HIKOTERRA®

Built better to power what matters.



Who is HikoTerra

We have been quietly developing a Hybrid Power System to help vessel & vehicle builders, installers & users by reducing complexity & cost with a battery-first approach, that reduces reliance on generators and supports cleaner, quieter and more sustainable operation.

Founder story

Our **founder** & CTO Chris Fotherby is one of New Zealand's leading engineers.

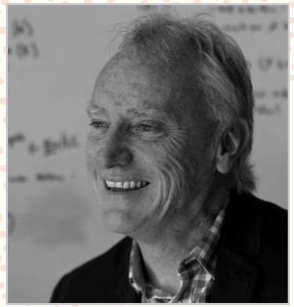
Chris was CTO at Navman for many years and solved complex engineering problems to allow Navman to bring market leading technology to the world, critically at a cost that was able to transform the GPS & marine electronics industry.

Over the last decade Chris has been applying his talent to making power electronics simply better & more efficient, while also providing critical technical solutions for Fusion & Invenco. His designs are revolutionary and will create change in a market that has been stagnant in its core power conversion fundamentals.



Chris Fotherby
Founder & CTO

Strong team with proven industry track records



Sir Peter Maire
Investor & Board

Sir Peter is a significant shareholder and director of Power Concepts. He has successfully founded and developed leading tech companies in New Zealand, including Navman & Fusion,



John Scott
Board

John is a seasoned and accomplished leader in the marine and technology sectors. John spent 14 years in executive roles at Navico, one of the world's largest marine electronics companies



Mark Harnett
CEO

With 20 years of service at Navico Group in various roles, Mark brings extensive experience in marine & mobile Product Management, Digital Product Ownership and GTM



Mark Griffith
Engineering Lead

Mark is an accomplished product development leader with over 20 years of experience in the consumer electronics and marine technology sectors.



Matt Forbes
Sales Director

Matt is a seasoned marine industry expert with over 20 years of experience in marine & mobile sales channel development



Kiel More
Snr. Application Engineer

Kiel has nearly two decades of experience in marine electrical systems across field service, application engineering, and technical sales

Credible engineering, market and channel setup experience

- Internationally recognised & trusted team
- History of marine & mobile industry success with Navman, Fusion, Navico, BEP & CZone
- Well connected to industry talent pool to attract the best & brightest
- The experience needed to get products engineered, compliant and into production
- Proven reputations to get access at key OEM's
- Extensive experience in nuanced global sales channels

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Key Contacts



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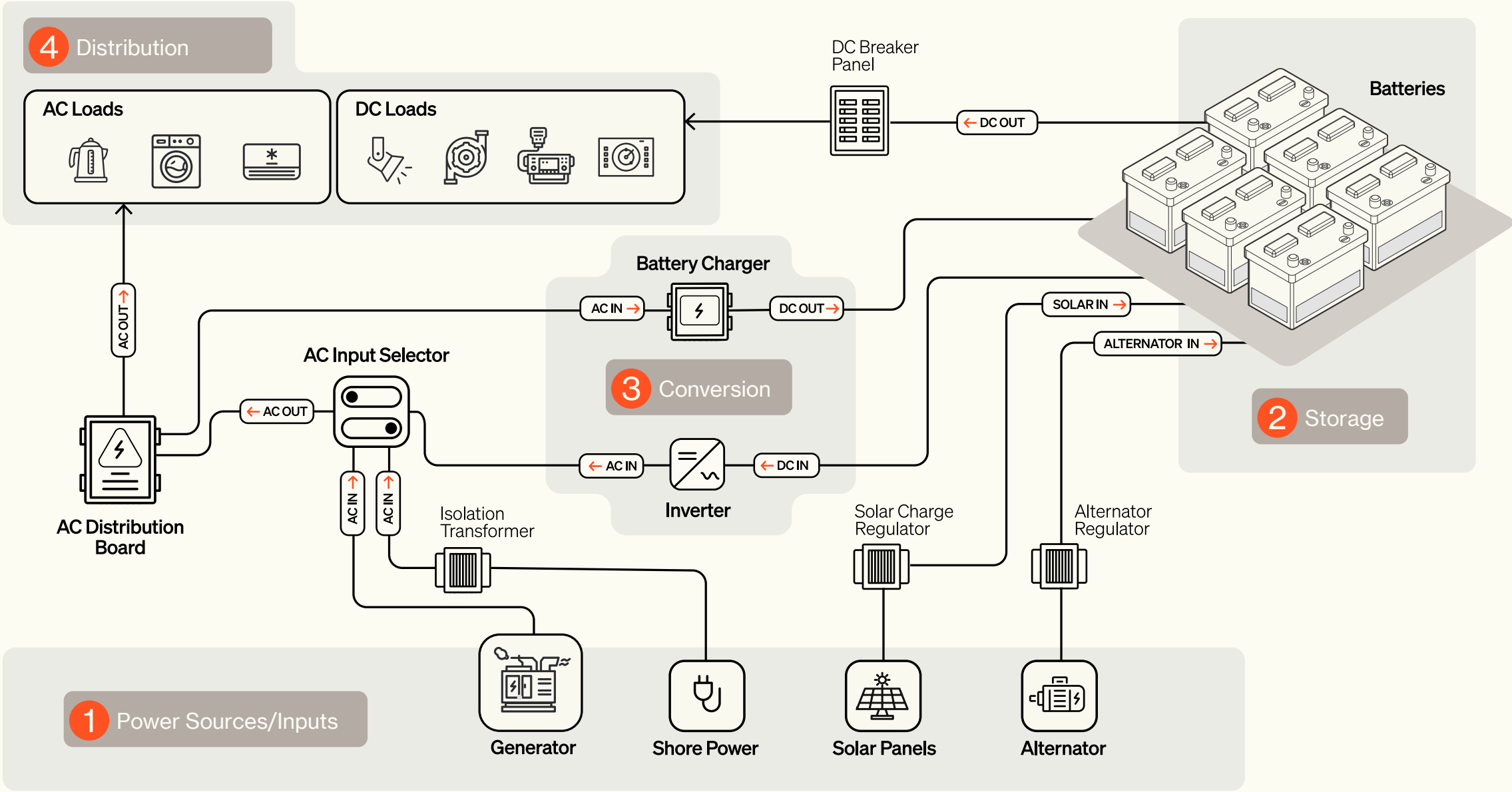
Mark Harnett
CEO

Phone: +64 (0) 21 493 274
Email: mark.harnett@hikoterra.com



HikoTerra doesn’t feel like managing a power system – it feels like using one. And that makes all the difference.

Traditional power system 101



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Why now?

Stagnation

INNOVATOR'S DILEMMA

victron energy

MASTERVOLT

Innovation

LIFESTYLE

Onboard energy demand



BATTERY TECHNOLOGY

Storage capacity ↑

Storage cost ↓



SUSTAINABILITY



Sustainable is standard.

INDUSTRY

> **The future of boating will not look like the past.** So, it's imperative for the boating industry to appeal to a younger, more diverse group of potential future boaters"

NMMA National Marine Manufacturers Association

INDUSTRY



Generator replacement is trending.

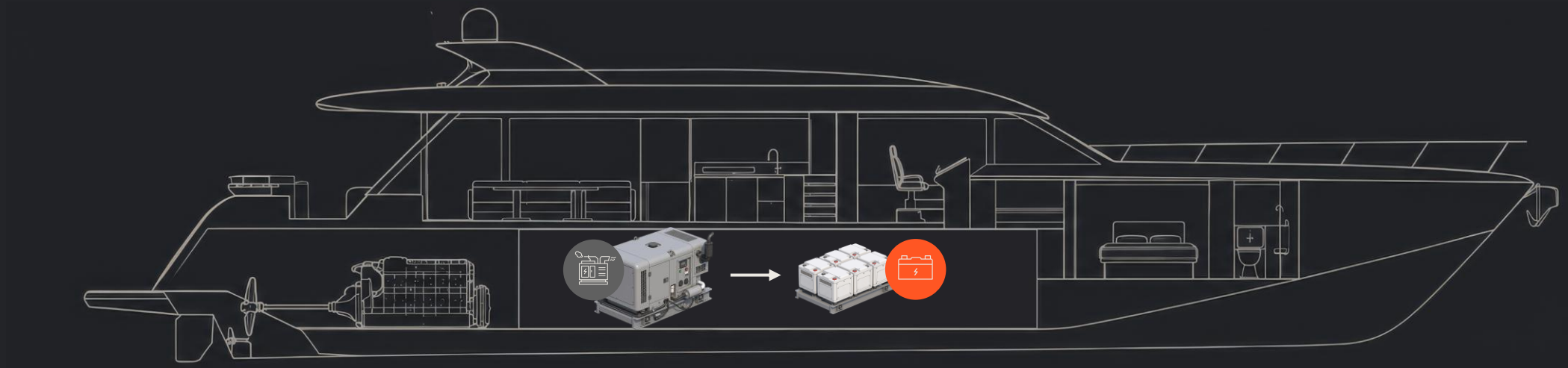
GREENLINE YACHTS

FATHOM e-power system

HIKOTERRA

The world's best boat builders are moving from generator first to battery first for onboard power

GENERATOR FIRST → **BATTERY FIRST**



We're here to make the switch easier for them.

INSTALL FASTER

50%

HikoTerra can be installed in up to half the time of equivalent battery-first systems



WITH LESS COMPLEXITY

85%

The HikoTerra H⁴ system is an integrated solution that requires up to 85% fewer modules, cables, lugs & connectors than the competitor system shown.

USE CASE SPOTLIGHT:

Overnight Air Conditioning - no diesel, vibrations or noise.

For the end-user



Problem

I want to run my air conditioning overnight without the noise & vibration of a diesel generator.

Solution

A battery-first power system with enough capacity to deliver a home like experience.

For the installer



Problem

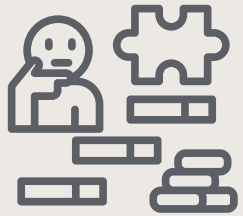
Currently available battery-first power systems are too complex and expensive to design, install & integrate as electrification intensifies.

Solution

A fit for purpose integrated power system with fewer components & cables that takes up less space and can be installed in less than half the time.

Problems to solve

Complex onboard systems for users



- Multiple systems to operate & balance, genset, inverter, charger system & shore power
- Users have to manually manage & juggle inputs & loads
- User demographics are changing with less experienced and more diverse users
- Shore power breaker trips due to overload

Noise & vibrations from Gensets



- Often gensets run continuously
- Gensets can be noisy & cause vibrations
- Often power is needed when quiet is desired i.e. at anchor
- Fumes & exhaust can circulate back into the boat
- Some marinas and anchorages prohibit or restrict genset use

Complex System design, install & service



- Multiple components from multiple vendors
- Time consuming & complex design, install & commission
- Integration headaches and trouble shooting
- Space required for gensets & tanks
- Additional through hull fittings required

Ongoing cost & sustainability



- Oversize genset required to satisfy peak demand but rarely used to capacity
- Old inverter tech is less efficient with a smaller temp range which requires more capacity
- High cost of fuel to feed constantly running genset
- Oil changes & servicing of another ICE component
- Additional emissions

First Product- H⁴ Hybrid Power System

The H⁴ Hybrid Power System offers an unparalleled level of efficiency, scalability, integration, and ease of installation for marine and mobile power requirements.

These components work together to create a fully integrated system that is more compact, easy to install, and maintain. This enables the removal or reduction of the generator, resulting in a simpler, more familiar user experience for the consumer.

Rack installation and mounting system with patented memory feature

Advanced LiFePO4 8kWh **battery** modules

High-Efficiency 12kW Bi-directional **Inverter**

Intelligent 220A Battery **charger**



50% UP TO **Reduction in installation cost and time**

Multiple system layout options

Up to 2x8

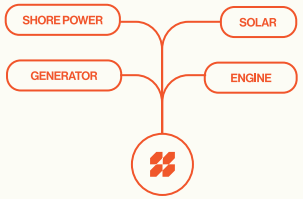
Inverter Output

12kW
24kW
36kW

8kWh LiFePO4 battery modules for up to

96kWh total capacity

Seamless input switching without disrupting loads



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PRODUCT UPDATE

Inverter now rated to 12kW!

The H⁴ Hybrid Power System inverter steps up from 10kW to 12kW.

