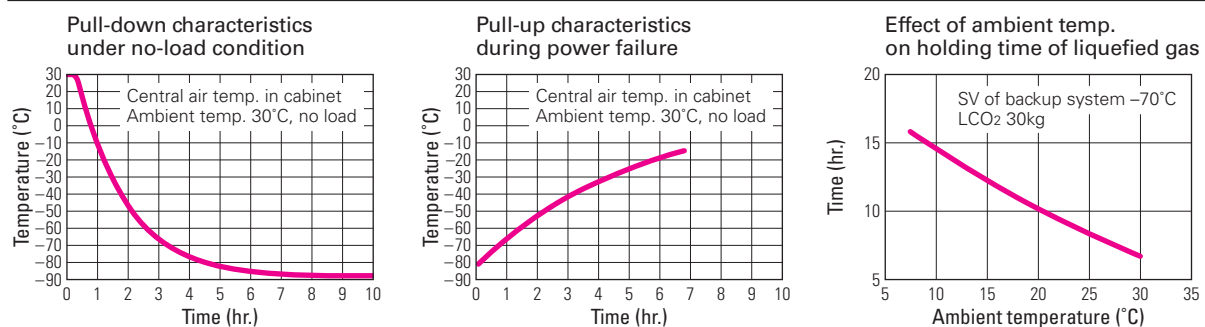
TEMPERATURE EFFECTIVE CAPACITY

**-86°C 487 L (17.1cu.ft.)**

Dimensions Unit: mm (inch)



### Performance Data



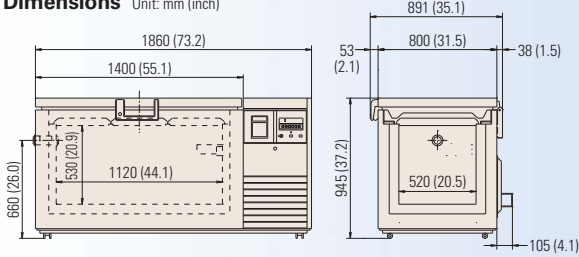
Low-profile design for easy access to stored materials

# MDF-394

TEMPERATURE EFFECTIVE CAPACITY

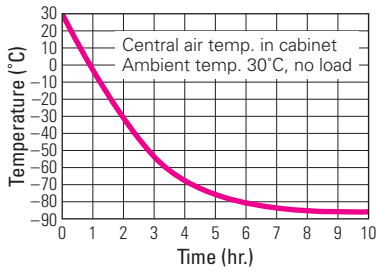
**-86°C** **309 L (10.9 cu.ft.)**

Dimensions Unit: mm (inch)

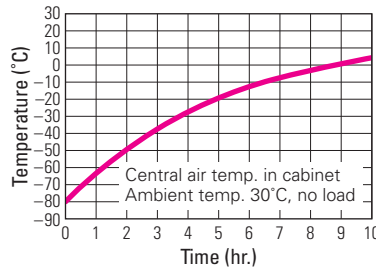


## Performance Data

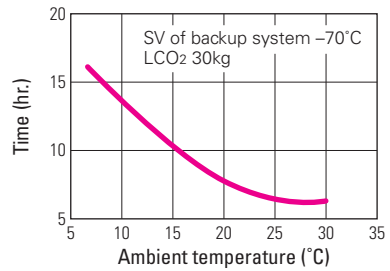
Pull-down characteristics under no-load condition



Pull-up characteristics during power failure



Effect of ambient temp. on holding time of liquefied gas



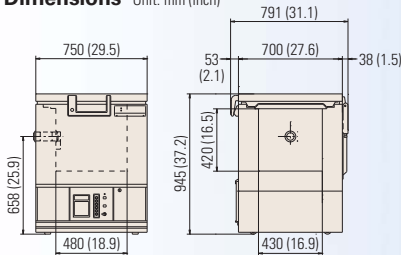
Compact, space-saving unit optimized for private use

# MDF-193/193AT

TEMPERATURE EFFECTIVE CAPACITY

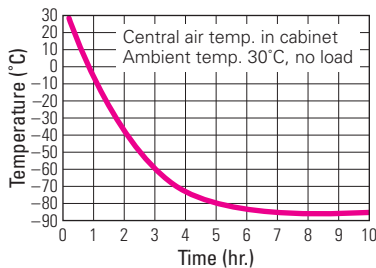
**-86°C** **86 L (3.0 cu.ft.)**

Dimensions Unit: mm (inch)

