

# MarineNet



Freshness Retaining Device for vessels

## DENBA<sup>+</sup> Marine

SUSTAINABLE DEVELOPMENT GOALS



# Introduction of MarineNet – (1) Company Profile

Established : 25<sup>th</sup> Feb. 2000

Capital : 200,000,000 yen

President : Katsuki TANAKA

Shareholders :

-  ITOCHU Corporation
-  Mitsui O.S.K. Lines, Ltd.
-  Kawasaki Kisen Kaisha, Ltd.
-  Nippon Kaiji Kyokai
-  Mitsui & Co., Ltd.
-  Sumitomo Corporation
- World Marine Co., Ltd.
- Anchor Ship Partners Co., Ltd.
- Hyundai Corp
- Fujitsu Limited

-  Japan Maritime Daily Co., Ltd.
-  NYK Line
-  Iino Kaiun Kaisha Ltd.
-  Mitsubishi Corporation
-  Marubeni Corporation
-  Sojitz Corporation
- Shoei Kisen Kaisha Ltd.
- Yamamizu Shipping Co., Ltd.
- Fuji Trading Co., Ltd.



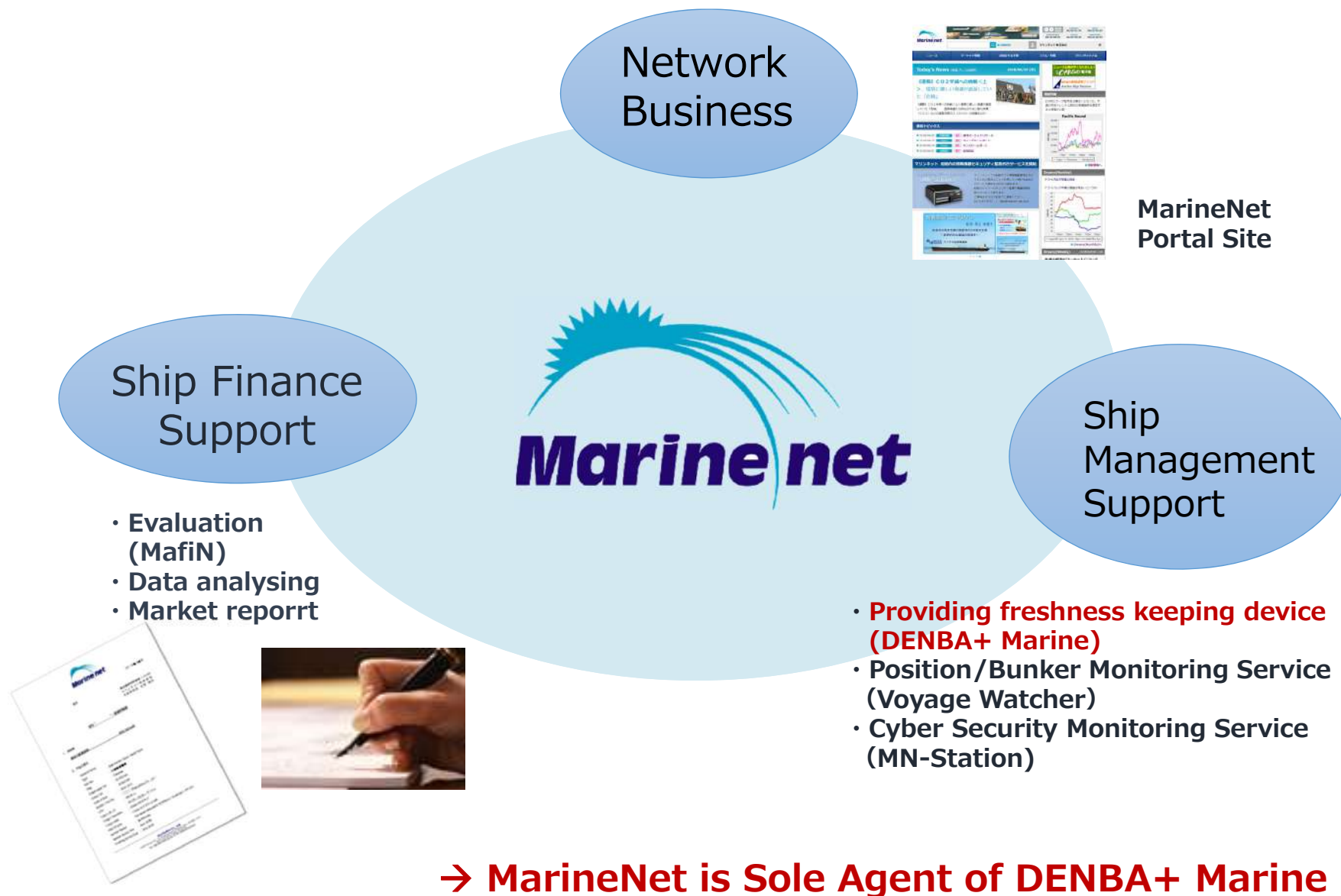
Philosophy :

*Link to the Future of Shipping and Shipbuilding Industry*



Marine Net is based on a neutral position within the shipping and shipbuilding industry. Contribute to creating the future of the shipping and shipbuilding industry by connecting people, information and technology.

