



TERMODINAMICA

MARINE INVERTER AIR CONDITIONING

ENG

COMPANY PROFILE

Termodinamica operates in the marine air conditioning industry with cutting edge technology, our award winning Ibx Innovation Awards 2015, **US Patent Number 10415858**.

The company was founded in 2010 by three partners who have been working in the refrigeration and industrial mechanical sectors since the early 1980s.

Their great passion for the sea led the three partners to transform their vision into reality, true comfort on board.

To achieve this they use only the highest quality materials and the advanced technology, the hallmarks of Termodinamica. These actions guarantee excellence in its manufacturing facilities and products. Termodinamica structures itself into three main divisions: mechanical, electronics and refrigeration.

The company utilizes the latest industry technologies from robotic arc welding to white argon chambers for titanium welding in a protected atmosphere. The production area is organized to assure the highest quality standards will be met.

Termodinamica offers a full range of services for the marine HVAC sector including; cooling and heating with inverter heat pumps, cold and chilled rooms, cold rooms constructed in stainless steel (optional), titanium heat exchangers that are custom made for every need, engine room and car parking ventilation for ferries and we also manufacture steel air ducts.

Termodinamica counts on a team of highly skilled technicians around the world who are ready to assist with any project or wish and will meet the requests of the most demanding customer.





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WHY CHOOSE US

Termodinamica believes in revolutionizing the marine air conditioning industry by creating technology and top quality products that deliver high performance and comfort on board in a sustainable environment.

GRADE 2 TITANIUM EXCHANGERS

Our patented technology uses grade 2 titanium exchangers to avoid any corrosion in the system. The base material is high purity grade 2 titanium welded by TIG in an argon protective chamber. This means maximum performance without any degradation.

EFFICIENCY AT ITS BEST

Termodinamica technology has been designed to maximise the power at 50% consumption or less compared to any other competitors.

THINKING ABOUT USERS

Termodinamica uses a telemetry system for HVAC. This allows you to control our technology through the Internet regardless of where you are. In addition we have integrated a smart control system which alerts you whenever a component or a part is not working properly.

INVERTER AIR CONDITIONING SOLUTION FOR ANY SIZE VESSEL.