RATED POWER OUTPUT

+20%

Per inverter, increased from 10kW to 12kW

MAXIMUM SYSTEM OUTPUT

36kW

Per system with three inverters (previously 30kW)

FULL RATED OUTPUT AT

40°

Delivers clean, stable power in environments other systems can't.

hikoterra.com/products/h4



H⁴ Hybrid Power System Components-Deep Dive

High-Efficiency 12kW Bi-directional Inverter

- Designed from the beginning to be compact, lightweight, highly efficient (97%), and with a low self consumption
- Uses surface mount technology to simplify production
- Will run in parallel with generator and start it if required
- 12kW output at 40°C continuous
- 16kW surge output for three seconds
- Superior full load efficiency means longer run times
- Built in solar/DC input



Advanced LiFePO4 8kWh Battery

- High 8kWh or 314Ah at 26V capacity
- Latest generation, high quality LiFePO4 prismatic cells rate for 10,000 cycles.
- Built in internal BMS, shunt, fuses and safety disconnect switches simplifying install
- Auto-disconnect from rack in case of fault, allowing the system to operate using remaining batteries
- Active cooling & ventilation option
- Battery logs every degree of temperature change for its lifetime for fault tracking



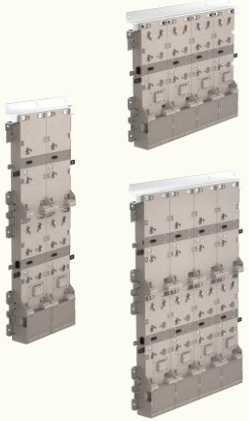
Intelligent 200A Battery Charger

- Multi voltage shore power input
- Built in isolation transformer
- 200A battery charging
- Dual 250A alternator inputs for charging off main engines
- Can restart completely discharged batteries from shore power or alternator, no technician required
- 95% commonalty with inverter for optimised production



Rack installation and mounting system

- Reduces installation time by 50%
- Boat builder orders on vessel & consumer power requirements
- Configures physical rack layout depending on installation requirements, space & location
- Multiple layout options from 1x4 to 2x8
- Reduces space required for power system
- Rack eliminates many external fuses & switches
- Internal backplane means most heavy gauge cables, lugs and bolts are not required



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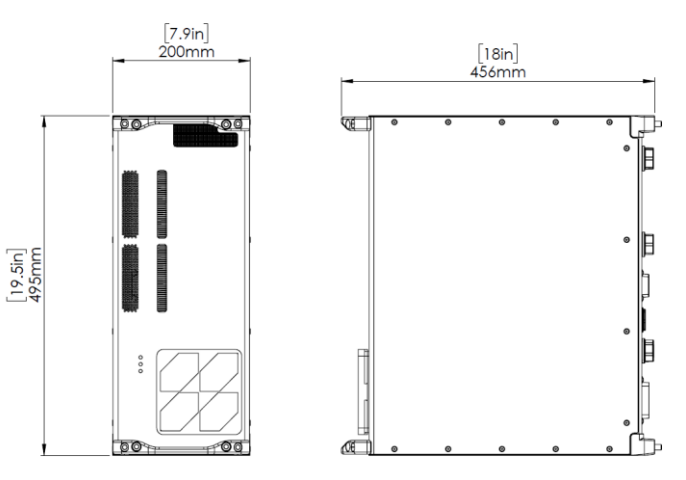
12kW Inverter tech specs

H⁴V12000

Category	Specification	Unit	Value	Notes
Inverter	Input voltage range	V DC	23-29V	
	Nominal battery voltage	V DC	25.6	
	Output voltage	V AC	230 (50Hz) 240V (60Hz)	±2%
	Output frequency	Hz	50/60	±0.01%
	Continuous output at 25℃	W	12000	At unity power factor. For 12kW output three batteries required
	Continuous output at 40℃	W	12000	At unity power factor. For 12kW output three batteries required
	Continuous output at 65℃	W	TBA	At unity power factor
	Peak power	W	16000	3 secs
	Input current	A DC	494	At nominal input voltage
	Maximum continuous Output current	A AC rms	53	
	Power factor range		-1 to 1	
	Maximum output fault current	A AC rms	71	
	Maximum efficiency	%	97	
	Zero load power	W	30	
	AC Output Connector		Proprietary	Connection to Rack
	Solar charge maximum input voltage	V DC	50	
	Solar charge input max current	A DC	250	
	Solar charge input connector		Proprietary	
	Fan speed	RPM	0-13000	Automatically controlled
Communications	NMEA2000		Yes	Via HikoTerra gateway
	Wi-Fi		Yes	Via HikoTerra gateway
	Bluetooth		Yes	Via HikoTerra gateway
	Fibre Optic		Yes	Connector less plastic optical fibre (POF) cable to the Generator Controller
Physical	Dimensions	HxWxD mm	495x200x465	Does not include rack
	Weight	kg	24	
Environmental	Protection		IP30	
	Operating temp - Full power	℃	-20 to +40	
	Operating temp	℃	-20 to +50	
	Operating humidity	%	0-95% non-condensing	
	Storage temp	℃	-40 to +80	
Standards & Compliance	Safety		EN 62477-1	
	Emissions		IEC 60945	
	ABYC		E-11, A-31	
	RCM		EESS AS/NZS 4417.2 – Level 1 equipment	



Dimensional Drawing



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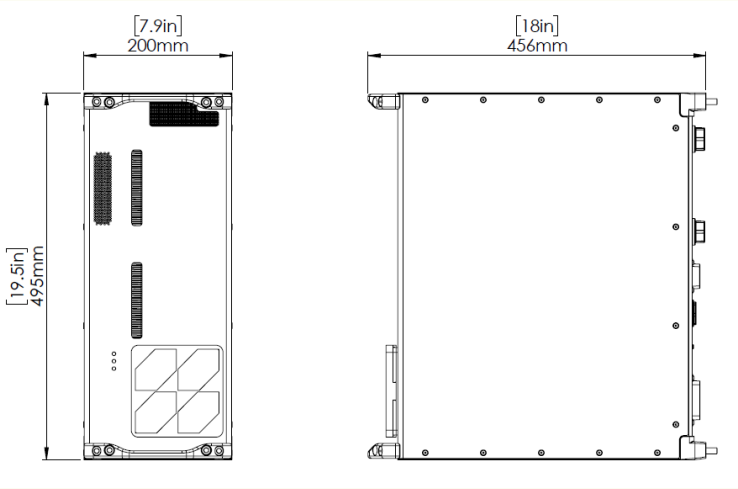
200A battery charger tech specs

H⁴C200

Category	Specification	Unit	Value	Notes
Charger	Max Charge Current	A DC	200	
	Max Alternator Input current (x2)	A	250	
	Full load consumption	W	5000	
	Alternator Input disconnect switches		Yes	
	Alternator Input load dump protection		Yes	
	Alternator Input connector		Proprietary	
	Fan speed	RPM	0-13000	Automatically controlled
Shore Power Input	Input Voltage	V AC	85-264	
	Input Frequency	Hz	50/60	
	Max input current	A	22	
	Shore power input connector		Proprietary	Connection to Rack
	Isolation transformer		Built in	External transformer not required
Physical	Dimensions	HxWxD mm	495x200x456	Does not include rack
	Weight	kg	24	TBD
Environmental	Protection		IP20	
	Operating temp - Full power	℃	-30 to +40	
	Operating temp	℃	-30 to +50	
	Operating humidity	%	0-95% non-condensing	
	Storage temp	℃	-40 to +80	
Standards & Compliance	Safety		IEC 62477-1	
	Emissions		IEC 60945	
	RoHS		IEC 63000	
	ABYC		E-11, A-31	



Dimensional Drawing



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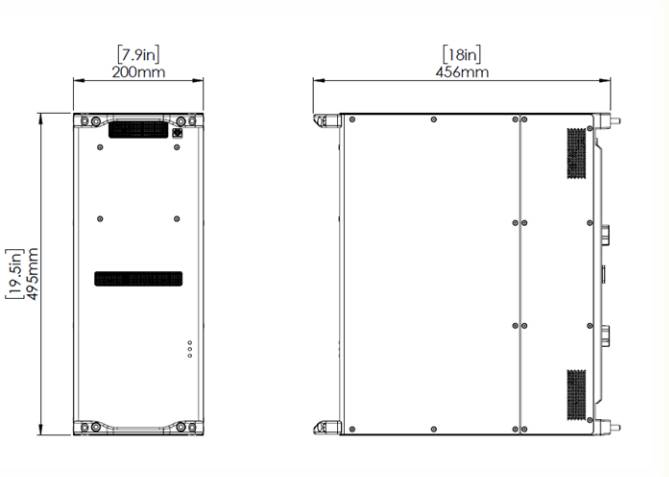
8kWh battery tech specs

H⁴B8000

Category	Specification	Unit	Value	Notes
Category	**Specification**	**Unit**	**Value**	**Note**
Battery	Nominal voltage	V	25.6	
	No load voltage, fully charged	V	26.4	
	Nominal capacity (Cn)	Ah	314	
	Nominal energy	Wh	8000	
	Chemistry		LiFePO4	
	Cell type		Prismatic	
	BMS		Yes	Built in
	Battery fuse		Yes	Built in
	Safety Disconnect switch (x2)		Yes	Built in, one MOSFET, one mechanical
	Current measurement shunt		Yes	Built in
Physical	Dimensions	HxWxD mm	495x200x456	Does not include rack
	Weight	kg	65	
Environmental	Protection		IP55	
	Operating temp (discharge)	℃	-20 to +50	
	Operating temp (charge)	℃	0 to +50	
	Operating humidity	%	95% non-condensing	
	Storage temp (recommended)	℃	-20 to +35	
Logging	Temperature logging	℃		Log temp per degree change for lifetime of battery
Standards & Compliance	Batteries		IEC 62619, IEC 62620	
	Small Craft Lithium-Ion Batteries		ISO 23625	
	Emissions		IEC 60945	
	Transport		UN38.3	
	RoHS		IEC 63000	
	ABYC		E-10, E-11, E13	
	RCM		AS/NZS 3004.2:2014 – Section 2.9.3	



Dimensional Drawing

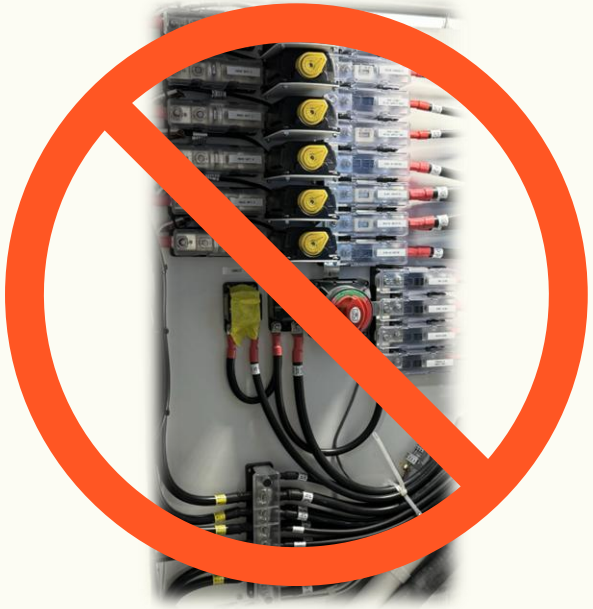


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Innovation highlight- H⁴ Battery

By building in key system components, the **H⁴** battery not only reduces install time & effort but also ensures safety.

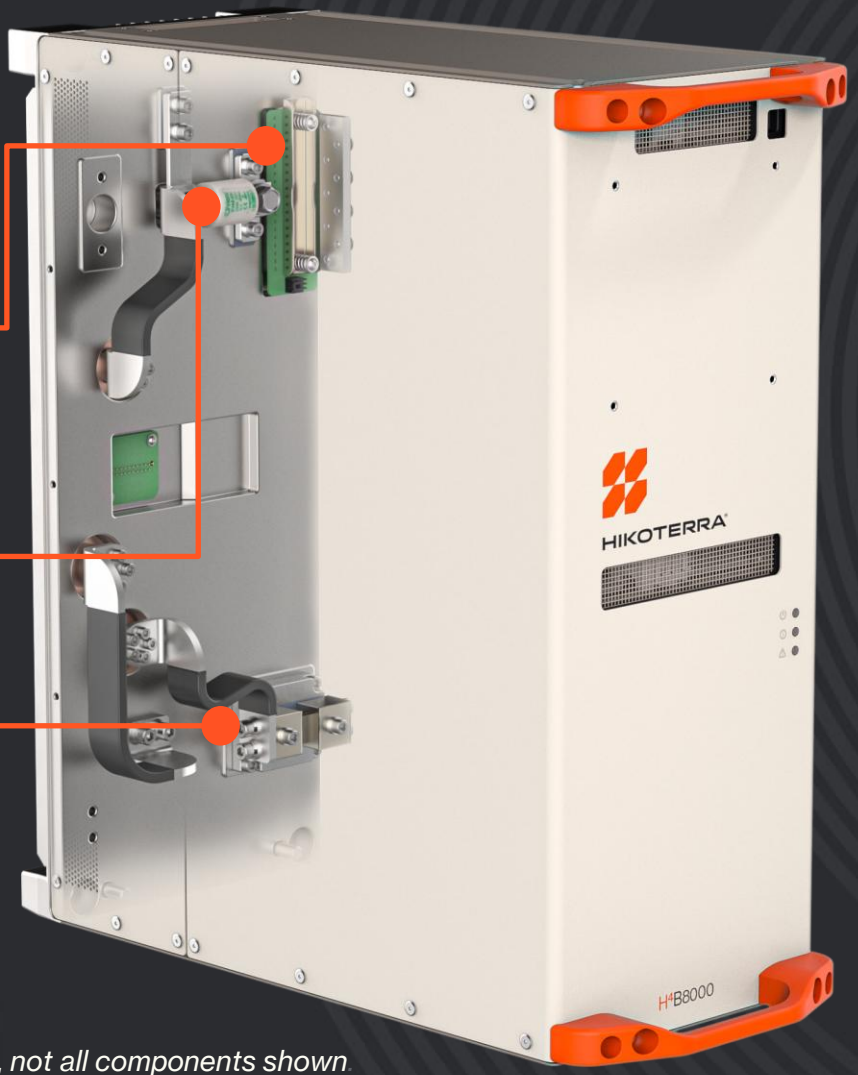
Most of these safety switches, fuses and connections required in a typical competitor installation are built in with the **H⁴** system