# Introduction of MarineNet – (2) Main Services



# Company Profile of DENBA Japan

- **DENBA JAPAN CO., LTD.**
- ADDRESS: 3-15-6, Meitetsufudousan Takebashi Bld.5F, Kandanishikicho, Chiyoda-ku, Tokyo, 101-0054, JAPAN
- CEO: Kanetaka GOTO
- TEL : +81 (0)3-3518-6718##
- FAX : +81 (0)3-3294-1223
- WEBSITE : <http://www.denba.co.jp/>
- **Business Overview**
  - **DENBA+** manufacturing and sales
  - **DENBA FRESH PRO** manufacturing and sales
  - **DENBA Fryer** manufacturing and sales
  - **DENBA Health** manufacturing and sales
  - **DENBA Binno** manufacturing and sales
  - **DENBA+ Marine** manufacturing and sales
  - **DENBA equipped Container** sales and rental
  - Solutions/Services providable thanks to DENBA technology



## DENBA+ Marine - Freshness Retaining Device for vessels

Simply place the device and mats in ship's Vegetable Room.  
Make vegetables last longer.

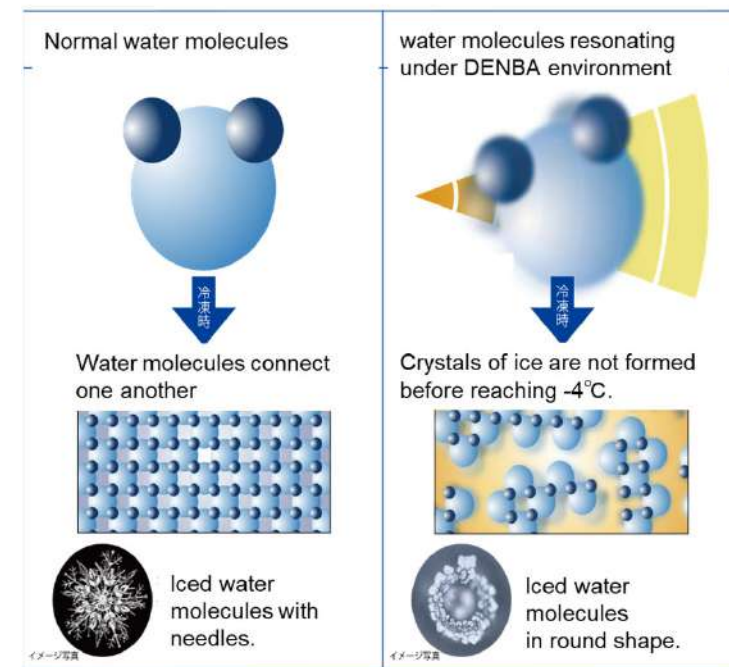


# DENBA Technology

- ✓ DENBA is a food preservation technology, which **activates the cells of food by resonating water molecules.**



- ✓ The **freshness of the food is kept longer**, and the **production of bacteria is suppressed**, which contributes the food loss rate to become significantly lower.
- ✓ DENBA+ Marine aims to adopt this technology to reduce **the rate of food loss during voyages to near zero.**



5

# DENBA Technology (comparison examples)

【 The case of vegetables stored in the ref. room of the vessels 】

without DENBA

35<sup>th</sup> day

with DENBA



Eggplant



## DENBA Technology (comparison examples)

【 The case of vegetables stored in the ref. room of the vessels 】

without DENBA

35<sup>th</sup> day

with DENBA



Chinese Cabbage





# DENBA Technology (comparison examples)

【 The case of vegetables stored in the ref. room of the vessels 】

without DENBA

19<sup>th</sup> day

with DENBA



Spinach



## Monitoring results (comments from crew)

18days later



All vegetable in photo are better in place that have range of DENBA active, compare to the other vegetable that cannot reach the range of DENBA active.