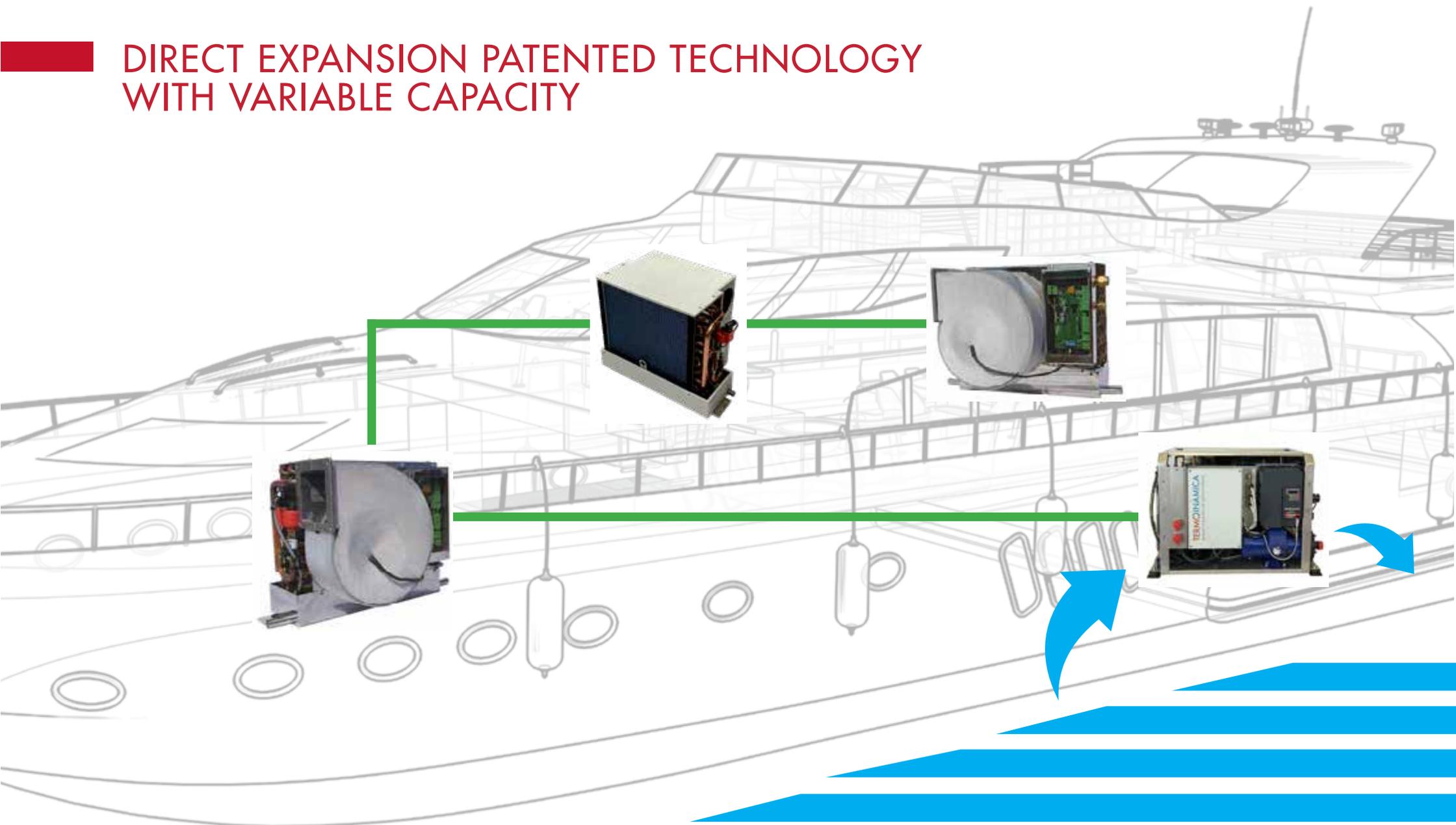
Termodinamica technology can work at low temperatures on the air handler and offers you a superior dehumidification. It allows you to create a healthier environment. It increases the on board comfort (up to 20% RH in 20 minutes).