Switch connects and disconnects the battery from the rack

Fuse protects the battery and rack

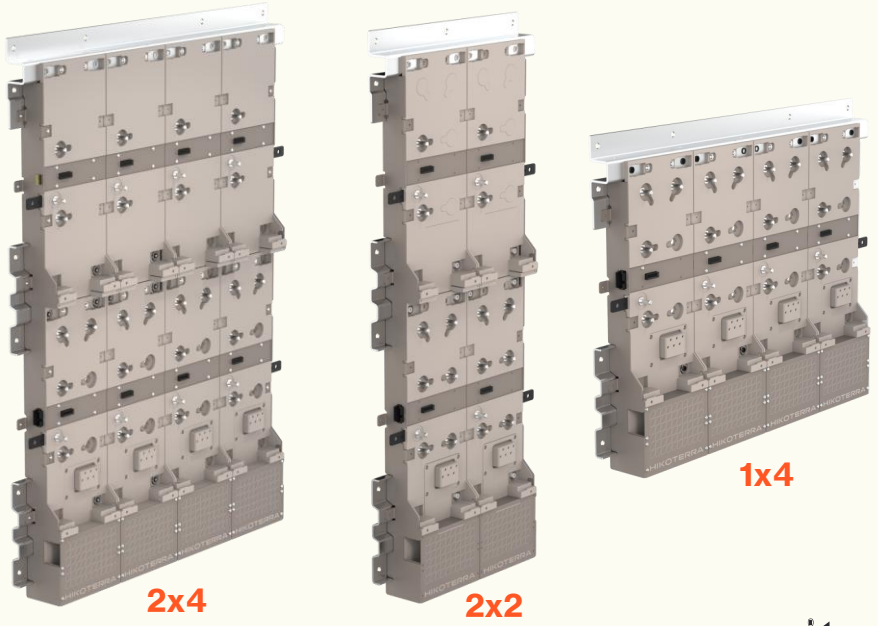
Shunt measures current flow into and out of the battery



Simplified view, not all components shown

Mounting rack configs & tech specs

Category	Specification	Unit	Value	Notes
Capacity	Minimum height		1 slots	
	Maximum height		2 slots	
	Minimum width		3 slots	
	Maximum width		8 slots	
	Minimum Capacity 5kW inverter		3 slots	1x 5kW inverter, 1x charger, 1x battery
	Minimum Capacity 12kW inverter		4 slots	1x 12kW inverter, 1x charger, 2x battery (3 batts required for 12kW)
	Maximum capacity		16 slots	
	Minimum Inverters		1	
	Max inverters single phase		2	
	Max inverters three phase		3	
	Minimum charger		1	
	Maximum charger		2	
	Minium batteries per 12kW inverter		3	2 batteries for 10kW output
	Maximum batteries		12	96 kWh
	DC Connection studs		M6/M8/M10	
	AC Connection		M4 ring terminals	One pair per 5kW
Dimensions	2x2 Rack (incl. Modules)	HxWxD mm	1319x522x512	Some clearances for heat and cable bend radius will be required
	1x4 Rack(incl. Modules)	HxWxD mm	746x946x512	Some clearances for heat and cable bend radius will be required
	Additional width per rack slot	mm	212	
	Other rack configurations	TBA	TBA	Other rack configuration dimensions pending
Standards & Compliance	Safety		IEC 60335-1	
	Emissions		IEC 60945	
	RoHS		IEC 63000	
	ABYC		E-11	
	RCM		EESS AS/NZS 4417.2 – Level 1 equipment	
			AS/NZS 60335.1	
			AS/NZS 3004.2:2014	

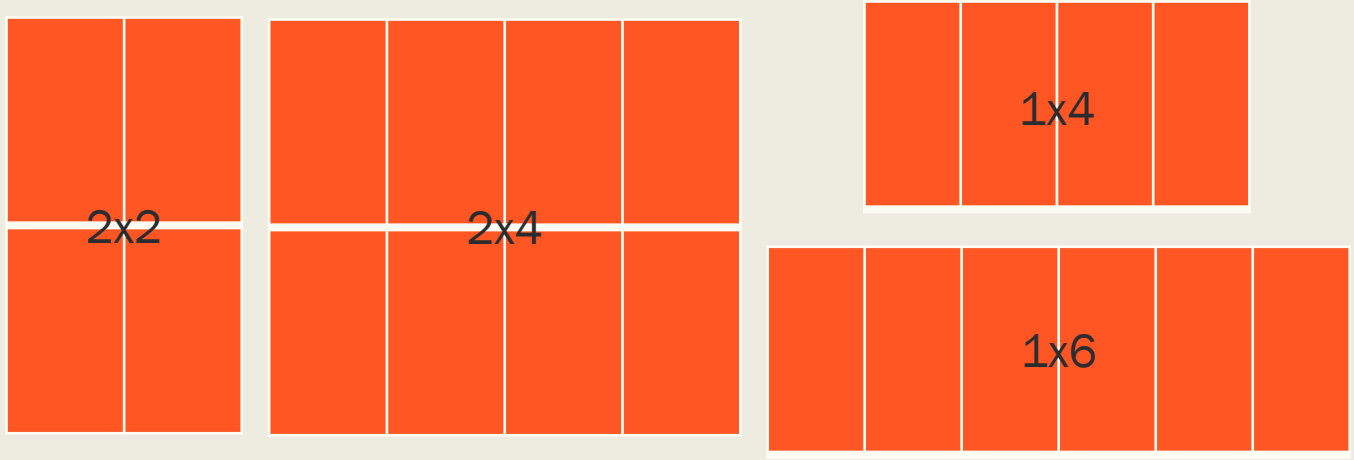


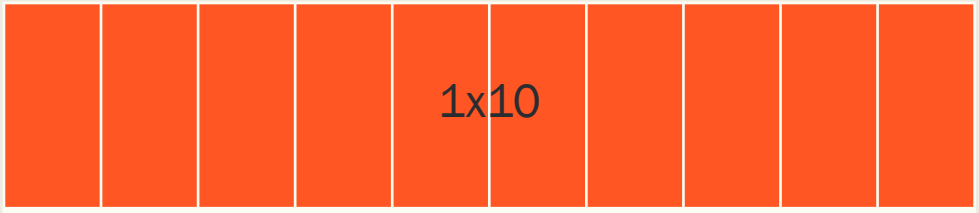
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Initial rack configuration availability

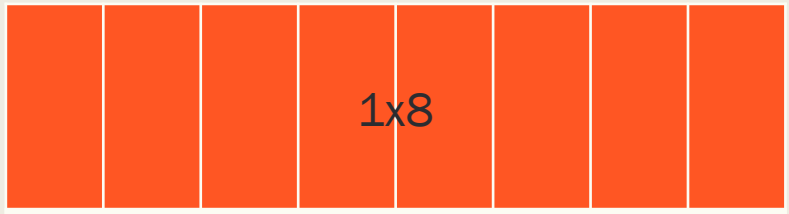
Height	Width	Positions	MVP for SOP/Status
2	2	4	Available on release
1	6	6	Available on release
2	4	8	Available on release
1	4	4	Available on release
1	8	8	Within 3 months of release
2	6	12	Within 3 months of release
2	8	16	Within 3 months of release
Other sizes and configurations considered on request			