23days later



Now, all vegetable in DENBA active starting to have a black spot and the leafy vegetable is starting to turn in color brown. The non DENBA active vegetable is in no good condition compare to the last few days.

26days later



All Vegetable in DENBA active and non DENBA active range are all in no good apprerance.  
But in my ovservation the vegetable that in place in DENBA active is longer life compare to non DENBA active range vegetable.

## Testimonials from crew

Lush vegetables  
Crispy touch

DENBA installed onboard our vegetable room, it's **amazing** how this technology successfully preserved the **freshness** and **high quality** of vegetables and fruits .

The vegetables and fruits that we harvested at Naoshima, Japan on JAN 31<sup>st</sup> was the same date the DENBA+ was installed onboard, has **retained more than 95% of their freshness**, original appearance and taste even up to present.

DENBA's performance installed on board this vessel is **truly effective** and very much working good for **better and longer freshness** of fruits and vegetables life. It was daily monitoring by myself and crew are happy about the result of this component. Thanks for such good inventions made by DENBA.

Fresh!

Very good  
impression  
from AMSA

# Monitoring Reports by crew (Copy)

Crew report for comparison between with and without DENBA

→ "On DENBA" is better!

◇ Check item  
vegetable name : CAULIFLOWER

	"On DENBA+" is better	"On DENBA+" is better if I have to choose	No difference	"Non DENBA+" is better if I have to choose	"Non DENBA+" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) discoloration of roots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) color depth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

vegetable name : GREEN PEPPER

	"On DENBA+" is better	"On DENBA+" is better if I have to choose	No difference	"Non DENBA+" is better if I have to choose	"Non DENBA+" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) discoloration of roots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) color depth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

vegetable name : CUCUMBER

	"On DENBA+" is better	"On DENBA+" is better if I have to choose	No difference	"Non DENBA+" is better if I have to choose	"Non DENBA+" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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c) color depth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

vegetable name : CHINESE CABBAGE

	"On DENBA+" is better	"On DENBA+" is better if I have to choose	No difference	"Non DENBA+" is better if I have to choose	"Non DENBA+" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
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d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

vegetable name : BITTER MELON

	"On DENBA+" is better	"On DENBA+" is better if I have to choose	No difference	"Non DENBA+" is better if I have to choose	"Non DENBA+" is better
a) gloss, beam, freshness on surface	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b) discoloration of roots	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c) color depth	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

◇ Check item  
vegetable name : CAULIFLOWER

	"On DENBA+" is better	"On DENBA+" is better if I have to choose	No difference	"Non DENBA+" is better if I have to choose	"Non DENBA+" is better
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d) other (if any)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

vegetable name : GREEN PEPPER

	"On DENBA+" is better	"On DENBA+" is better if I have to choose	No difference	"Non DENBA+" is better if I have to choose	"Non DENBA+" is better
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vegetable name : CUCUMBER

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## Outcome – healthier and delicious dishes served on board

### Daily Menu (抜粋)

		MENU			
14-Aug-21	Breakfast	Pork Luncheon meat	Fried egg		
	Lunch	Red snapper fish sinigang	Vegetables salad	Fresh banana	
	Dinner	Pork Adobo	Sauteed vegetables		
22-Aug-21	Breakfast	Pork Luncheon meat in tin	Fried egg	Yogurt	
	Lunch	Tuna head whole tinola	Sauteed mix vegetables pinakbet	Ice cream	
	Dinner	Pork tenderloin steak	Vegetables salad	Sparagus soup	
27-Aug-21	Breakfast	Pork Luncheon Meat	Fried Dried Squid		
	Lunch	Pork Feet Sinigang	Fried fish sardines	Vegetables salad	Water Melon fresh
	Dinner	Sauteed Chicken with coco milk	Milk fish Paksiw		
01-Sep-21	Breakfast	Chicken sausage	Fried Dried Squid	Orange Juice	
	Lunch	Pork Feet Sinigang	Fried milk fish	Vegetables salad/ Atsara	Apple Fresh
	Dinner	Pork hocks Pata	Sopas/ Soup		
05-Sep-21	Breakfast	Chicken sausage	Scrambled Egg	Fresh Milk	
	Lunch	Prawn Sinigang	Pork Minced Burger steak	Fruit salad	
	Dinner	Fish Mackerel Paksiw	Mix vegetables with coco milk		
09-Sep-21	Breakfast	Chicken sausage	Scrambled Egg	Fresh Milk	
	Lunch	Tuna head whole tinola	Mix vegetables		
	Dinner	Chicken Adobo	Fried Fish		

### Crew Comment

Our frank feedback is that it really change/benefited and have a lot of advantage applying DENBA, the healthy lifestyle of whole crew onboard consuming fresh vegetables and fruits daily, due to all vegetables and fruits stay fresh until to the last supply. Aside from healthy foods, we can save provision consumption if every time we have a fresh vegetables to eat mixed with fish or meat rather than consuming whole meat daily as it was expensive compare to vegetables.