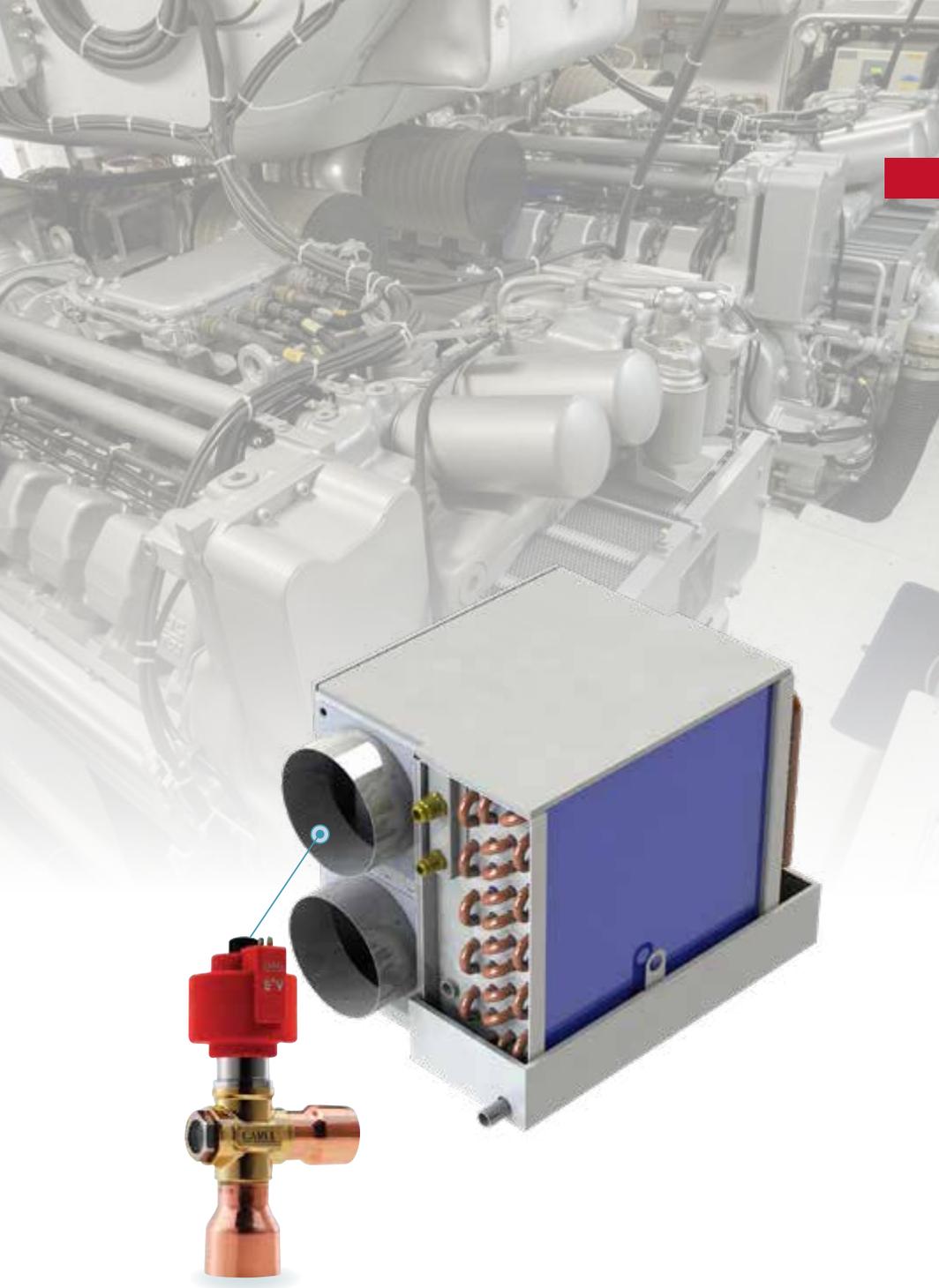
TECHNOLOGY YOU CAN COUNT ON

Termodinamica technology is easily integrated due to three key components:

- **LIGHTWEIGHT MATERIALS** - Aviation grade aluminum-Titanium grade 2 exchangers. 316L stainless steel chassis and drain pans. At Termodinamica we use the best quality materials to satisfy the customer.
- **COMPACT SIZE** - Termodinamica offers compact sized equipment to best fit your needs. We address every possibility to have the smallest footprint possible for our equipment.
- **FLEXIBLE AC REFRIGERANT LINE** - At Termodinamica we use refrigerant plastic hoses vs copper piping. This allows easier installation, less chance of failure compared to copper piping and better longevity of materials.

DIRECT EXPANSION PATENTED TECHNOLOGY WITH VARIABLE CAPACITY





ELECTRONIC EXPANSION VALVE – EEV

EEV are a very important component of the system. These valves allow you to get extremely precise temperature outputs from air diffusers. EEV offer an accurate electronic control with 500 steps allowing for precise operation of the air handler to the tenth of a degree.

Compared to a chilled water line, our use of a refrigerant line allows you to optimize performance. This allows you to minimize the time to obtain the desired temperature in the cabins.

The flexibility of this system makes it possible to maintain one room at a working temperature of 77°F and another at 68°F. This is done by adjusting air handler coils to different temperatures. Each valve has a dedicated microprocessor that manages and communicates with the central CPU. On the contrary, chillers have the same water temperature for all air handlers and the thermostat only controls the fan speed.

This technology, in combination with inverter compressors, is exclusive to Termodinamica which holds worldwide patents for use in the marine industry.

These valves allow the CPU to control superheat and the condensation of refrigerant which means each can come up to the physical limit of its operating curve.