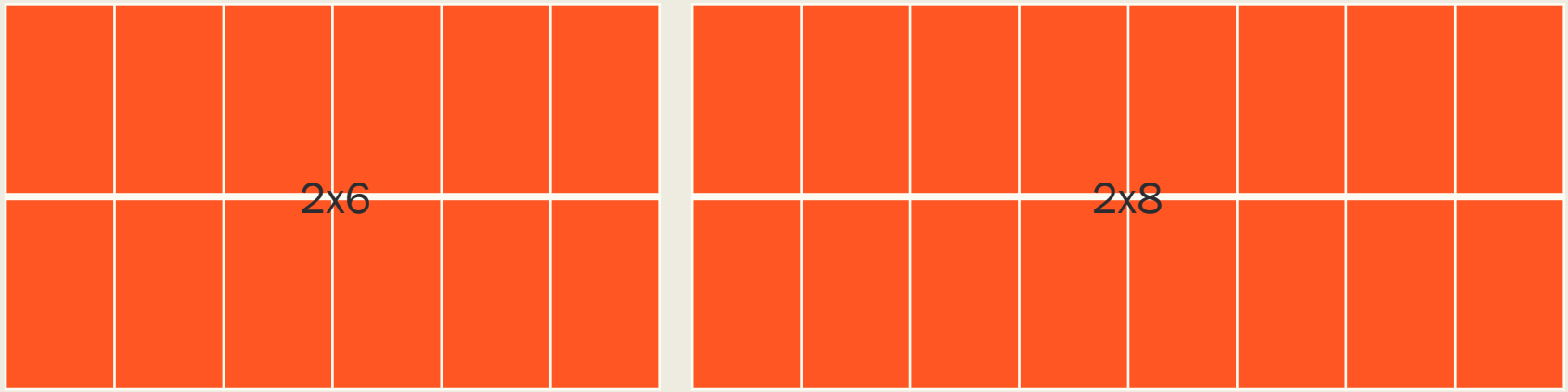
Available on release



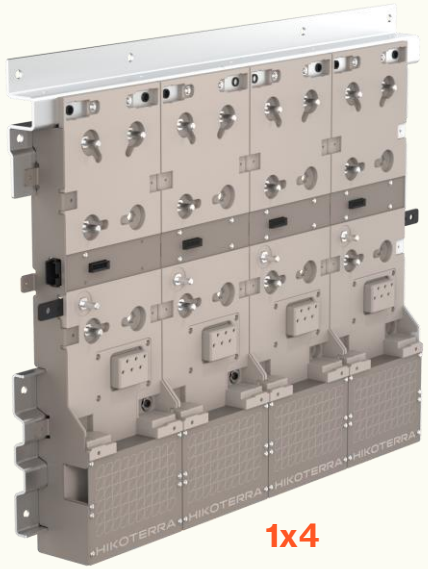


Available on within 3 months of release

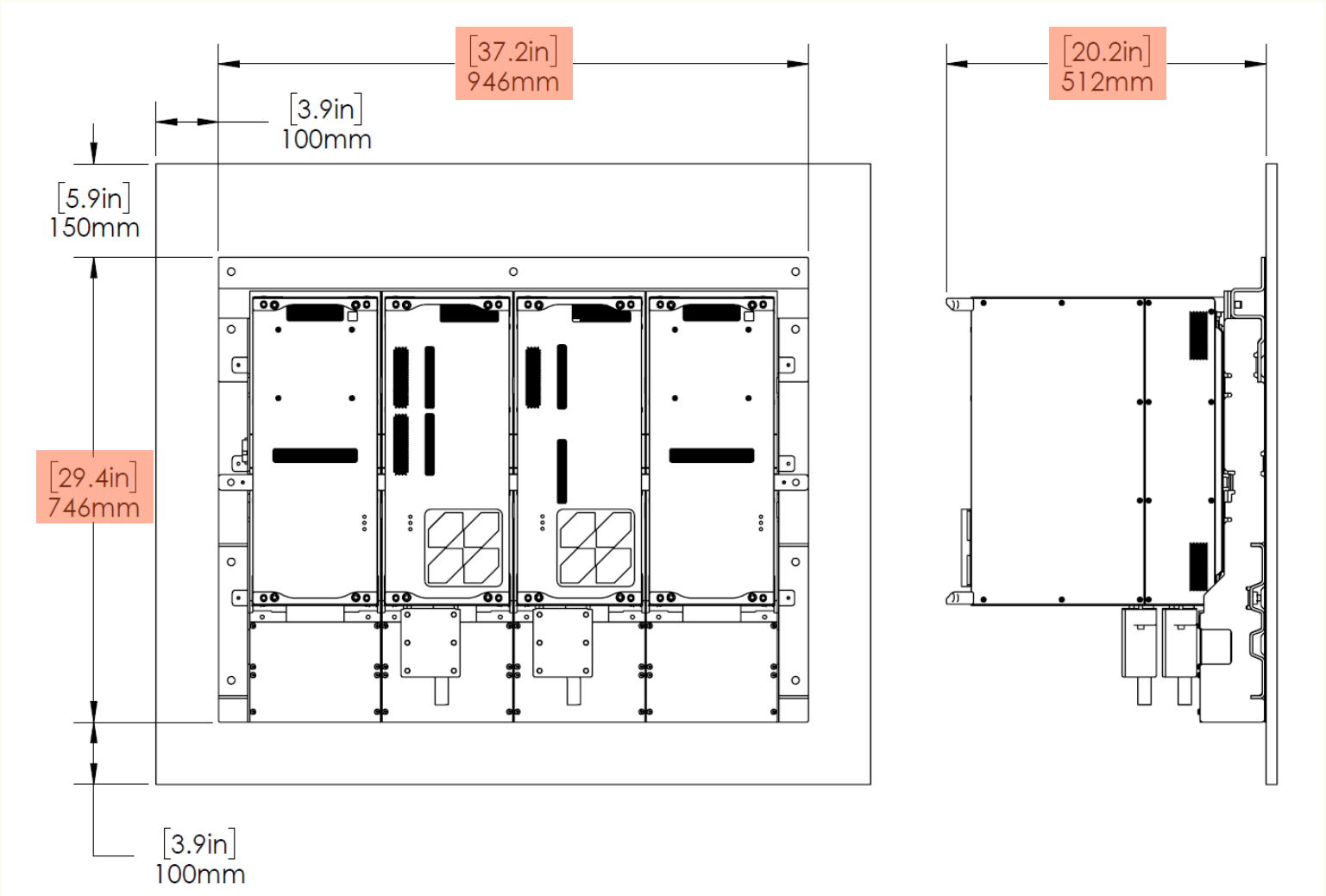




Example system dimensions 1x4



1x4



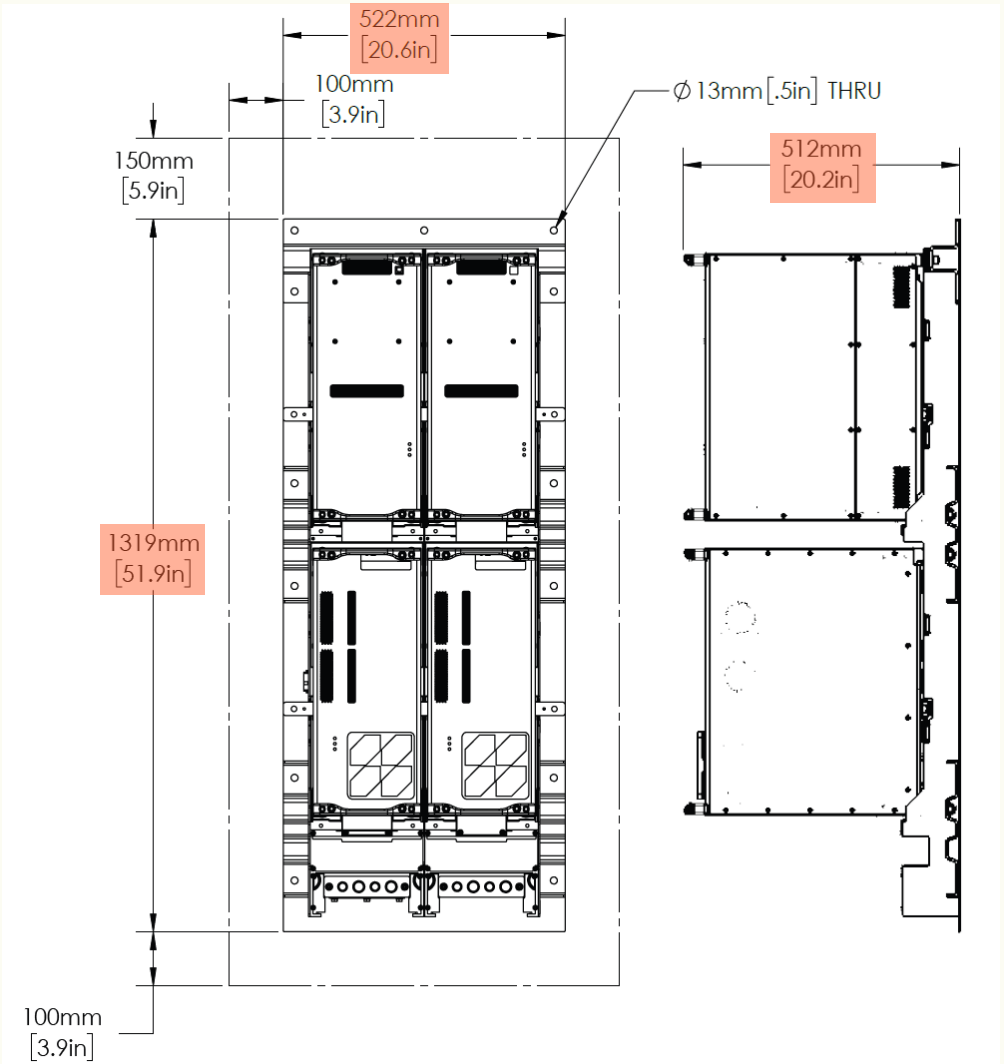
1x4 Rack(incl. Modules)	HxWxD mm	746x946x512

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Example system dimensions 2x2



2x2



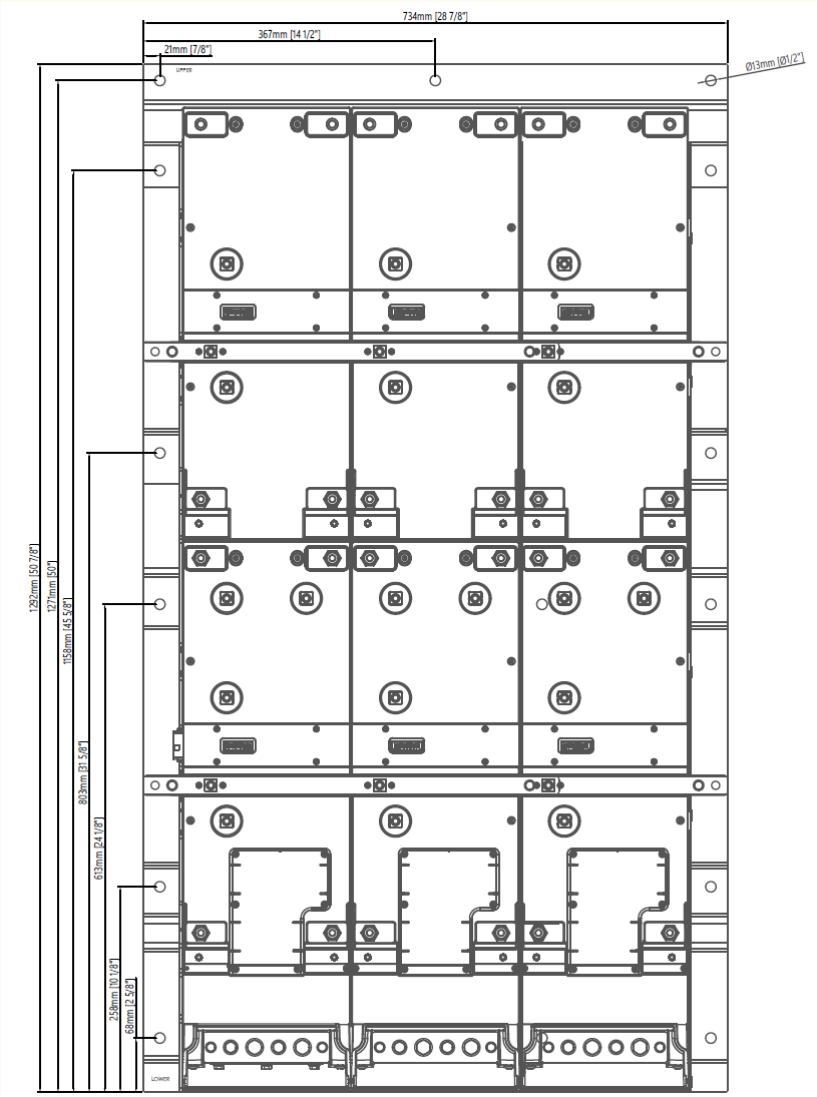
2x2 Rack(incl. Modules)	HxWxD mm	1319x522x512

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Example system dimensions 3x2



2x3



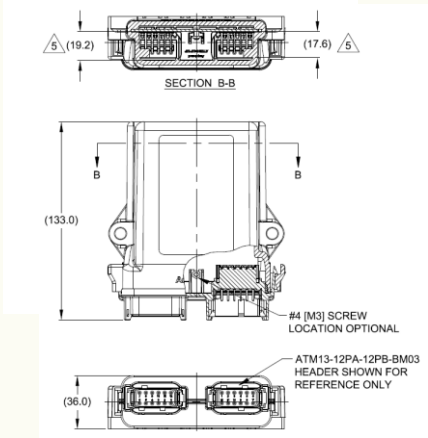
2x3 Rack(incl. Modules)	HxWxD mm	1319x522x512

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Alternator Regulator tech specs

Category	Specification
Nominal battery voltage	24 V
Operating ambient temp range	-15°C to 60°C (5°F to 140°F)
Delivered with	Alternator temperature sensor with 8mm (5/16") lug and 3 m cable
Compliance	CE
Charge characteristic	Automatic / 3-step+ for Lithium Ion
Field current	Up to 8 amps
Dedicated Reg-On Wire	From start ignition key (optional via pressure switch)
Regulation	P-Type
Alternator thermal protection	Alternator body mounted sensor
Waterproof	IP 68, IP69K
Enclosure Dimensions	117mm(W) x 133mm(L) x 35mm(H)
	4.61"(W) x 5.24"(L) x 1.38"(H)
Weight	
Protection features	Alternator overtemperature protection Alternator excessive field current protection Broken B+ wire detection
Other features	Alternator output current limiting (derating)
Connector	Waterproof Deutsch DTM06-12SA or Amphenol ATM06-12SA
Connections	B+, B-
	Stator
	Field
	Reg-On
	Temp sensor x 2
	Control
Warranty	2 Years

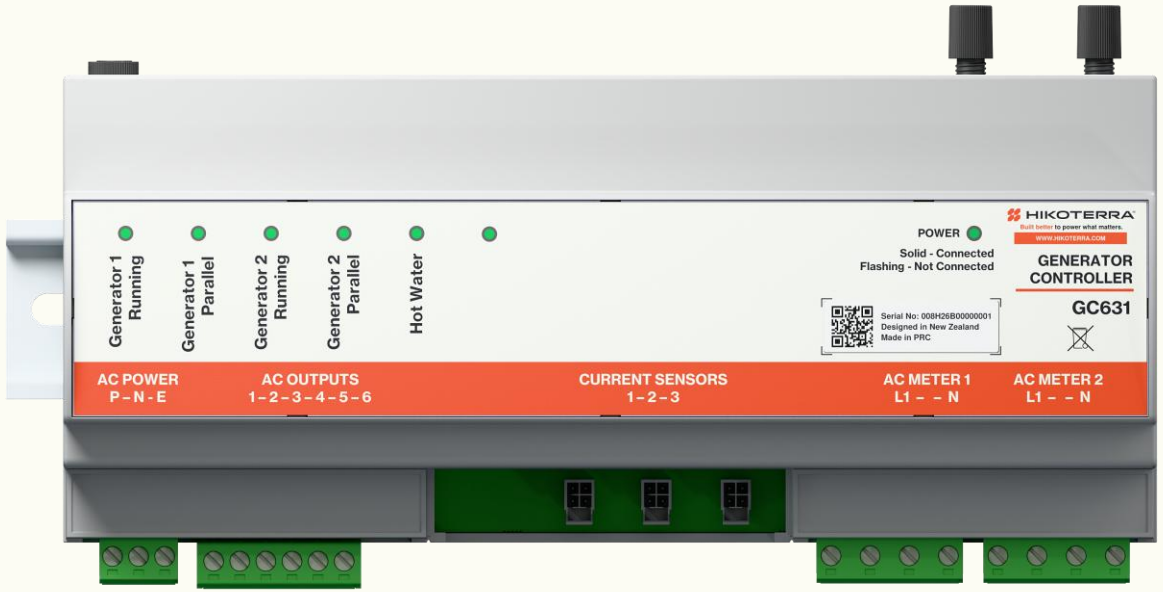




Dimensional Drawing

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Generator controller



Category	Specification
Mounting	DIN rail mount
Enclosure dimensions	196 x 119 x 57 (7.72" x 4.72" x 2.25")
AC input	100-240V AC 50/60Hz
	Fused @ 5A
Metering Channels	2 x single phase generator voltage inputs (2 channels)
	3 x current sensor inputs
AC outputs	6 x 0.5A AC outputs, thermal & current protected
	Peak inrush 1A
Comms	2 x fibre optic (Tx,Rx) to inverter
Compliance	CE

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Suggested Contactors & Relays

Genset parallel contactor:

Contactor	Schneider Acti9 iCT A9C20882
Rating	100A, 2NO
Coil Voltage	220-240V AC 50Hz
Coil inrush	53VA, ~230mA
Coil Hold-in	6.5VA, ~28mA



AC Load shedding contactor:

Contactor	Schneider Acti9 iCT A9C20721
Rating	25A, 1NO
Coil Voltage	220-240V AC 50Hz
Coil inrush	9.2VA, ~40mA
Coil Hold-in	2.7VA, ~11.7mA



Genset Start/Stop control relay:

Contactor	Phoenix Contact RIFLINE set, 2903339
Rating	6A AC, 2A @ 24V DC
Coil Voltage	230V AC 50/60Hz
Coil inrush	Unknown
Coil Hold-in	6mA



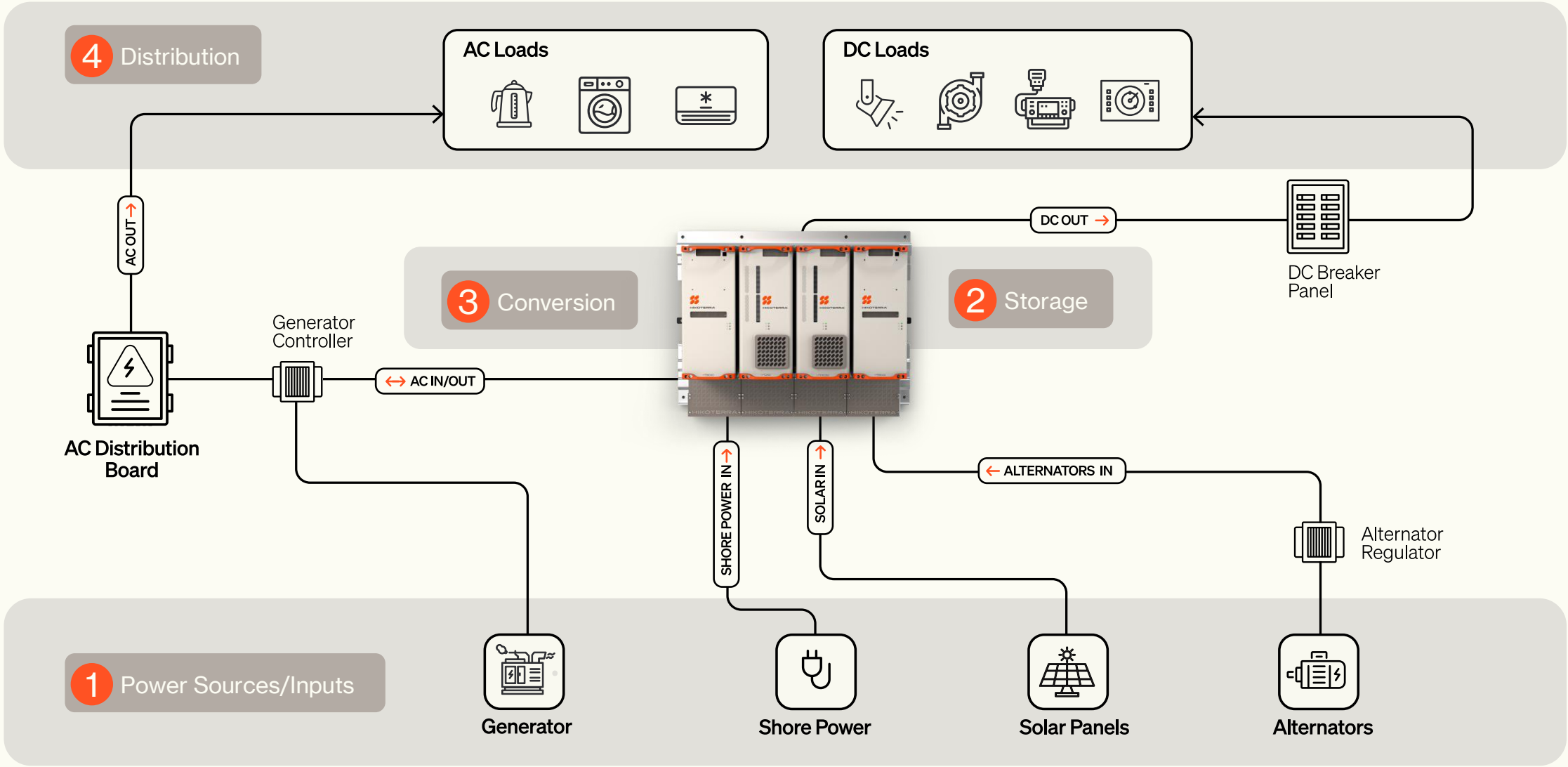
3-phase genset or shore power :