→ **Fresh vegetables had been served even four weeks after leaving port.**  
(the vessel had sailed on 14<sup>th</sup> August)

## Why DENBA for vessels? – (1) SDGs



SUSTAINABLE DEVELOPMENT GOALS

-Besides SDGs, PSC of various countries start to conduct **detailed checks of living and eating environments** in their inspections.

# Why DENBA for vessels? – (2) compliance/working environment

## MARITIME LABOUR CONVENTION, 2006(MLC2006)

### Regulation 3.2 Food and catering

**Purpose:** To ensure that seafarers have access to good quality food and drinking water provided under regulated hygienic conditions

1 Each Member shall ensure that ships that fly its flag carry on board and serve **food and drinking water of appropriate quality, nutritional value and quantity** that adequately covers the requirements of the ship and takes into account the differing cultural and religious backgrounds.

### Guideline B3.2.1 Inspection, education, research and publication

1 The competent authority should, in cooperation with other relevant agencies and organizations, collect up-to-date information on nutrition and on methods of purchasing, storing, preserving, cooking and serving food, with special reference to the requirements of catering on board a ship.



Australian Government

Australian Maritime Safety Authority

Strengthen inspections!

Class NK documents

[https://www.classnk.or.jp/hp/pdf/publications/Publications\\_image/PSC20E.pdf](https://www.classnk.or.jp/hp/pdf/publications/Publications_image/PSC20E.pdf)

[https://www.classnk.or.jp/hp/pdf/publications/Publications\\_image/PSC21E.pdf](https://www.classnk.or.jp/hp/pdf/publications/Publications_image/PSC21E.pdf)

In 2021, there were 28 cases of detainable deficiencies due to Labour Conditions - accommodation, recreational facilities, food and catering worldwide.

4 deficiencies – Quantity/variety not sufficient for intended voyage quantity of fresh food not sufficient

# Innovation Endorsement by Class NK

DENBA+Marine is certified by ClassNK

## ClassNK Innovation Endorsement for Products & Solutions

Document No: 22VT00850

THIS IS TO CERTIFY that the undernoted product has been examined and found in order in accordance with manufacturer's specification.

This certificate is issued to  
Applicant : DENBA JAPAN CO., LTD.  
Place of applicant : Tokyo, Japan

Product descriptions:  
1) Food freshness preservation device

Product name : DENBA+ Marine

Version No. : Version 2

This certificate is subject to the conditions specified in the attached sheet(s).  
Issued at Tokyo on 9<sup>th</sup> March 2022.

  
( Hisashi Ikeda )  
General Manager  
Technical Solution Department



Attached sheet to certificate "22VT00850" (1/3)

1. Definition of "Product Description(s)"

- i) This freshness preservation device generates a low frequency (30-60hz) electric potential (voltage) in a certain range of space from discharging mat, which gives fine vibrations and resonance to the water molecules in the food.

By installing the freshness preservation device in a storage (refrigerated warehouse) in the ship, it resonates, activates water molecules in the food, which leads to food freshness preservation.

This freshness preserving equipment will contribute to reducing food loss, maintaining the health of seafarers, and improving the food environment, which in turn will help to ensure a better quality of seafarers and will be a positive contribution to the SDGs.

This technology has obtained patent in 46 countries/region including following.

Patent No.  
JP 5683032 B1, 5974377 B2, 6366882 B1  
CN 105472998 B, 10741519 B  
KR 10-1739099 B1, 10-2069813 B1

This freshness preserving equipment will contribute to **reducing food loss**, maintaining **the health of seafarers**, and **improving the food environment**, which in turn will help to ensure a better quality of seafarers and will be a **positive contribution to the SDGs.**



# Component of DENBA+ Marine

## Main unit



Input Volt: AC100V-120V  
AC220V-240V  
(50Hz/60Hz)