Thanks to the evolved management of the electronic valve, we are able to obtain COP values of up to 7.

One kW of electricity consumed equals 7 kW of heating capacity produced. We offer the option for custom made systems for heat pump boilers and pools.

TOUCH SCREEN CONTROL

An advanced air conditioning system needs advanced controls. Our system is equipped with a 4.3" wide touchscreen which is bright, sensitive to touch and ergonomically friendly. The touchscreen display can be customized and offered in larger sizes of up to 15 inches with a glass surface.

The user has the option of choosing from a different set of parameters such as the 7 speed ventilation overnight mode and an automatic setting.

The power manager software has a dedicated area where you can set the maximum power consumption of the HVAC system.

The service mode area displays the working conditions of the system and records the working data for up to 3 months in several different graphs.

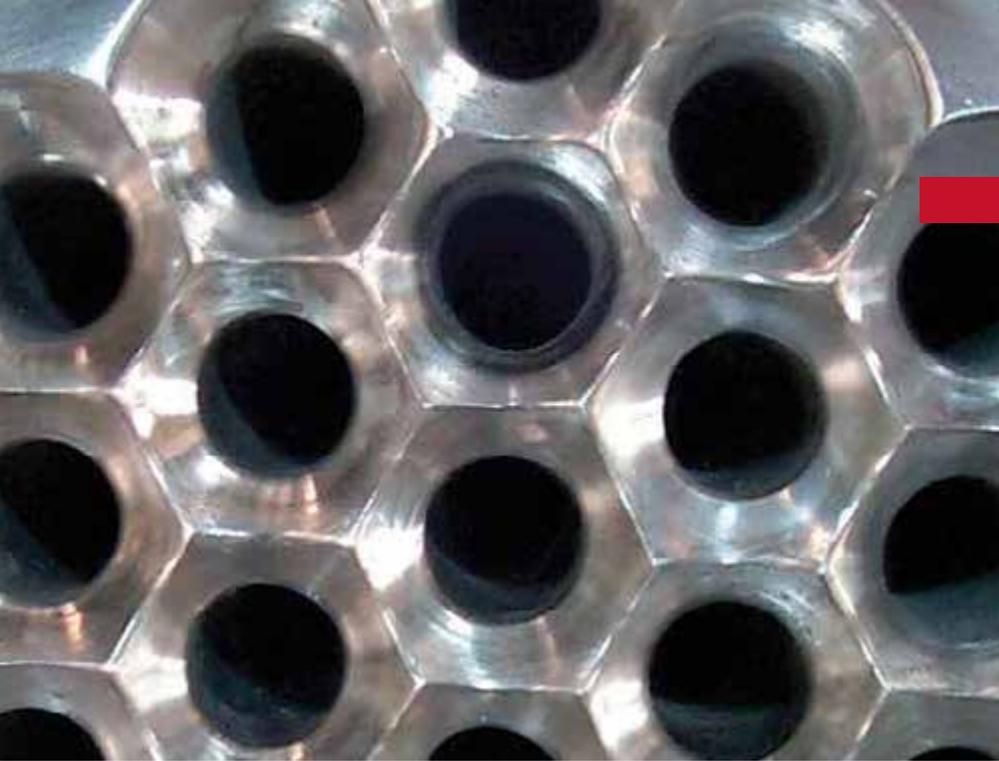


CABIN CONTROL – 3.5" TOUCH SCREEN

The display is user friendly and is extremely easy to adjust the temperature and set the preferred fan speed or allow it to adjust automatically.

This cabin control offers a screen saver that is able to turn off the backlight to avoid disturbing guests during the night.





ROBUST & RELIABLE

TITANIUM CONDENSER – Termodinamica’s condenser consists of a fully TIG welded pure titanium cylinder with gas flow inside a flooded tube.

- This is very different from the old coaxial tubes in standard systems which has lower efficiency.
- Our special condenser eliminates the need for maximum power absorption with changing sea water temperatures like coaxial condensers.
- Due to our unique construction architecture, the gas condensation process is greatly improved and increases the efficiency of the system an average of 62%.
- Our condenser has a weight reduction of roughly 3X compared to copper-nickel.
- Titanium is virtually corrosion and foul proof to assure everlasting reliability and efficiency.