Contactor	Schneider TeSys Deca
Rating	125A, 4NO
Coil Voltage	230V AC 50Hz
Coil inrush	200VA, 870mA
Coil Hold-in	20VA, 87mA



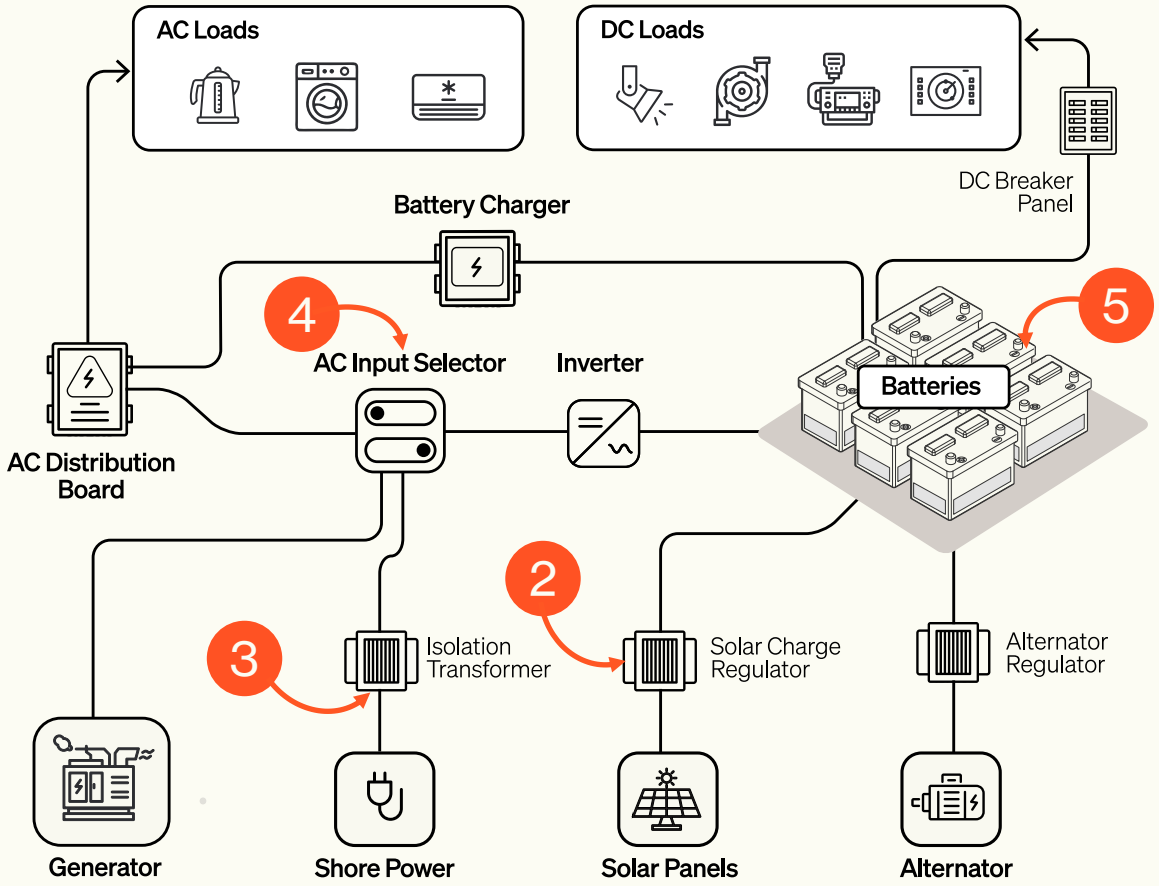
HIKOTERRA

HikoTerra System Diagram

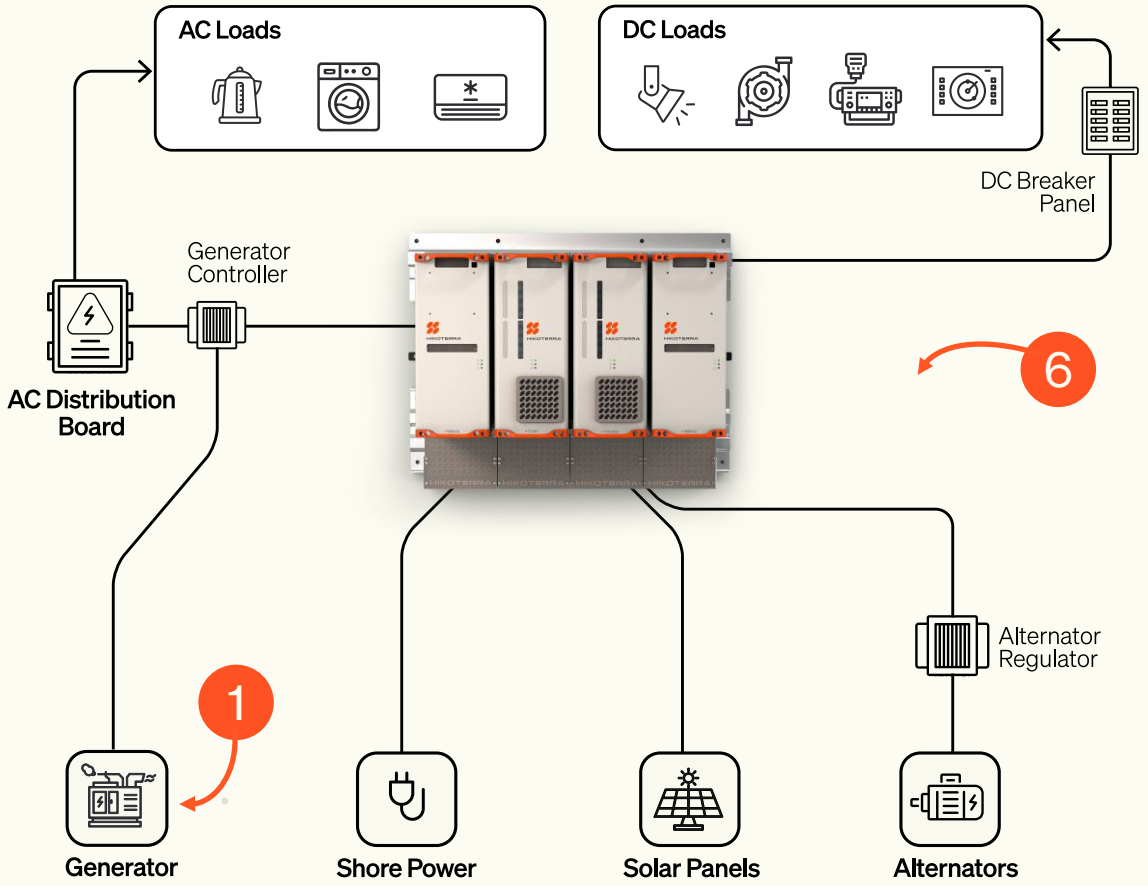


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Traditional System



H⁴ Hybrid Power System



1. Fewer or smaller generator(s)
2. Solar charge regulator not always required
3. Isolation transformer not required
4. AC Input selector not required
5. Heavy Guage DC connections not required
6. Fewer modules to mount & wire

HIKOTERRA

Key Operational Differences

- All AC power for on-board appliances is delivered either from the inverter, or from the inverter operating in parallel with the generator.
- Having the inverter in parallel with the generator results in an improved waveform and much reduced sags and surges compared with running direct from the generator.
- The generator always runs at its most efficient operating point, near full load.
- The parallel combination results in an increase in the total available AC power capacity. A 12kW inverter combined with a 10kW generator provides a maximum power capability of 22kW.
- Shore power is only connected to the battery charger and doesn’t directly power any appliances on the boat. The appliances receive clean, constant power, even when the shore power voltage sags.
- The battery charger eliminates the need for a shore power isolation transformer.
- Being able to operate the AC systems from just the power provided by the alternators provides a back-up if the generator fails.

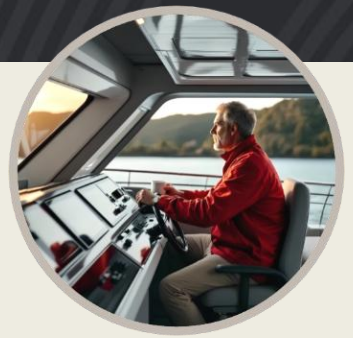
System Advantages

For builders & installers



- The system will reduce the design, mechanical & electrical installation time and cost by more than 50%
- The rack and module design significantly reduces overall weight and size of the power system resulting in space & interior volume saving
- Single system supplier reducing integration & commissioning headaches and simplifying service
- Modules can be plugged into the rack immediately prior to delivery; this reduces cash flow and eliminates accidental damage to expensive modules during build.
- System works with any standard AC generator
- Generators are run less, but at optimal load, meaning fewer or smaller generators required
- A simpler & better experience for their customers that will lead to fewer support calls

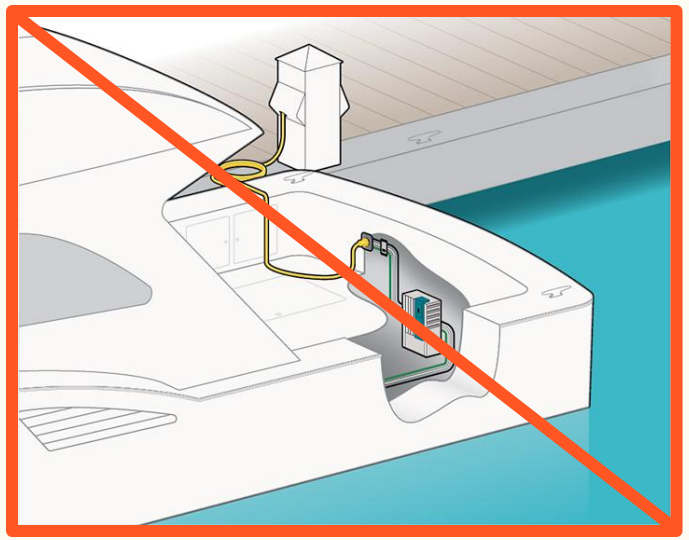
For users



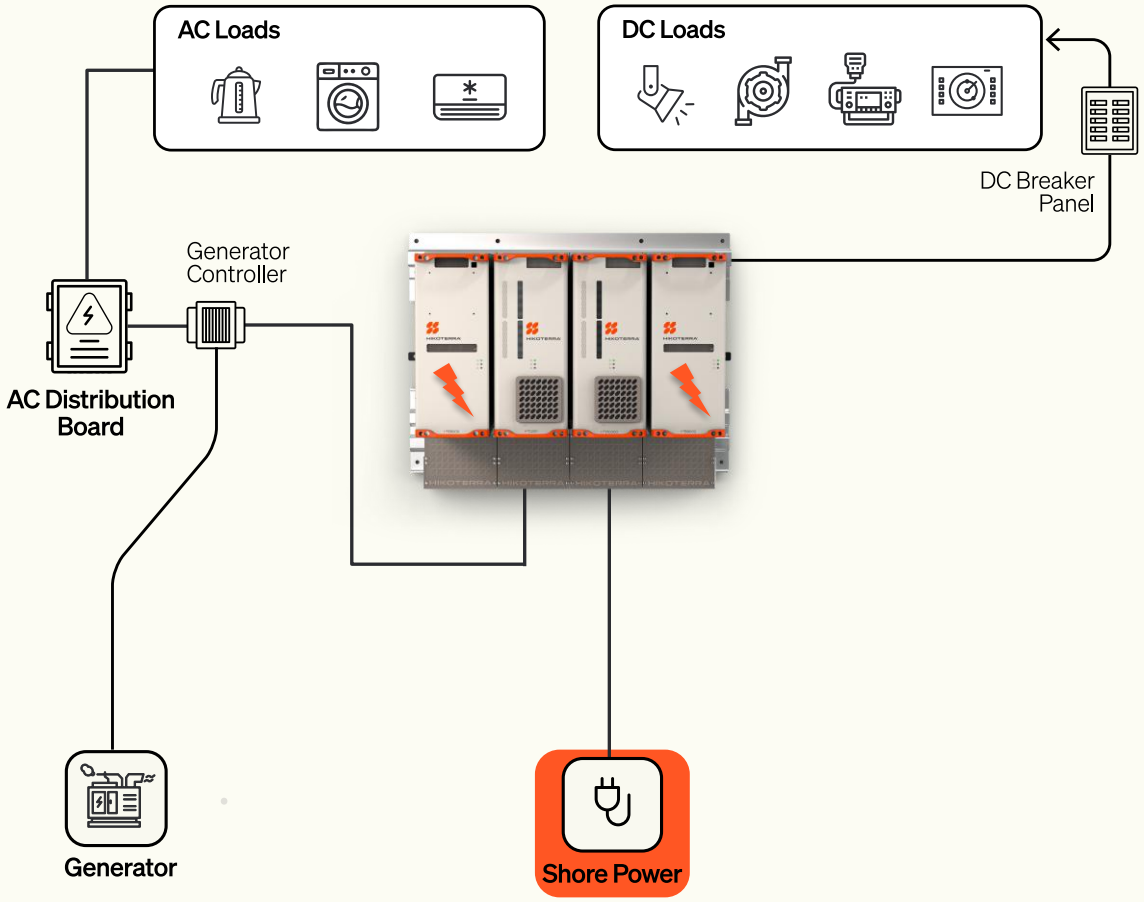
- Battery-first design with enough storage and inverter capacity to deliver a home like experience
- Delivering all power through the inverter even when connected to shore power ensures appliances receive clean and stable supply, even when shore power voltage sags
- Alternators can fast charge the battery when the vessel is underway, removing the need to run the generator while the main engines are running
- Generator run time is much reduced, giving long period of silent running with no noise, vibration, or fumes, AC can run overnight for better sleep
- Less fuel required, reduced maintenance and running costs

