Marine IsoBoost Transformers - System Brochure

Perfect for new builds and retrofits the range offers both standard and bespoke options that can be used worldwide.

Marine IsoBoost Transformers

ENERGY SOLUTIONS

AC System Controller

The Energy Solutions AC System Controller Changeover (ACCO) are designed to provide a simple, reliable and automatic AC source selection and suit a wide variety of power supply configurations.

The ES-ACCO-2S2G-100-50-US variant is an AC changeover designed for vessels with two shore cords and two generators. The shore capacities are both 50 amp whilst on the generator inputs there is one rated at 100 amps and one at 50 amps. Power sources should all be 240/120 volts for this unit. This unit matches the fit and form of our IsoBoost transformer range making for a very integrated engine room package.

When installed, the AC Changeover power selection is automatic. Generators have priority over shore-power. If only a single supply is available the output bus bars are both supplied from a single source; if there are two supplies the bus tie opens. This automatic operation provides rapid changeover between supplies, minimising any interruption to supplies on-board.

IsoBoost Combiner

The Energy Solutions shore power combiner allows two shore cords to be combined provided they are supplied via appropriate Energy Solutions IsoBoost or isolation transformers. Combining two shore cords into a single supply for the boat means that the ships loads are applied evenly across the two shore cords. For boats with two equal cords the loads are split 50 / 50. For boats with mismatched cords the loads are applied proportionally. This eliminates the need to 'balance' loads across two bus groups onboard.

In order to safely combine two cords the Combiner checks the voltage and phase of both supplies to ensure they can be combined. The unit allows low levels of load to be drawn from one cord, but as the load increases it connects the second cord. If the load drops back it will revert to a single cord again.

In order to safely have two cords in parallel we must protect against one cord being unplugged at the dock side and the male cable pins remaining live as they are being 'backfeed' from the other cord. The Combiner protects against this by monitoring the power flow from both cords. If positive, forward, power is not being drawn from both cords then it will take the supplies out of parallel to eliminate backfeeding.

We offer two models – one that will accommodate two 50 amp cords or a 100 amp and 50 amp (IB3-COMB-2S-PARR-050-100), And a second, larger model that will handle accommodate two 100 amp cords (IB3-COMB-2S-PARR-100-100)

IsoBoost Transformers

The Energy Solutions IsoBoost transformer provides a cost effective and reliable solution to isolate and manage a shore line. It provides all of the features of a normal isolation transformer, as well as providing a boost function to manage the volt drop on heavily loaded shore lines, or to cope with a 208V (phase to phase) supply. On startup, the isolation transformer automatically soft starts the transformer to prevent inrush from tripping the supply breaker. If the voltage is in range, it operates in 1:1 mode, so that the output voltage matches the input voltage. If the supply voltage drops below 215V, it automatically switches into boost mode, effectively raising the output voltage by around 10%. If the supply voltage recovers, the IsoBoost automatically switches back to 1:1 operation.

- Double wound isolation transformer to BS EN 60076-1.
- Custom enclosure, powder coated RAL9016 traffic white finish.
- Input is automatically switchable between 208/400 (configured at time of order) and 240 volts nominal.
- Protective screen between input and output windings (normally connected to incoming earth)
- Output is 240 volt nominal, with centre tap available.
- Dual frequency (but no frequency conversion)
- Input 3 wire (earth and two conductors)
- Output options for 3 wire or 4 wire
- Models available for US or EU operation (208V or 400V).
- Automatic soft start to prevent shore supply tripping
- Inbuilt metering, logging and power analysis
- Fit and form replacement for Charles Industries™ Isoboost transformers

A sophisticated power meter is built into the case of the IsoBoost. It provides detailed monitoring of the output supply of the transformer, allowing the user to check that the supply is acceptable before connecting it to the vessel switchboard. The power monitor is also used to provide the control of the boosting function. It includes the following features:

- Voltage, frequency, current monitoring
- Power, power factor and energy usage
- Harmonic content and THD
- Event and alarm recording
- Modbus RTU communication for optional remote display

Boost function

The output voltage of the transformer is directly related to the input voltage. This output voltage, when the transformer is in Boost mode, is +10% higher than the input voltage on the European specification transformers and +15% higher than the input voltage on US specification transformers. The boost function will typically happen at the following voltage levels:

European Spec: Input Voltage is below 216V **USA Spec:** Input Voltage is below 216V

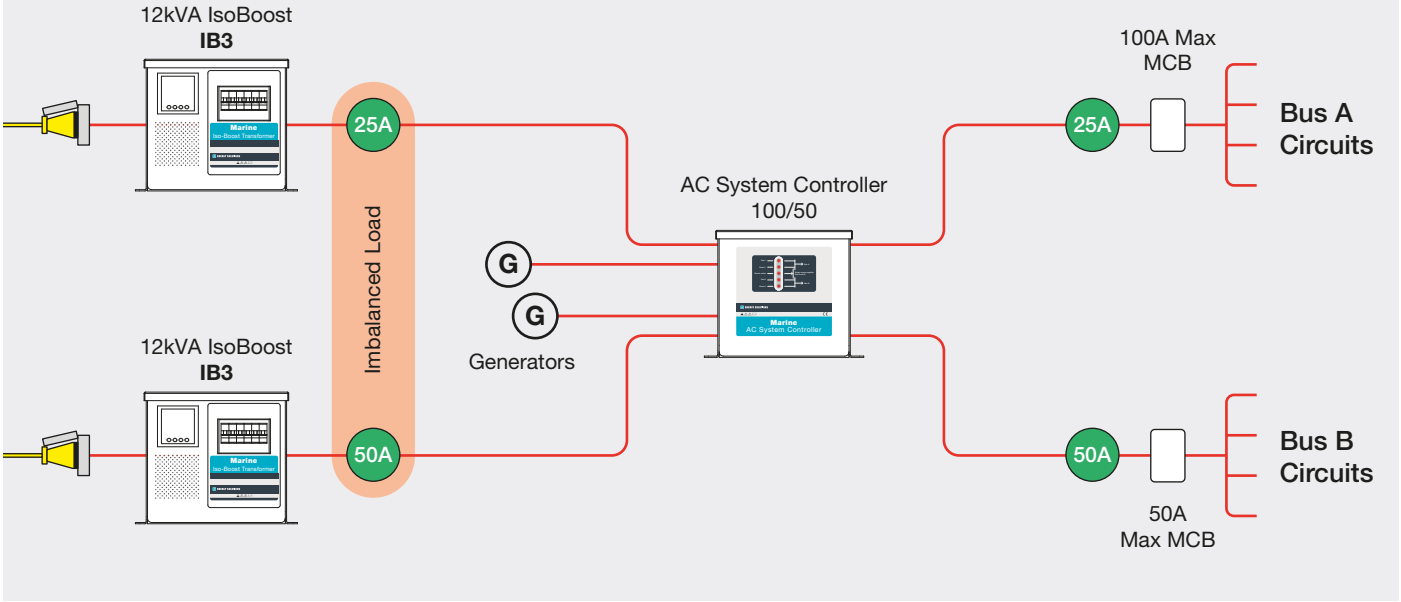
Buck function (24 kVA Euro spec only)

The European spec 24 kVA IsoBoost unit operates differently to the rest of the range. This model has a 1:1 mode for when the vessel can only get a 230 volt single phase supply. However, if the boat can access a 400 volt three phase outlet then the transformer will accept any two phases into it's input and then select a drop down winding (buck winding) to drop the 400 volts down to 230 volts for on-board use.

The extra voltage means you get more power from a certain amperage connector. For instance a 100 amp connection at 230 volts gives 23 kW of onboard power – but a 63 amp 400 volt supply will give 25 kW. For single phase boats with high onboard loads the ability to access three phase dock side outlets is a massive benefit.