SEA WATER PUMPS – Pumps are normally another critical chapter in the reliability of a yacht. Termodinamica has designed special pumps that address corrosion issues.

- The main problems are related to the shaft that connects the motor and impeller.
- With the contact of different materials flooded in salt water, the shaft is the first part subjected to corrosion. Termodinamica has solved this problem with a magnetic drive impeller with no shaft therefore no seals.
- The impeller is sealed inside the pump head and the propulsion power is transmitted through a magnetic field. With the use of a powerful neodymium based magnet, the pump offers very good electrical efficiency. Pumps range from 26 gallons/minute to 528 gallons/minute.

ELECTRONICS – Often, electronics are synonymous with problems and complexities. Termodinamica is convinced that electronics are essential to simplify system management as well as installation of a device.

- The spirit that drove the design of our system was to streamline it and make it more reliable. Each component is combined with a small intelligent microprocessor for management.
- Each board communicates with each other by a 2 wire bus (rs485). In order to wire an entire yacht, you need only 4 wires that start from the compressor box to the touch screen (2 x 24VDC power + 2 data bus).
- This translates to a considerable savings of time during the cable installation and greater repair simplicity in case of failure.
- The integrated diagnosis system is displayed on the touch screen showing the parameters of machine operation which allows the user to identify and fix the operating problems.



INNOVATIVE ENGINE BOX

1 LIGHTWEIGHT COMPRESSOR UNIT VS MULTIPLE

Each component has been carefully selected for not only its construction quality but also for its weight. The final result is impressive. Compared to other systems, weight is reduced by 3-5 times. For example, a 100ft yacht with a Termodinamica system has a compressor box weight of 88lbs versus 264lbs for a standard chiller unit.

The framing is made with high strength aviation grade aluminum which is appropriately treated to prevent corrosion from salt. On average, the overall dimensions are half of a chiller of comparable power. This is achieved by use of high-speed compressors and heat exchangers designed by our engineers that reduce the system size. In some cases, a custom-built engine box is possible to meet the specific needs of a shipyard or owner.

COMPRESSOR BOXES ABLE TO BE BUILT TO FIT ANY BTU SIZING

MOTOR YACHT						
TERMOTINAMICA						
YACHT	ft	40	60	100	130	150
POWER	KW	1,5	3,5	9	15	30
WEIGHT	lb	100	191	304	372	423
COMPETITORS						
YACHT	ft	40	60	100	130	150
POWER	KW	4	6	30	45	90
WEIGHT	lb	300	600	800	1500	3000
SAILING YACHT						
TERMOTINAMICA						
YACHT	ft	40	60	100	130	150
POWER	KW	1,5	2,5	7	15	20
WEIGHT	lb	100	103	304	372	423
COMPETITORS						
YACHT	ft	40	60	100	130	150
POWER	KW	4	8	14	30	40
WEIGHT	lb	300	600	800	1500	3000

EFFICIENCY AT ITS BEST

The energy efficiency of Termodinamica's systems is unrivaled compared to traditional systems. Our compressors have no inrush current on startup and accelerate gently on a digital ramp-up. This eliminates the need for oversized generators needed to power the air conditioning system startup loads. The inverter compressor is interfaced with a microprocessor system that constantly analyzes the working conditions in order to obtain maximum performance.