Integration highlight-Shore Power

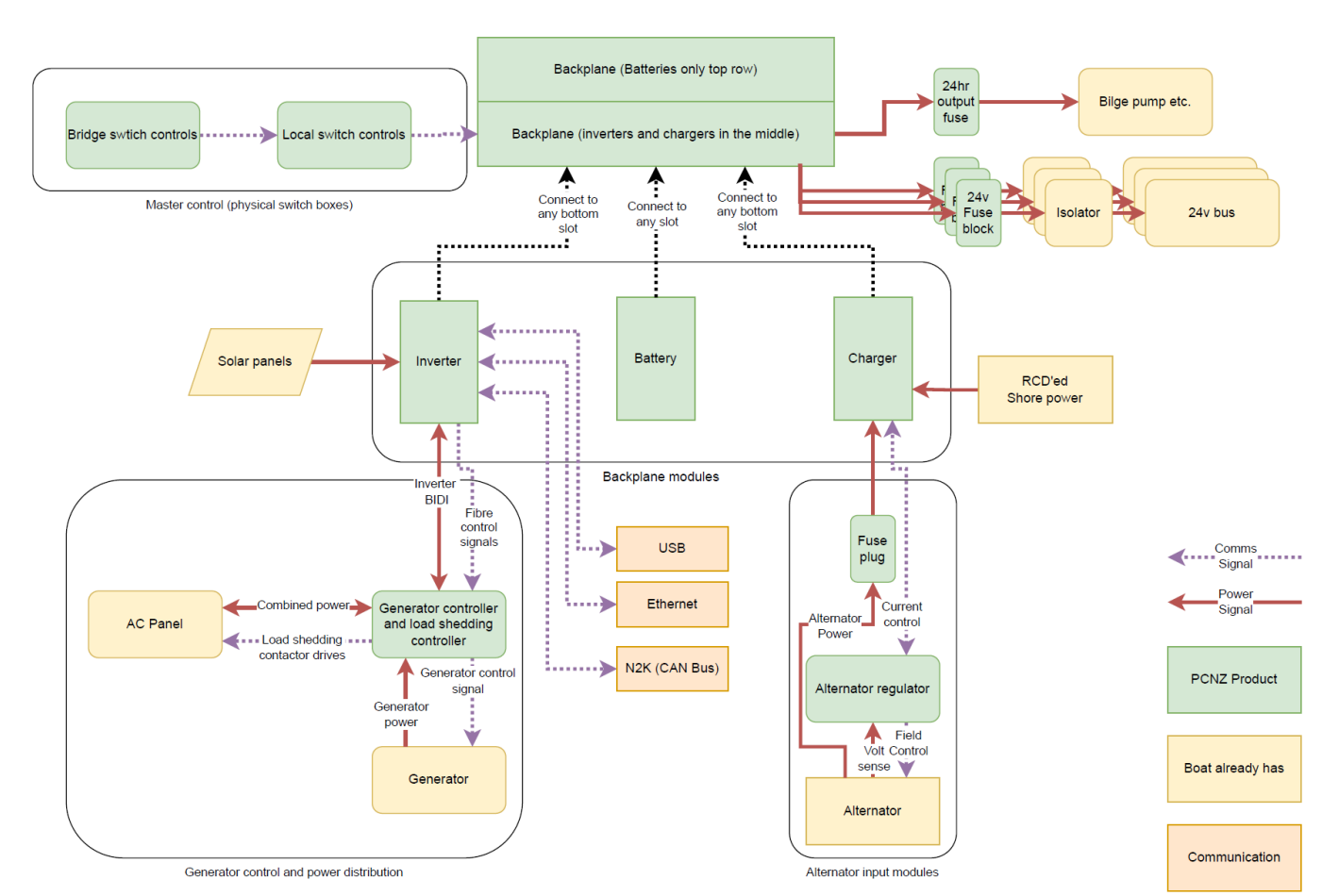
Shore power is only connected to the battery charger and doesn't directly power any appliances on the boat. The appliances receive clean, constant power, even when the shore power voltage sags.
The battery charger eliminates the need for a shore power isolation transformer.



Installing an isolation transformer on any boat with a shore power connection prevents galvanic corrosion, reverse polarity issues, and protects swimmers near your boat from electric shock drowning. | Photo: ©2019 Erich Stevens

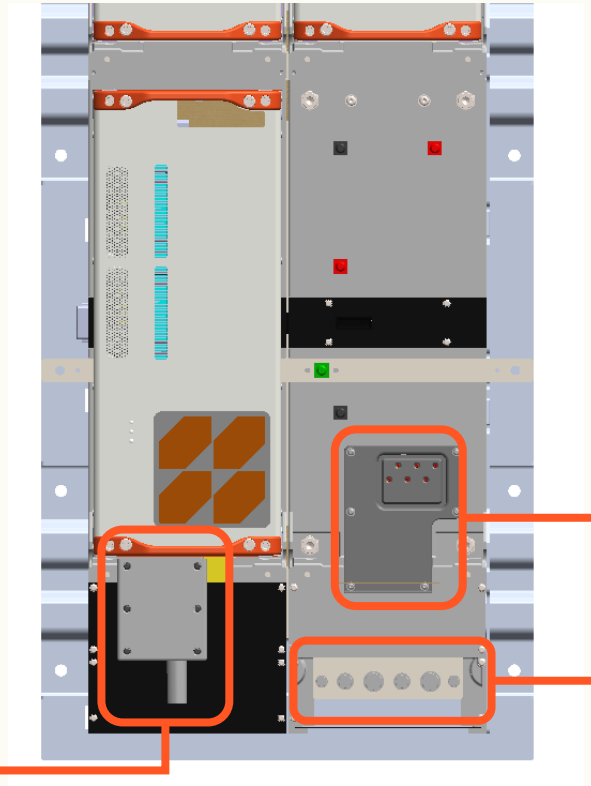


Functional Block Diagram



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AC & DC Connections



DC Inputs
Inverter (Solar, DC)
Charger (Alternators)

AC

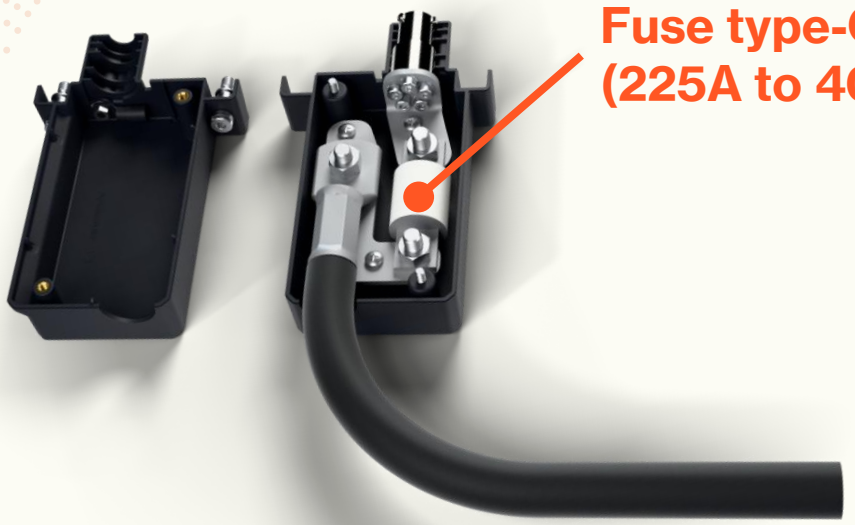
DC (6/8/10mm)

DC Input Connectors (inverter)

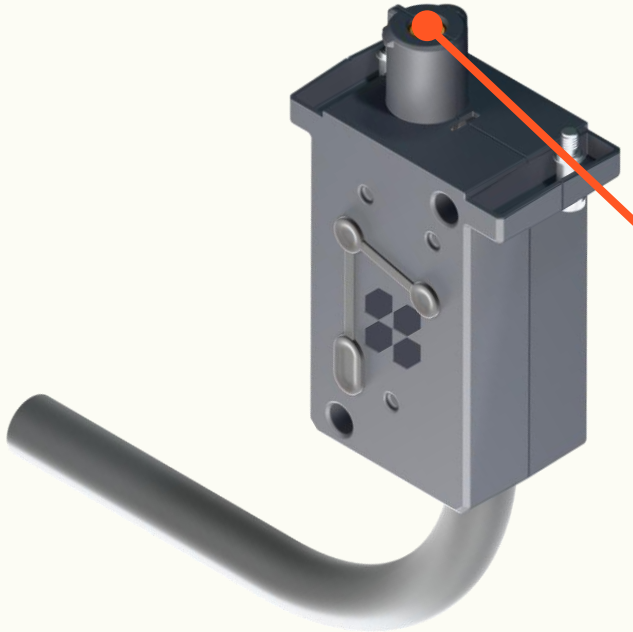
DC Input available on inverter (50V, 250A max)

Used for;

- Solar input (MPPT)
- DC input for charging
  (Outboard engine alternator via 12:24V DC/DC converter)



Fuse type-Class T (225A to 400A)





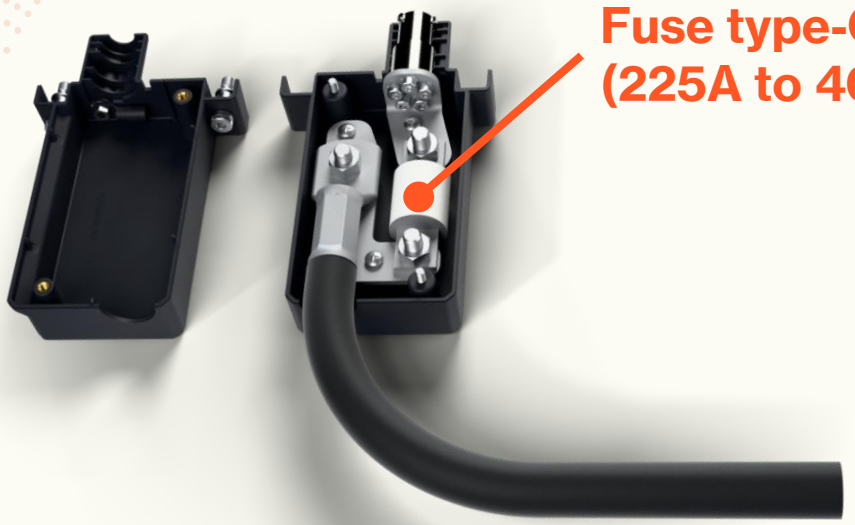
Underside of inverter

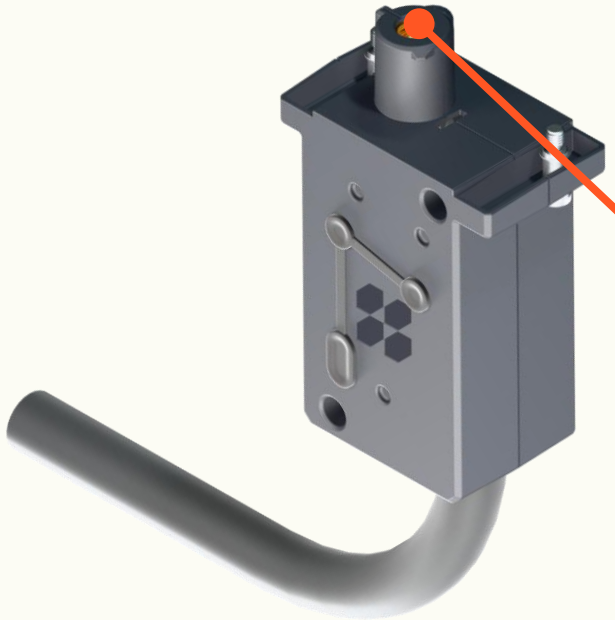
Alternator Input Connectors (Charger)

Alternator Input (Charger)

Used for;

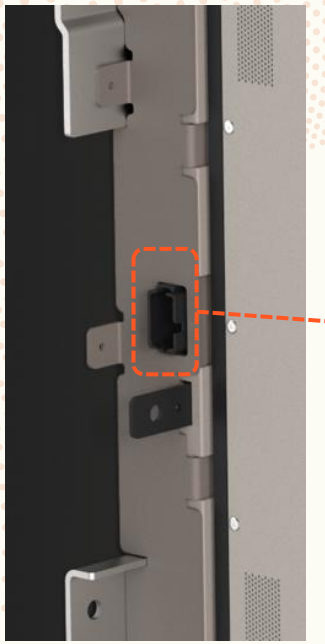
- Alternator Input 1 (250A Max)
- Alternator Input 2 (250A Max)