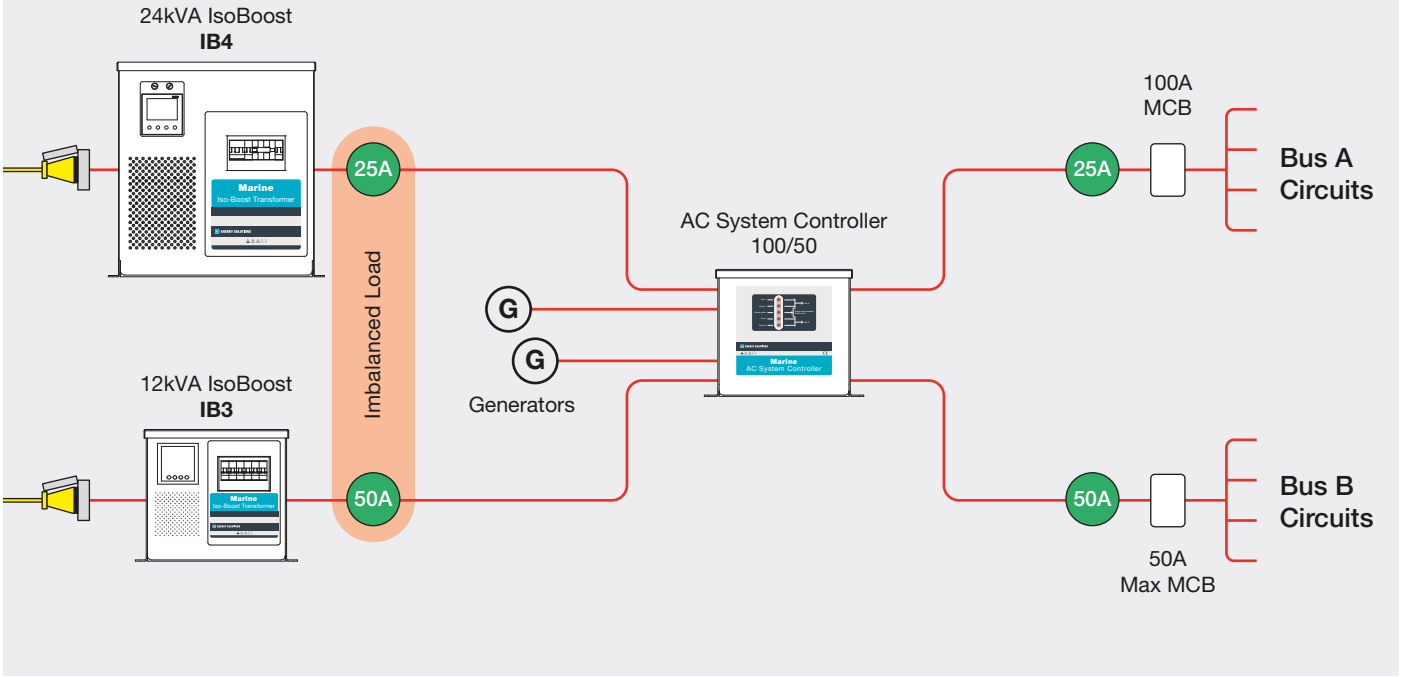
Sample Systems - IsoBoost transformers with split bus shore power operation