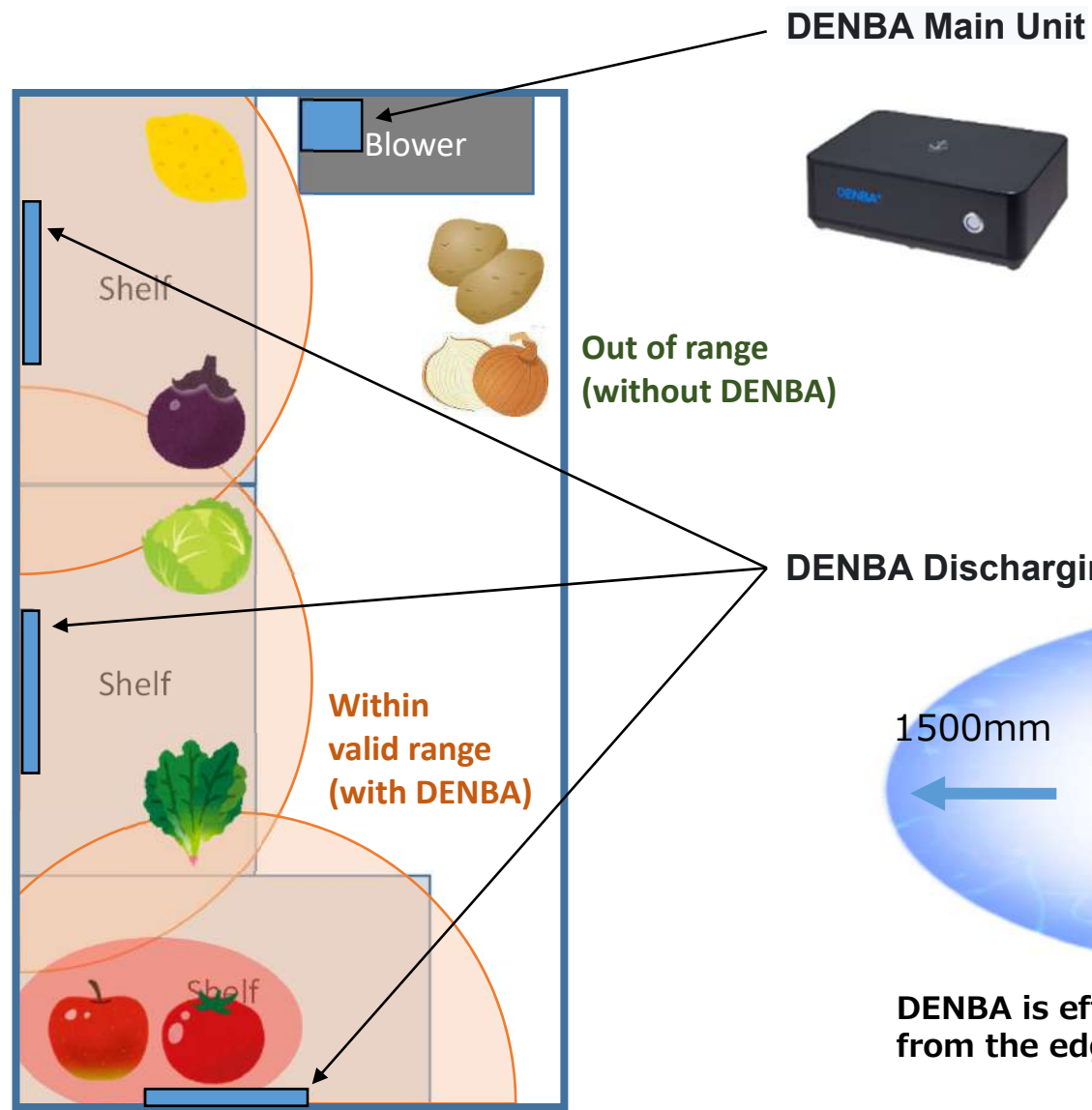
E power cons. : 4W

## Electrical discharge mat (3sheets)



Weight: 1.25kg/sheet

# DENBA+Marine installation in Veg. Room (1)



DENBA Discharging Mats



DENBA is effective within a radius of 1.5m from the edges of the sheets

Tomatoes and apples can be positively affected by the electric field, but the ethylene gas they produce affects other vegetables, so keep a distance from other vegetables/fruits.