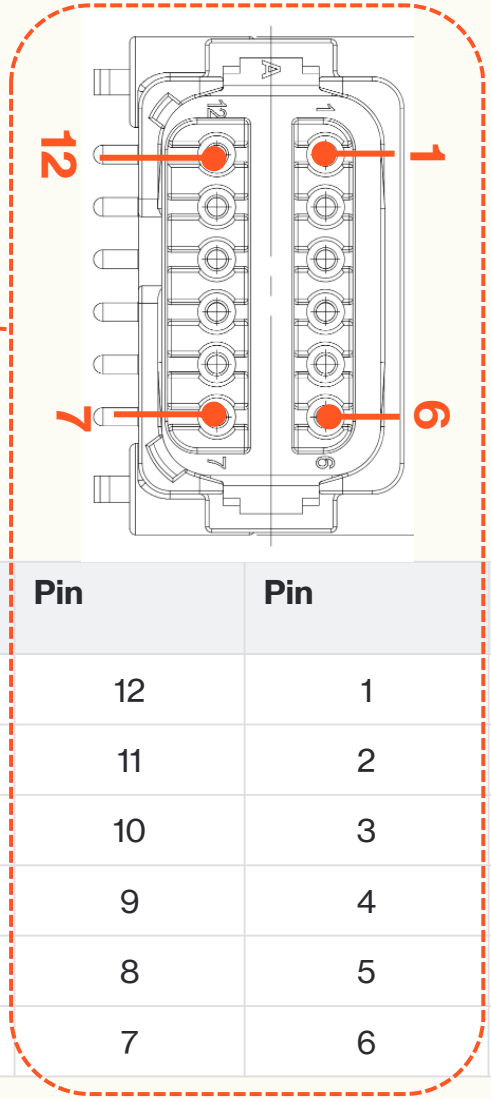






Rack connector-Control Switches & H-Bus





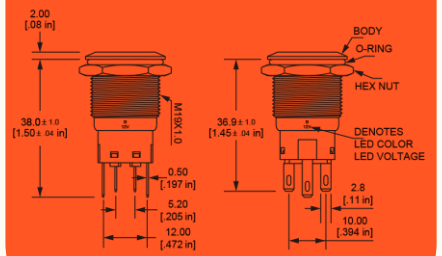
	Signal	Pin	Pin	Signal	
INPUT	AC_ENABLE	12	1	BATTERY_ENABLE	INPUT
OUTPUT	GATEWAY 24V	11	2	0V	
	H-BUS CAN_L	10	3	24V	
	H-BUS CAN_H	9	4	ALARM_LED	OUTPUT
OUTPUT	AUDIBLE_ALARM	8	5	REMOTE_DC_ISOLATORS	OUTPUT
INPUT	ALARM_MUTE	7	6	AC_ACTIVE_LED	OUTPUT

Control panel & switches

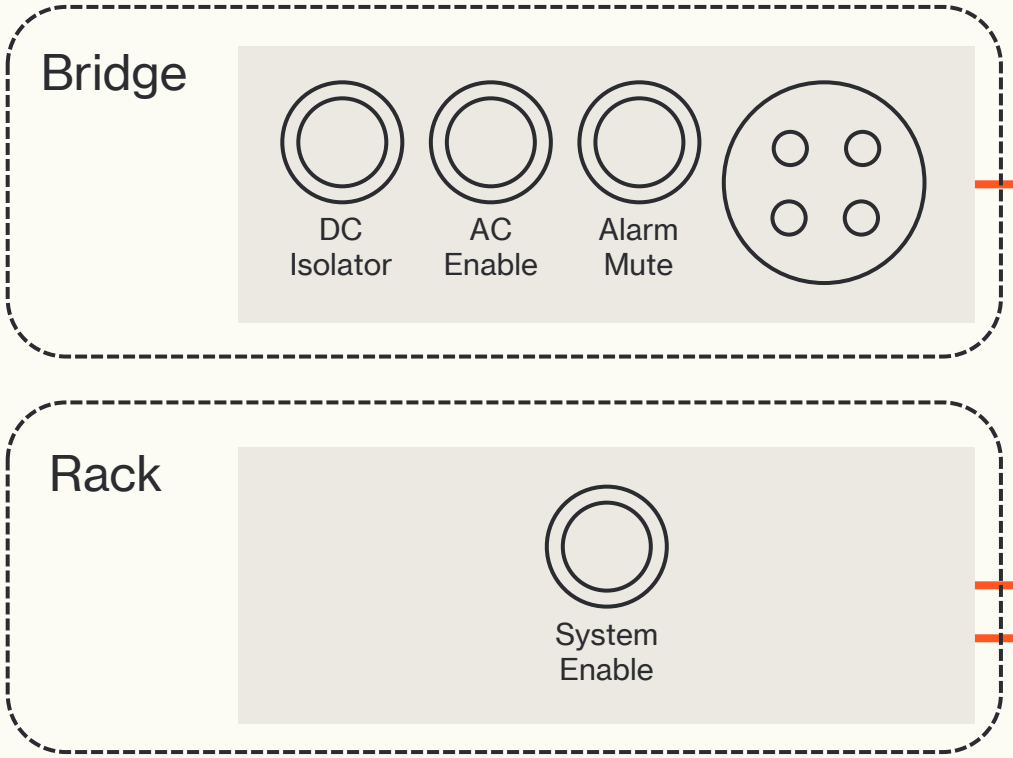
Function	Control	Location	Note
System Enable	AC&DC	Rack	Within 1m of rack
DC Isolator	DC	Bridge	Controls an ML downstream of 24hr circuit
AC Enable	AC&DC	Bridge	Controls inverter output, on/off
Alarm Mute	Alarm	Bridge	Mutes alarm
Alarm buzzer	Alarm	Bridge	

Recommended Switch

Langir L19A



Gold contacts required





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Connectivity



Connectivity Gateway

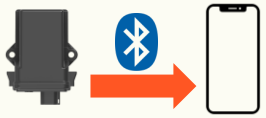
Category	Specification
Power Supply	24V from rack connector
H-BUS	Proprietary from rack connector
NMEA2000	M12 5 pin Micro-C
Bluetooth	BLE5
WiFi	WiFi 6 Dual Band 2.4 & 5GHz
Dimensions (H/W/D)	118mm x 114mm x 35mm
Connectors	DT 6P – H-BUS & Power
Environmental	IP68 & IP69K
Power Supply	24V from rack connector
H-BUS	Proprietary from rack connector
Storage (Logging)	Micro SD up to 32GB



Connectivity options

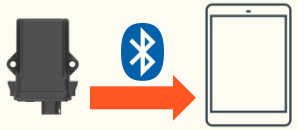
Onboard

BT direct to mobile device



- Ideal for small boat/RV
- Avoids WiFi/5G internet source confusion

BT direct to tablet



- Ultimate low cost display solution for RV
- Could also use WiFi

WiFi to onboard network to device



- Full boat/RV coverage
- Device can likely access internet via boat/RV source

WiFi direct to mobile device



- Better range than BT?
- Could lead to internet source confusion

Offboard

WiFi to onboard network with internet-user



- Vessels/Vehicles with Internet connectivity
- Connect to boat/RV from anywhere

WiFi to marina/RV park WiFi with internet



- Connect gateway to marina/RV park WiFi
- Connect to boat/RV from anywhere

Captive Portal/Hotel/Credential issues

WiFi to network with onboard internet-support



- Vessels/Vehicles with Internet connectivity
- Remote support

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System Configuration & Commissioning

pcnzl-enigma@raspberrypi: ~/PowerRack

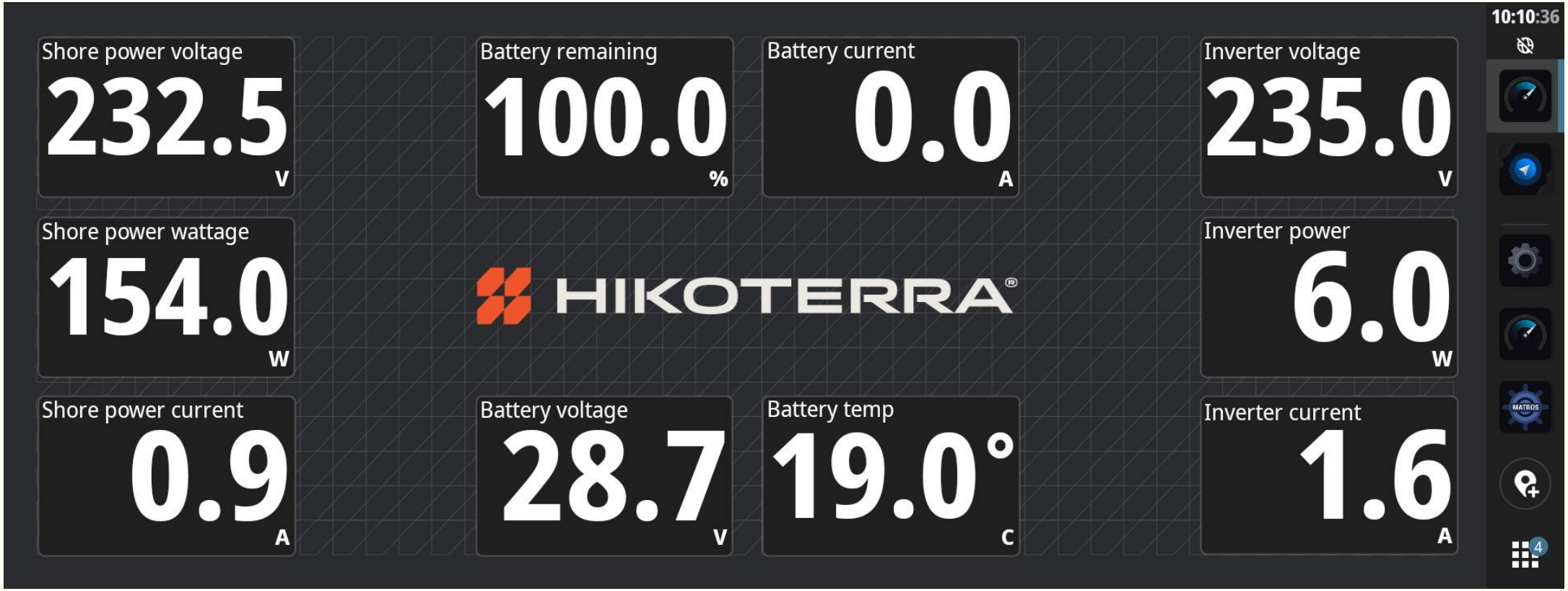
```
          PCNZL Inverter Debug          |                                  AC Master Screen                                  |       Active Displays: 1/3 \ (+)
------------------------------------------------------------------------------------------------------------------------------------------------------------------
            Runtime ACM Data            |         Generator Configuration          |            ACM Configuration             |            Runtime DCM Data
----------------------------------------|------------------------------------------|------------------------------------------|-----------------------------------------
FC State:              FCS_BOOT 13 days |Magnitude Kp:                    11.500   |Is AC Master:                        true |Quiet State:                      None
Prev FC:                     FCS_BOOT   |Magnitude Ki:                    10.500   |Gen Auto Mode:                      false |SOC:                             37.5%
Fibre Gen RX                        0   |Frequency Kp:                    1.000    |Nominal Channel Current:          20.000A |Gen Max Charge Ampacity (DC):     600A
Fibre Inv RX                        0   |Frequency Ki:                    1.000    |Min SOC Pref QT:                     10% |fastfilt:                        4.0A
Fibre retries                       0   |Generator Type:               Synchronous |Min SOC No QT:                       30% |slowfilt:                        4.0A
Fibre CRC err                       0   |Nominal Gen Max I:               0.000A   |Target SOC No QT:                    80% |avId:                           35.9A
Gen Fault:                        0x0   |Nominal Gen V:                 230.000V   |Target SOC Pref QT:                  80% |BoundedId:                      43.3A
ACM State:                ACM_RUNNING   |Min Voltage:                   180.000V   |Final SOC Pre QT:                    90% |DCMaxGenId:                      0.0A
ACM Gen State:  ACM_GEN_OFFLINE 13 days |Max Voltage:                   300.000V   |Load Trigger Fast:                   80% |invId:                           7.3A
Manual Gen:                       OFF   |Min Frequency:                  40.000Hz  |LT Fast tc:                           1s |genId:                           0.0A
Gen Connection:           Disconnected  |Max Frequency:                  70.000Hz  |Load Trigger Slow:                   50% |DCM State:                   DCM_BULK
Manual Target setpoint:          0.000  |Generator Signaling:        Pulse ON/OFF  |LT Slow tc:                          60s |Target:                       27.194V
Id Target:                       0.00   |Pulse on time:                     10s    |Gen Min On Time:                    120s |Measured:                     26.188V
Iq Target:                       0.00   |Pulse off time:                     5s    |Cold Ramp Time:                     300s |Warm up Limit:                 0.5A
Id measured:                     0.00   |Load Shed 1 polarity:      Normally Open  |Cfg saved:                          true |
Iq measured:                     0.00   |Load Shed 2 polarity:      Normally Open  |                                         |
Load Shed 1:              Disconnected  |Load Shed 3 polarity:      Normally Open  |                                         |
Load Shed 2:              Disconnected  |Load Shed 4 polarity:      Normally Open  |                                         |
Load Shed 3:              Disconnected  |Config up to date:                 false  |                                         |
Load Shed 4:              Disconnected  |                                          |                                         |
Gen Voltage:                     0.0V   |                                          |                                         |
Gen Freq:                     55.00Hz   |                                          |                                         |
------------------------------------------------------------------------------------------------------------------------------------------------------------------
'help' for list of test commands
-------------------------------------------------
list  -List Devices on the rack.
exit  -Switch back to the system overview screen, alternatively press 'esc'.
gstart  -Starts the generator.
gstop  -Stops the generator.
setid  -Set ID.
setiq  -Set IQ.
setinvr  -Set inverter output resistance.
setinvl  -Set inverter output inductance.
ld  -Configure Loads for shedding, multiple loads can be toggled at once.
prntgenflt  -Prints the generator faults.
gclrflt  -Clear generator faults.
setqt  -Set a Quiet Time.
enableqt  -Enable a specific quiet time.
lsqt  -Print the Quiet Times.
qtcfgsave  -Save qt config data to rack eeprom.
csvgen  -Begin a stream of the gen debug data over the ethernet stream
gencfg  -Change a gencfg parameter.
acmcfg  -Change an acmcfg parameter.
acmcfgsave  -Save configs for acm.
gsetacm  -Toggle ACM
```