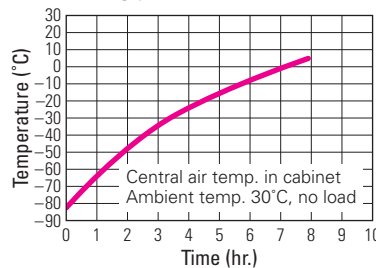


## Performance Data

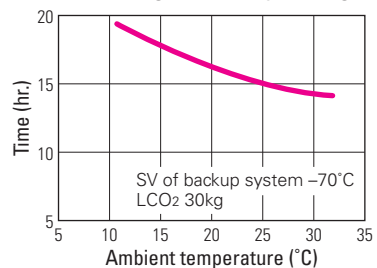
Pull-down characteristics under no-load condition



Pull-up characteristics during power failure



Effect of ambient temp. on holding time of liquefied gas





## Specifications

Model No.	MDF-1156/1156ATN	MDF-794/794AT	MDF-594/594AT	MDF-394	MDF-193/193AT
<b>Temperature Range</b>	-130°C to -152°C		-20°C to -86°C		-50°C to -86°C
<b>Exterior Dimensions (W x D x H)</b>	1400 x 800 x 945 (mm) 55.1 x 31.5 x 37.2 (inch)	2570 x 770 x 1070 (mm) 101.2 x 30.3 x 42.1 (inch)	2010 x 770 x 1070 (mm) 79.1 x 30.3 x 42.1 (inch)	1860 x 800 x 945 (mm) 73.2 x 31.5 x 37.2 (inch)	750 x 700 x 945 (mm) 29.5 x 27.6 x 37.2 (inch)
<b>Interior Dimensions (W x D x H)</b>	500 x 450 x 572 (mm) 19.7 x 17.7 x 22.5 (inch)	1840 x 500 x 762 (mm) 72.4 x 19.7 x 30.0 (inch)	1,280 x 500 x 762 (mm) 50.4 x 19.7 x 30.0 (inch)	1120 x 520 x 530 (mm) 44.1 x 20.5 x 20.9 (inch)	480 x 430 x 420 (mm) 18.9 x 16.9 x 16.5 (inch)
<b>Effective Capacity</b>	128 liters (4.5 cu.ft.)	701 liters (24.8 cu.ft.)	487 liters (17.1 cu.ft.)	309 liters (10.9 cu.ft.)	86 liters (3.0 cu.ft.)
<b>Exterior Cabinet</b>	Galvanised steel with baked on finish				
<b>Interior Cabinet</b>	Aluminum plate	Stainless steel			
<b>Inner Lid</b>	1	4	3	1	
<b>Insulation</b>	Foamed-in-place rigid polyurethane				
<b>Compressor</b>	<b>High stage side</b>	Hermetic type, 1,100 W		Hermetic type, 450 W	Hermetic reciprocated type, 450 W
	<b>Low stage side</b>	Hermetic type, 1,100 W		Hermetic type, 750 W	
<b>Evaporator</b>	<b>High stage side</b>	Cascade condenser			Tube-on-sheet type
	<b>Low stage side</b>	Tube on sheet (shared with interior)			
<b>Condenser</b>	<b>High stage side</b>	Fin and tube type	Fin and tube type		Finless tube type
	<b>Low stage side</b>	Cascade condenser	Shell and tube type	Cascade condenser	
<b>Temperature Control</b>	Microprocessor control system, Non-volatile memory	Microprocessor: Keypad input Set value memory: non-volatile memory			
<b>Temperature Display</b>	Digital display				
<b>Sensor</b>	Platinum resistance (Pt. 100 W)			Platinum resistance (Pt. 1000 W)	Platinum resistance (Pt. 100 W)
<b>Safety</b>	Cylinder key on the lid handle				
<b>Alarm system</b>	Selectable high temp. alarm (+10°C & +15°C from set point)			Adjustable high and low temp. alarm (±5°C to ±20°C from set point)	
	Power failure alarm, Filter check lamp (Except MDF-193/193AT which have no filters), Remote alarm contact				
<b>Net Weight (Approx.)</b>	265kg (584 lbs.)—1156 272kg (600 lbs.)—1156ATN	335kg (739 lbs.)—794 345kg (761 lbs.)—794AT	291kg (642 lbs.)—594 301kg (664 lbs.)—594AT	219kg (483 lbs.)	103kg (227 lbs.)—193 109kg (240 lbs.)—193AT