## DENBA+Marine installation in Veg. Room (2)

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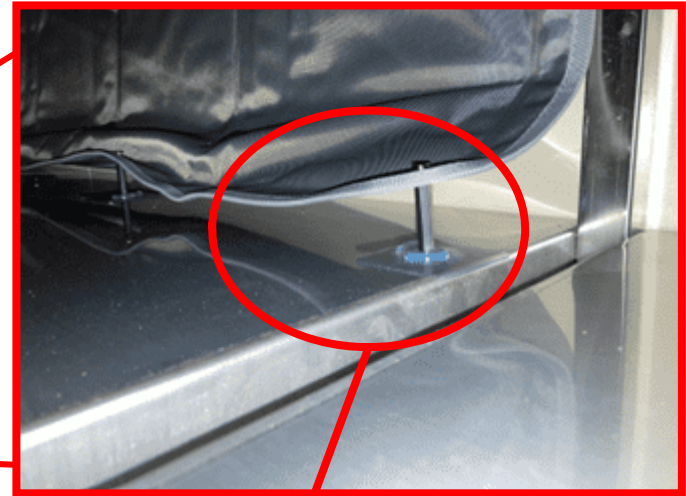
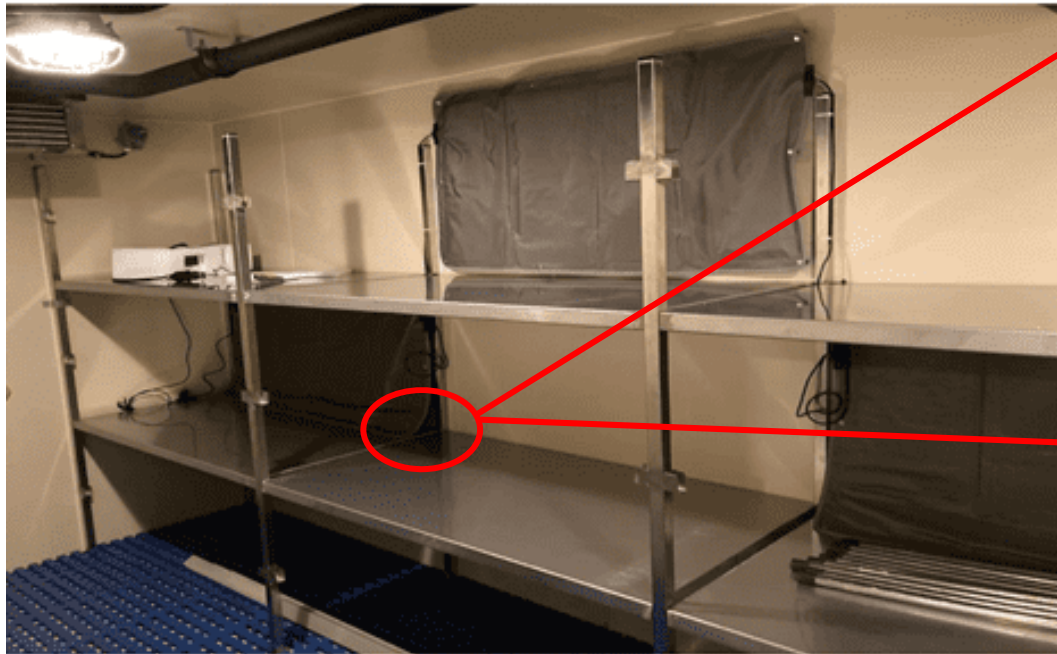


- Easy to install according to the manual.
- Just press the power button
- Start keeping the freshness of the provision automatically.

## DENBA+Marine installation in Veg. Room (3)

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- \* In case of steel shelves, it should not be contact with the electrical discharge mat.



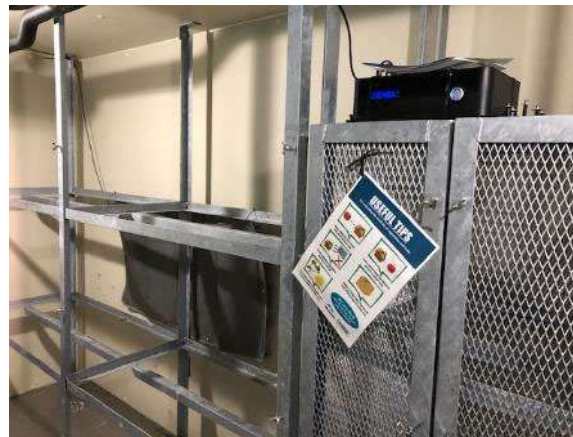
**Keep distance !**

※ Fixing hooks are included in the set of unit

## DENBA+Marine installation in Veg. Room (4)

There is enough food stored for about 15 crew members to live on board for about a month. This includes 30% grains, 20% of vegetables such as onions which can be stored for a relatively long time, 20% of leafy vegetables, 20% of milk and eggs and 10% of fruit juice (looks very sweet!), yogurt, etc. Depending on the crew nationality, Chinese, Vietnamese, and Indonesian crew may receive more vegetables than this. Filipino crew may have less leafy vegetables than other countries.