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MFD Integration, NMEA2000-Supported PGN's

PGN	Description
59392	ISO_ACKNOWLEDGEMENT
59904	ISO_REQUEST
60416	ISO_TRANSPORT_PROTOCOL
60928	ADDRESS_CLAIMED
65240	ISO_COMMANDED_ADDRESS
126208	COMMAND_GROUP_FUNCTION
126464	PGN_LIST
126983	ALERT
126984	ALERT_RESPONSE
126992	SYSTEM_TIME
126993	CONFIGURATION_INFORMATION
127491	ELECTRIC_ENERGY_STORAGE_STATUS_DYNAMIC
127503	AC_INPUT_STATUS
127504	AC_OUTPUT_STATUS
127506	DC_DETAILED_STATUS
127507	CHARGER_STATUS
127508	BATTERY_STATUS
127509	INVERTER_STATUS
127510	CHARGER_CONFIGURATION_STATUS
127511	INVERTER_CONFIGURATION_STATUS
127512	AGS_CONFIGURATION_STATUS
127513	BATTERY_CONFIGURATION_STATUS
127514	AGS_STATUS
127744	AC_POWER_CURRENT_PHASE_A
127747	AC_VOLTAGE_FREQUENCY_PHASE_A
127750	CONVERTER_STATUS
127751	DC_VOLTAGE_CURRENT
129033	LOCAL_TIME_OFFSET
130060	LABEL
130567	WATERMAKER
127502	SWITCH BANK CONTROL (backlog)
127501	BINARY STATUS REPORT (backlog)

MFD Integration, NMEA2000, Simrad NSX

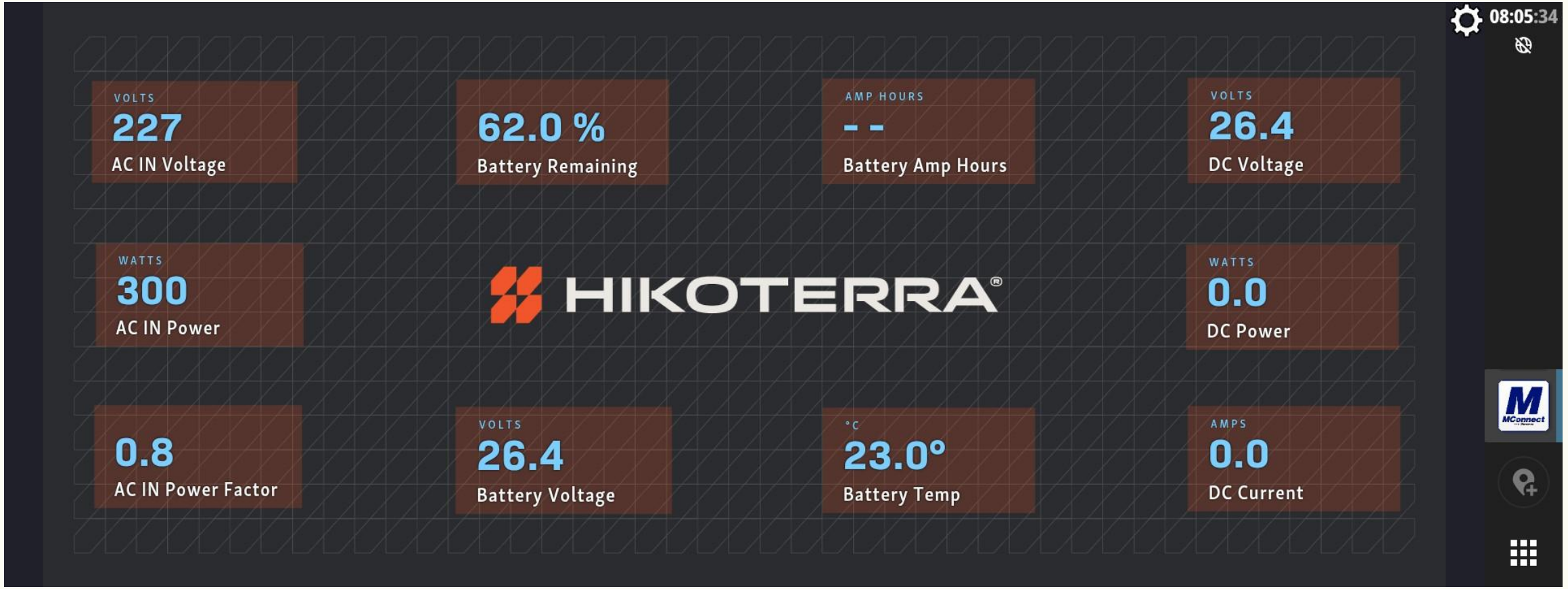


Screenshot taken from H⁴ system & Simrad NSX 15UW

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MFD Integration-HTML5-Maretron MConnect

Maretron MConnect, connected via ethernet to Simrad NSX, also compatible with most MFD's



Screenshot taken from H⁴ system & Simrad NSX 15UW

***System configuration**-H4 system connected via NMEA2000 to MConnect WSV100, MConnect connected to Simrad MFD via ethernet. Gauges & graphics on M-Connect editable by installer using Maretron built in editor. Richer graphics are available over our basic example. More info at https://www.maretron.com/products/mconnect/*

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CONFIDENTIAL

Installation Simplified

Get rid of the cabling chaos, and replace it with a more powerful, cleaner, and easier to install system

	Victron System	H⁴ Hybrid Power System
Inverter capacity (W)	6000	10000
Charger Capacity (A)	240	200
Battery Capacity (Wh)	13440	16000
Solar capacity (W)	2900	6000



H⁴ Hybrid Power System



Heavy gauge cables 4
Lugs to crimp 8
Modules to mount 1

1 module to mount

Key Takeaway

12 Modules to mount

Shore Power In

AC Out

Solar In

DC Out

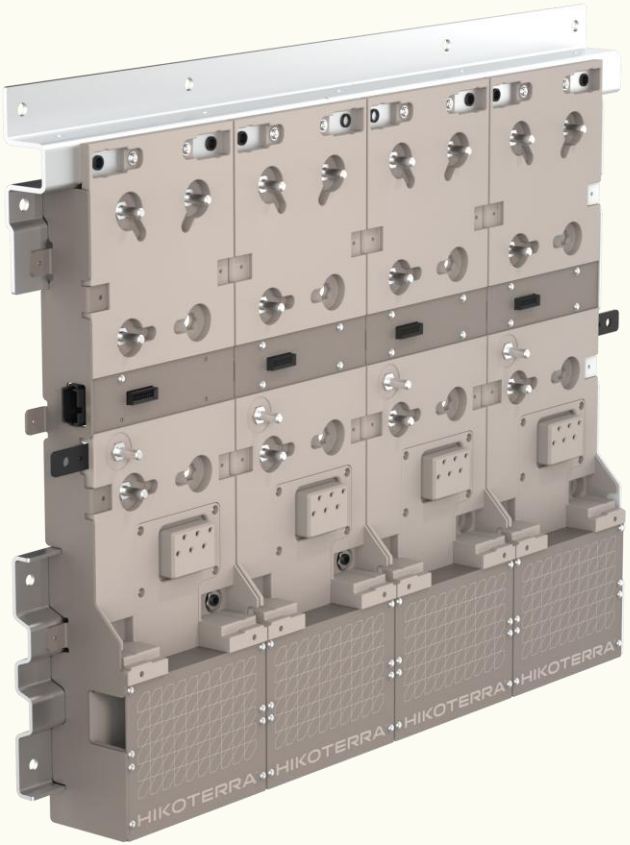
Heavy gauge cables 26
Lugs to crimp 50
Modules to mount 12

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Builder advantages: Recap

H4 Hybrid Power System

- ✓ 50% reduction in time & cost through the entire builder value chain of defining, designing & delivering an onboard power system
- ✓ Reduction in wall & floor space required, freeing up space for other systems or improving access
- ✓ More efficient inverter technology with a wider temp window means optimised systems - current systems are over designed due to continuous run time temperature constraints
- ✓ Modules are only plugged into the rack prior to delivery
  - Reduces cash flow and opens up working capital
  - Tight working spaces are opened up during build
  - No accidental damage to expensive modules during build
- ✓ All system components come from one supplier meaning fewer integration headaches and one place to call for service
- ✓ Smaller, lower cost generators required as generator is run less, but at optimal load
- ✓ Fewer modules to mount due to high system capacity and built in functionality
- ✓ With reduced complexity, less training required & lower consumer interaction with a self managing system the builder can expect fewer calls from their customers
- ✓ Dealers and service agents can replace modules easily with little training due to rack memory and battery balancing functionality
- ✓ Upgrades in minutes if spare slots are left on the rack for future expandability
- ✓ **A more familiar home like experience for the builders consumer, which helps differentiate from competitors in a crowded market**



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Problems solved

Reduced complexity for users



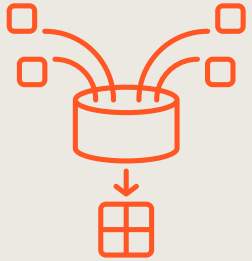
- Home like experience familiar to everyone
- Single self-managing system to interact with
- No more load juggling due to available battery capacity and seamless generator parallel (if required)
- Eliminated issue of shore power trips as shore power never directly supplies the loads

A quieter life



- Reduced or eliminated generator depending on config
- Reduced run time as batteries & alternators fill the gap
- If genset remains, it can be smaller and run at optimum load for less time
- Charge fast while underway using main engines due to system & battery charge capacity

Simpler system design, install & service



- One partner to call
- System design is simplified with fewer components, integration points & reduced cabling
- 50% less design, install & setup time
- Reduced overall system weight & space to use for other things
- Reduced or eliminated through hull fittings

Ongoing cost & sustainability



- Rightsized genset (if required at all) run at optimum load
- More efficient new technology with a wider temp window means optimised systems
- Lower running hours means less fuel
- More time between service intervals
- Reduced emissions

Test system in place

Test system in place for 2 years.

Connected to Starlink for external access & monitoring

System has recently been powering a vessel refit with continual shore power disruption.





Feedback from the market

"I think your approach of everything going through the batteries and the new racking system is genius and will shake up the market"



Owner of a 23-metre vessel, Auckland NZ

"100% agree on the philosophy and product direction."



System integrator & Technical Dealer, Gold Coast, Australia

Impressed on inverter specs, capability, and battery capacity, plus reduction of other system components. Validated the labour saving of 50% for a new build installation.



Technical Dealer, Auckland NZ

Warranty & Service-Key Points

2 Year Warranty

2-year warranty on all Hybrid Power System components, incl. batteries



Training & Certification

Program for distributors, dealers, OEM’s & technicians beginning Q1-26

Compliance & Approvals-Battery

CE (Europe)

Directive 2011/65/EU (RoHS)

- IEC 63000 - Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Directive 2014/30/EU (EMC)

- IEC 60945 - Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results

Regulation (EU) 2023/1542 (Batteries Regulation)

- IEC 62619 - Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for secondary lithium cells and batteries, for use in industrial applications
- IEC 62620 - Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for use in industrial applications

ISO 23625 - Small craft – Lithium-ion batteries

- We are designing H4B8000 to ISO 23625 & will provide documentation & reports for the boat builders RCD records.

ABYC (US)

E-10 - Storage Batteries
E-11 - AC and DC Electrical Systems on Boats
E-13 – Lithium-Ion Batteries

RCM (Australia/NZ)

IEC 62619 & 62620
IEC 60945
AS/NZS 3004.2:2014 – Section 2.9.3



Compliance & Approvals-Inverter/Charger

CE (EMEA)

Directive 2011/65/EU (RoHS)

- IEC 63000 - Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Directive 2014/30/EU (EMC)

- IEC 60945 - Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results

Directive 2014/35/EU (LVD)

- IEC 62477-1 - Safety requirements for power electronic converter systems and equipment

ABYC (US)

E-11 - AC and DC Electrical Systems on Boats
A-31 – Battery chargers and inverters

RCM (Australia/NZ)

AS/NZS IEC 62477.1
IEC 60945
EESS AS/NZS 4417.2 – Level 1 equipment



Compliance & Approvals-Rack

CE (EMEA)

Directive 2011/65/EU (RoHS)

- IEC 63000 - Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Directive 2014/30/EU (EMC)

- IEC 60945 - Maritime navigation and radiocommunication equipment and systems - General requirements - Methods of testing and required test results

Directive 2014/35/EU (LVD)

- IEC 60335-1 - Household and similar electrical appliances - Safety - Part 1: General requirements

ABYC (US)

E-11 - AC and DC Electrical Systems on Boats

RCM (Australia/NZ)

AS/NZS 60335.1
IEC 60945
AS/NZS 3004.2:2014
EESS AS/NZS 4417.2 – Level 1 equipment



End

Thank You!





HIKOTERRA®

Built better to power what matters.