### Voltage specification by destination

Representative destination	Voltage	Frequency	MDF-1156-PE/1156ATN-PE	MDF-794-PE/794AT-PE	MDF-594-PE/594AT-PE	MDF-394-PE	MDF-193-PE/193AT-PE
Europe	230V	50Hz (CE)	MDF-1156-PE/1156ATN-PE	MDF-794-PE/794AT-PE	MDF-594-PE/594AT-PE	MDF-394-PE	MDF-193-PE/193AT-PE
Korea	220V	60Hz	MDF-1156-PK/1156ATN-PK	MDF-794-PK/794AT-PK	MDF-594-PK	—	MDF-193-PK
Thailand	220V	50Hz	MDF-1156-PB/1156ATN-PB	MDF-794-PB	MDF-594-PB/594AT-PB	MDF-394-PB	—

ATN: LN<sub>2</sub> backup system, temperature recorder

AT: LCO<sub>2</sub> backup system, temperature recorder

## Optional Accessories

### Storage Racks (Aluminium)

Model No.	MDF-193C-PW	MDF-394C-PW	MDF-494C-PW	MDF-594C-PW
<b>Case Dimensions (W x D x H)</b>	207 x 144 x 413 (mm) 8.1 x 5.7 x 16.3 (inch)	155 x 155 x 515 (mm) 6.1 x 6.1 x 20.3 (inch)	207 x 144 x 539 (mm) 8.1 x 5.7 x 21.2 (inch)	207 x 144 x 665 (mm) 8.1 x 5.7 x 26.2 (inch)
<b>Number of Drawers</b>	3	4	4	5
<b>Applicable Model (Rack capacity)</b>	MDF-193/193AT (6)	MDF-394 (20)	MDF-1156/1156ATN (6)	MDF-594/594AT (18) MDF-794/794AT (24)

### Temperature Recorder

Model No.	MTR-85H-PW	MTR-155H-PW
<b>Recording Range</b>	-100 to +50°C	-170 to +30°C
<b>Freezer Model</b>	MDF-193 MDF-394 MDF-594 MDF-794	MDF-1156

### Inventory Racks (Stainless steel)

Model No.	Box Type (Capacity)	External Dimensions (mm)			Freezer Model (Rack capacity)
		Width	Depth	Height	
IR-207C-PW	2" (7)	144	142	405	MDF-193 (6)
IR-209C-PW	2" (9)	144	142	518	MDF-394 (21), 1156 (9)
IR-213C-PW	2" (13)	144	142	592	MDF-594 (24), 794 (36)
IR-305C-PW	3" (5)	144	142	405	MDF-193 (6)
IR-306C-PW	3" (6)	144	142	518	MDF-394 (21), 1156 (9)
IR-309C-PW	3" (9)	144	142	747	MDF-594 (24), 794 (36)



### ULT-Freezer Backup Kits

CVK-UB2-PW/UB2I-PW: LCO <sub>2</sub> Backup Kit for MDF-794/594/394	
CVK-UBN2-PW/UBN2I-PW: LN <sub>2</sub> Backup Kit for MDF-794/594/394	
CVK-A-PW: Built-in LCO <sub>2</sub> Backup Kit for MDF-193	
CVK-AT2-PW: LCO <sub>2</sub> Backup Kit for MDF-1156	
CVK-ATN2-PW: LN <sub>2</sub> Backup Kit for MDF-1156	I : version for North America only

\*Cooling performance is indicated by the temperature reached at the center of the freezer (at ambient temperature of 30°C with no load). In order to use the freezer at a stable temperature for a long time, it is recommended that the temperature be set to at least 5°C higher than the indicated lowest temperature.

In addition, depending on the usage conditions, it may not be possible to reach the indicated lowest temperature.

Caution: Panasonic guarantees the product under certain warranty conditions. Panasonic in no way shall be responsible for any loss of content or damage to content.

• Appearance and specifications are subject to change without notice.



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**Medical devices quality management system: ISO13485**



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