Scheme 20



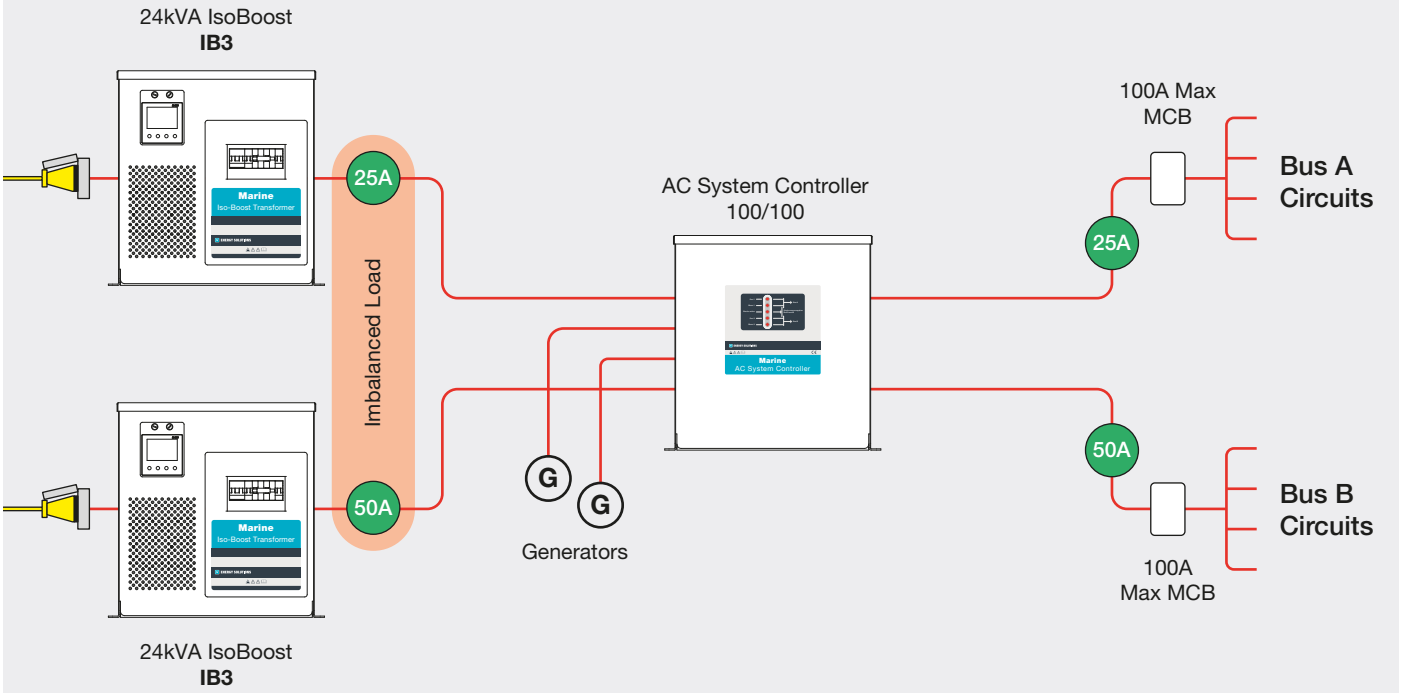
Allows for 2 x 240 volt shore cords (2 x 50 amp) and a 24 kVA generator and 12 kVA generator.
Twin shore-cords supply one output bus each. Mismatched bus loads cause mismatched shore supplies.

Scheme 21



Allows for 2 x 240 volt shore cords (1 x 100 amp and 1 x 50 amp) and a 24 kVA generator and 12 kVA generator.
Twin shore-cords supply one output bus each. Mismatched bus loads cause mismatched shore supplies.