**Please install a power socket for DENBA in the vegetable room.**



## DENBA+Marine installation in Veg. Room (5)

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The effect of DENBA sometimes promotes food drying. Vegetables should not be exposed directly to the open air; for example, keeping them in a box and covering them with a lid/ wrapping paper



# Make DENBA more effective!

To make DENBA's food freshness preservation more effective, we distribute information on how to store vegetables and precautions to take.



## USEFUL TIPS

for extending the shelf life of vegetables and fruits

Keep a distance from food that emit ethylene gas.

If you cannot keep the distance, put it in a sealed case.

Avoid exposing vegetables directly to cold air.

Better to keep foods that do not emit ethylene gas in boxes, too.

Rice, onions, garlic and potatoes may be stored outside the DENBA area.

We care about rich & varied dietary Life for CREW.

## Ethylene Gas Producing Foods

Correctly store fruits and vegetables to reduce food waste.

### What is ethylene gas?

Ethylene is a gas naturally released by some fruits and vegetables resulting from the ripening.

### Why should I care?

Fruits and vegetables that are stored incorrectly spoil quickly. This could mean lost profit for you.

### What can I do?

- Do not store fruits and vegetables that produce ethylene with those that are sensitive to ethylene. For example, do not store bananas and apples next to each other. This applies to produce that is refrigerated and not refrigerated.
- Do not store produce in bags or sealed containers. This will trap the gas and cause the produce to ripen faster.

### Ethylene Producers

Apples Avocados Bananas Cantaloupe Kiwi Peaches Pears Peppers Tomatoes

### Ethylene Sensitive

Apples Asparagus Avocados Bananas Broccoli Cantaloupe Collard Greens Cucumber Eggplant Grapes Honeydew Kiwi Lemons Lettuce Limes Mangos Onions Peaches Pears Peppers Squash Sweet Potatoes Watermelon

### Not Ethylene Sensitive

Blueberries Cherries Beans (Snap) Garlic Grapefruit Oranges Pineapple Potatoes Raspberries Strawberries Tomatoes Yucca

## How to install DENBA+Marine in Veg. room

① Choose DENBA type (100V or 200V depending on the ship)



② **Install electrical cables and outlets in food storage**

③ Delivery DENBA to designated place (port agent, shipyard etc)



④ Install the main unit and the electrical discharge mat



⑤ Check the effective area by electrical tester (included in package)



⑥ Put vegetables in the effective area











# DENBA+Marine Specs

Waterproof receptacle (power plug) included

**DENBA+Marine**

		
<b>Model</b> DENBA Marine (100V Ver.)	<b>Model</b> DENBA Marine (120V Ver.)	<b>Discharge Mat</b> DP-WP10
<b>Dimensions</b> W300mm×D200mm×H106mm	<b>Dimensions</b> W300mm×D200mm×H106mm	<b>Dimensions</b> W1200mm×D660mm×H10mm
<b>Input Voltage</b> AC100V 50/60Hz	<b>Input Voltage</b> AC120V 50Hz	<b>Weight</b> 1.25kg
<b>Power Consumption</b> 4W	<b>Power Consumption</b> 4W	<b>Quantity of plates per unit</b> 3pcs
<b>Weight</b> 4.6kg	<b>Weight</b> 4.6kg	

		
<b>Model</b> Waterproof plug P12-2B(Yellow)	<b>Model</b> Waterproof plug P12-2B(Blue)	<b>Model</b> Waterproof plug 1B-3P
<b>Input Voltage</b> AC100V-130V	<b>Input Voltage</b> AC100V-250V	<b>Performance</b> IP56
<b>Performance</b> IP56	<b>Performance</b> IP56	<b>Weight</b> 0.12kg
<b>Weight</b> 0.18kg	<b>Weight</b> 0.18kg	



An electric checker is included in DENBA package.

# Patent and Certifications

- This technology has obtained patent in 46 countries/region**

JP 5683032 B1, 5974377 B2, 6366882 B1	CN 105472998 B, 10741519 B
KR 10-1759099 B1, 10-2069813 B1	US 20160015076 A1
TW I568395 B	AU 2014382339 B2
PH 1-2016-501408 A1	ID 2017/10498
BR 112016017484-4 B1	
DE/IT/GB/FR/NL/BE/DK/NO/GR/ES/TR/CH/LU/ MC/LI/IE/SE/HU/FI/IS/AT/RO/BG/PL/PT/CZ/SK	EP3108752 B1

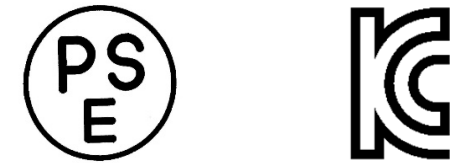
- Safety Certs**

- PSE for Japan
- KC for Korea
- CE for Europe
- RoHS for Europe
- FDA for USA
- FCC for USA

- IP Code** (International Protection Code by IEC60529)

Both main unit and discharging mats are by far better than IP22 which is required by IACS.