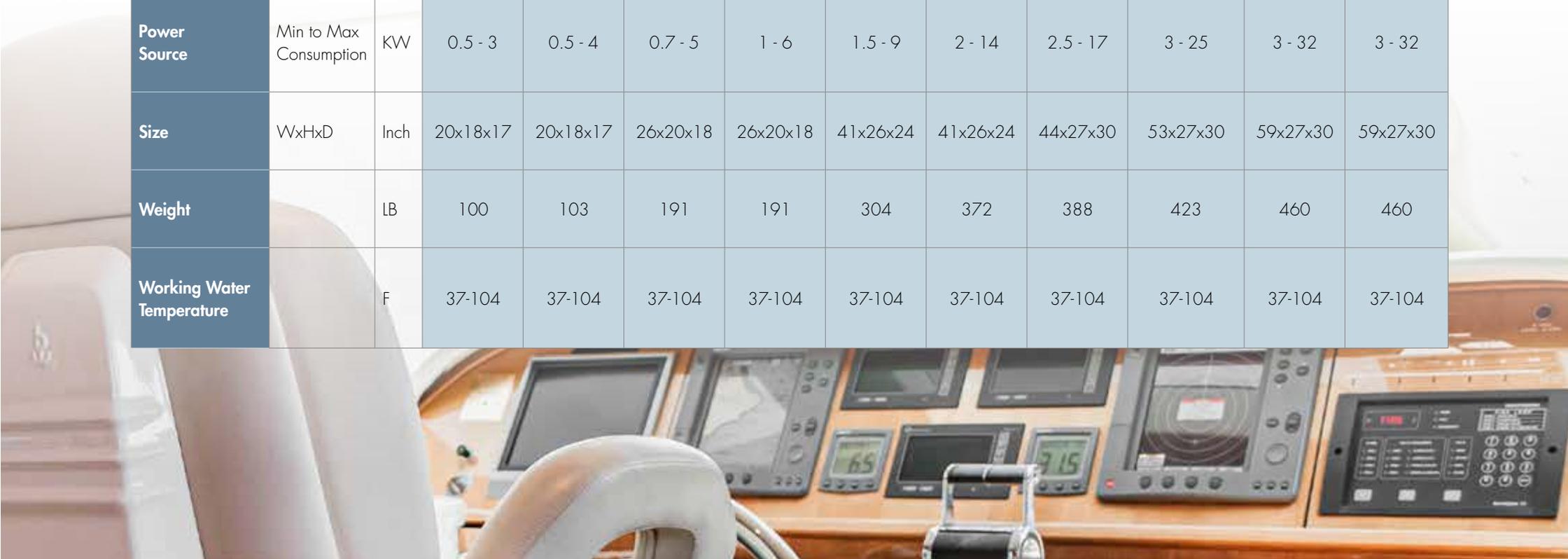
Our systems offer incredibly fast cooling and keep temperatures at desired set point with refined accuracy. Capacity on demand helps manage power consumption and directs it to where it is needed without wasted energy. The final result is an excellent saving of energy, a guaranteed 50% energy reduction compared to all other systems on the market. In many cases, Termodinamica is able to reduce energy consumption by up to 75%. In the past few years, Termodinamica has been the reference point of owners and shipyards focused on reaching the highest efficiency for marine air conditioning.

COMPRESSOR UNITS

Our competitor's chillers require more nominal power due to losses in the water transfer, gas condensation and distribution.

COMPRESSOR BOXES ABLE TO BE BUILT TO FIT ANY BTU SIZING

COMPRESSOR BOX			VRV10E1	VRV16E1	VRV20E1	VRV25E1	VRV35E2	VRV50E2	VRV80E2	VRV100E2	VRV120	CI100E2
Capacity	Cooling	BTU	42,000	67,200	84,000	105,000	147,000	210,000	336,000	420,000	504,000	504,000
	Heating	BTU	50,400	75,600	92,400	117,600	163,800	231,000	369,600	462,000	546,000	546,000
Power Source	Min to Max Consumption	KW	0.5 - 3	0.5 - 4	0.7 - 5	1 - 6	1.5 - 9	2 - 14	2.5 - 17	3 - 25	3 - 32	3 - 32
Size	WxHxD	Inch	20x18x17	20x18x17	26x20x18	26x20x18	41x26x24	41x26x24	44x27x30	53x27x30	59x27x30	59x27x30
Weight		LB	100	103	191	191	304	372	388	423	460	460
Working Water Temperature		F	37-104	37-104	37-104	37-104	37-104	37-104	37-104	37-104	37-104	37-104