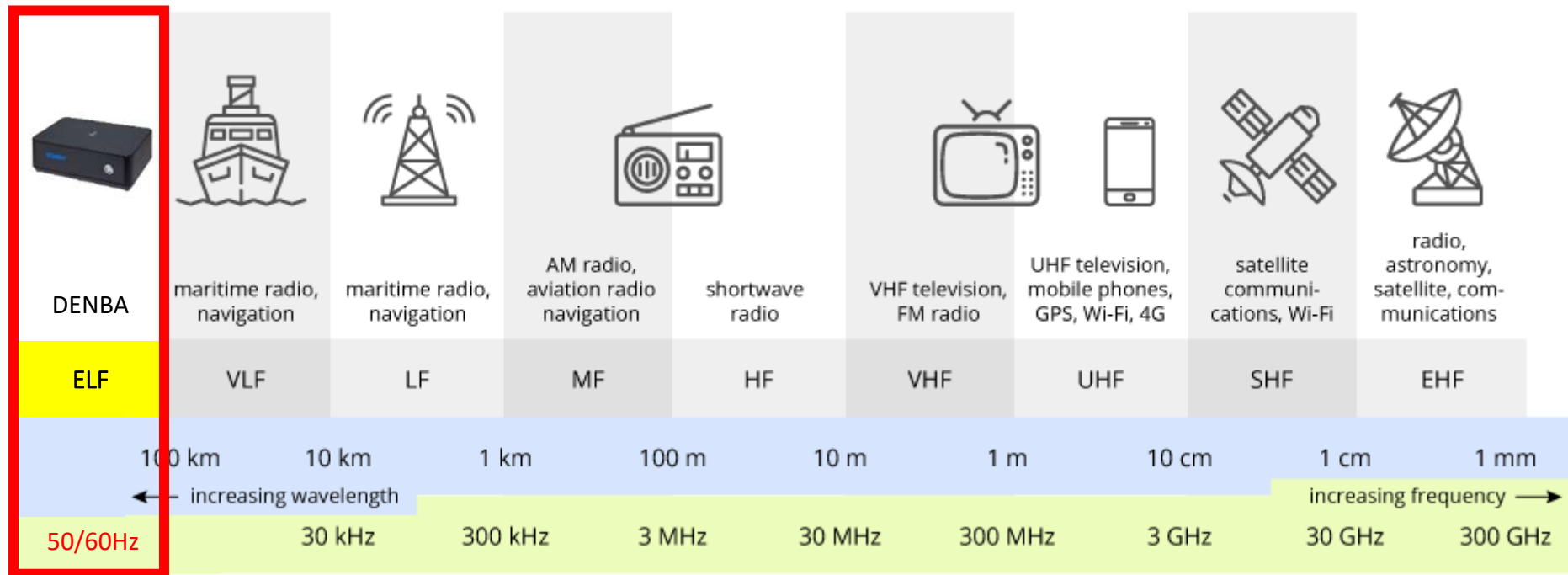
- Main Unit : IP45  
→ protected against solid foreign objects of 1,0mm  $\Phi$  and greater / protected against water jets
- Discharge Mat : IP56  
→ dust protected / protected against powerful water jets



CE certs



# DENBA Technology – No harm to humans



## Radio Frequency Bands - DENBA using ELF (Extremely Low Frequency)

Electromagnetic waves at commercial frequencies (50/60Hz) are also called ELF electromagnetic fields.

Its wavelength is 6,000 km/5,000 km, which is about the same length as the radius of the earth, so even near power lines, for example, the nature of the waves is very small, unlike radio waves. For this reason, separate safety standards have been established for the ELF electromagnetic field from the radio waves.

## Summary of Advantages of DENBA+Marine

- ① Easy to install!
- ② Easy Operation! - Just turn on the power button!  
(After blackout, you need to turn the power back on.)
- ③ No need to take vegetables out of the box, as the effect is same!  
(It should be taken out in case of a metal box)
- ④ Waterproof - No problem even if water is splashed on it during cleaning!
- ⑤ Can be used together with ozone generators and ethylene gas absorbers.
- ⑥ No adverse effect on the human body, in fact, a positive effect!