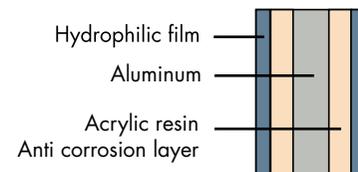
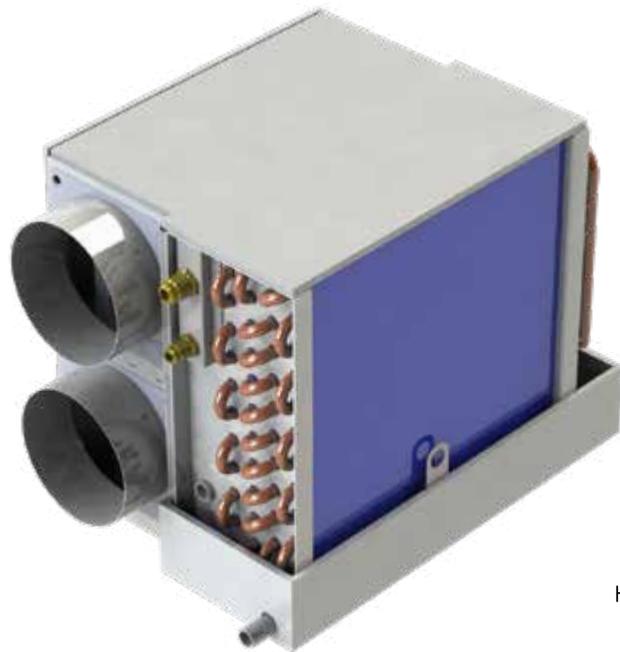
SUPERLIGHT AIR HANDLERS

Through our advanced design criteria, this type of coil offers the advantages of high cooling and heating capacity while still staying with a small footprint and incredibly low weight.

Termodinamica offers custom production of carbon fiber units on demand.

NO COMPRESSOR NOISE

HIGH CAPACITY





REMOTE CONTROL GSM – GPS

Termodinamica has adopted a precise telemetry system which transmits to a central command center to support all the operating parameters of the machine using the GSM 4G/UMTS network and notifies us in advance the possibility of a failure.

The GSM modem constantly communicates with the CPU of the system that controls the machine.

The control software processes all the information received and if the system detects an issue, staff is alerted and will contact the technical support center nearest to the vessel, possibly even before the owner may require service.

The built in GPS system can let you know your vessel's location at any time. In the case of smaller problems, the service center can work directly from the support center to control the air conditioning system making it possible to do diagnostic checks. The anomaly can be diagnosed and fixed easily with the engineer/owner/captain.

If a technician is necessary on site, you have the advantage of knowing in advance what needs to be done which saves time and bring the system back up and operating quickly.

Termodinamica builds in series its products, but also offers a high degree of customization. If after an installation is completed it is requested to have further adjustments of the working parameters, it is possible to set those remotely by adjustments in real time of the machine.

We work to fulfill every request, even those of the most demanding owners!



TECHNICAL SUPPORT AND MAINTENANCE

All Termodinamica's TAC (Technical Assistance Center) technicians have been trained by the factory for installations and repair. All technicians have a professional license or certificate for refrigeration. Our team of technicians are skilled, friendly and polite and have gone through extensive Termodinamica training which ensures that the customer will be satisfied with the speed, skill and professionalism during installations or servicing.

Our TAC keeps an inventory of all parts necessary to rebuild an entire machine. If failures occur due to abnormal tampering or problems to the electrical plants, Termodinamica is able to send components next day of up to 220lbs to any part of the world with direct delivery from the dealer or TAC. This is possible thanks to our agreements with DHL and FEDEX that ensures rapid air transport and care.

Remember that with Termodinamica's cutting-edge electronics built into our air handlers, we are able to know at any moment where your vessel is located via the built-in GPS transmitted to the support center. With this advanced assistance, even the most demanding owner will be satisfied!





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