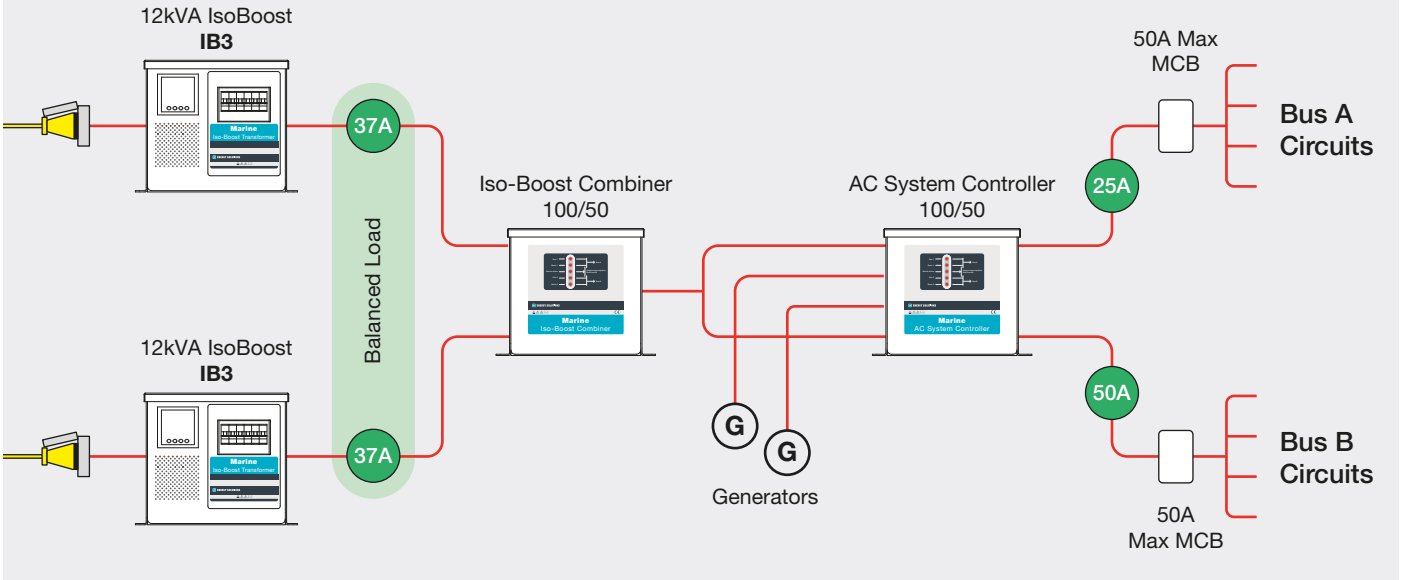
Scheme 22



Allows for 2 x 240 volt shore cords (2 x 100 amp) and a 2 x 24 kVA generator.
Twin shore-cords supply one output bus each. Mismatched bus loads cause mismatched shore supplies.

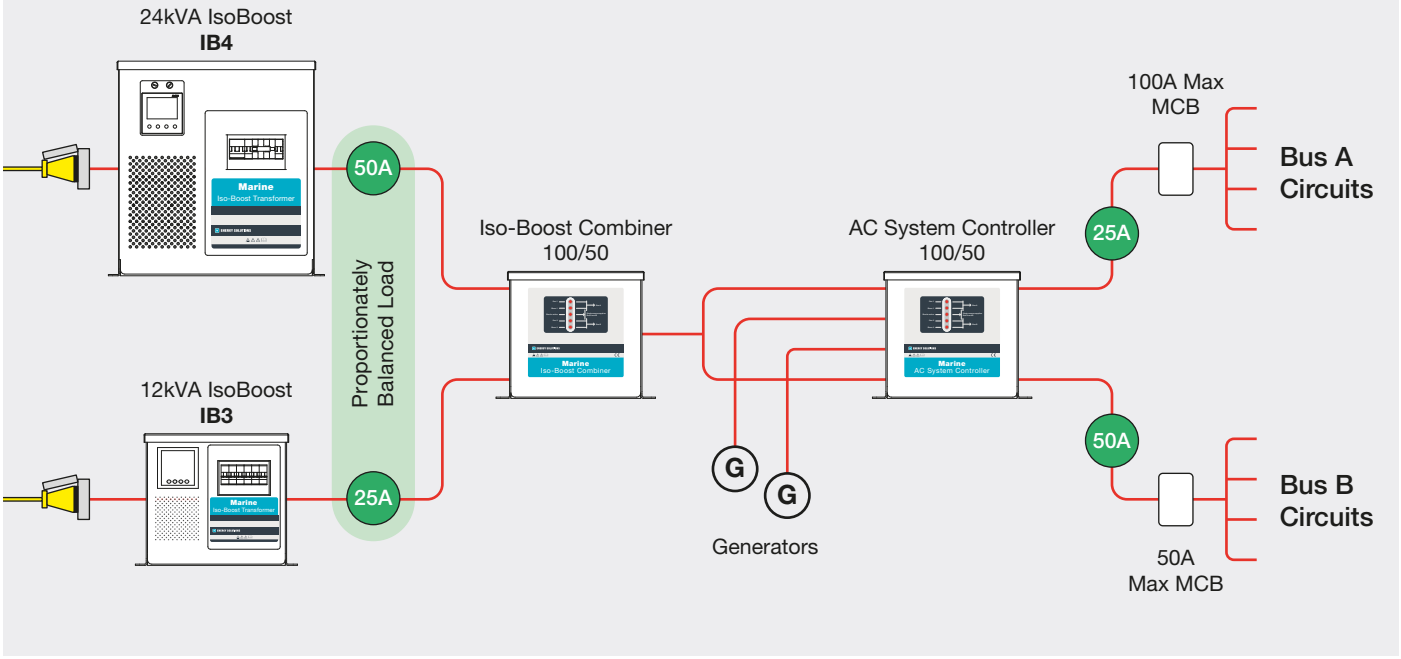
Sample Systems - IsoBoost transformers with parallel bus shore power operation

Scheme 30



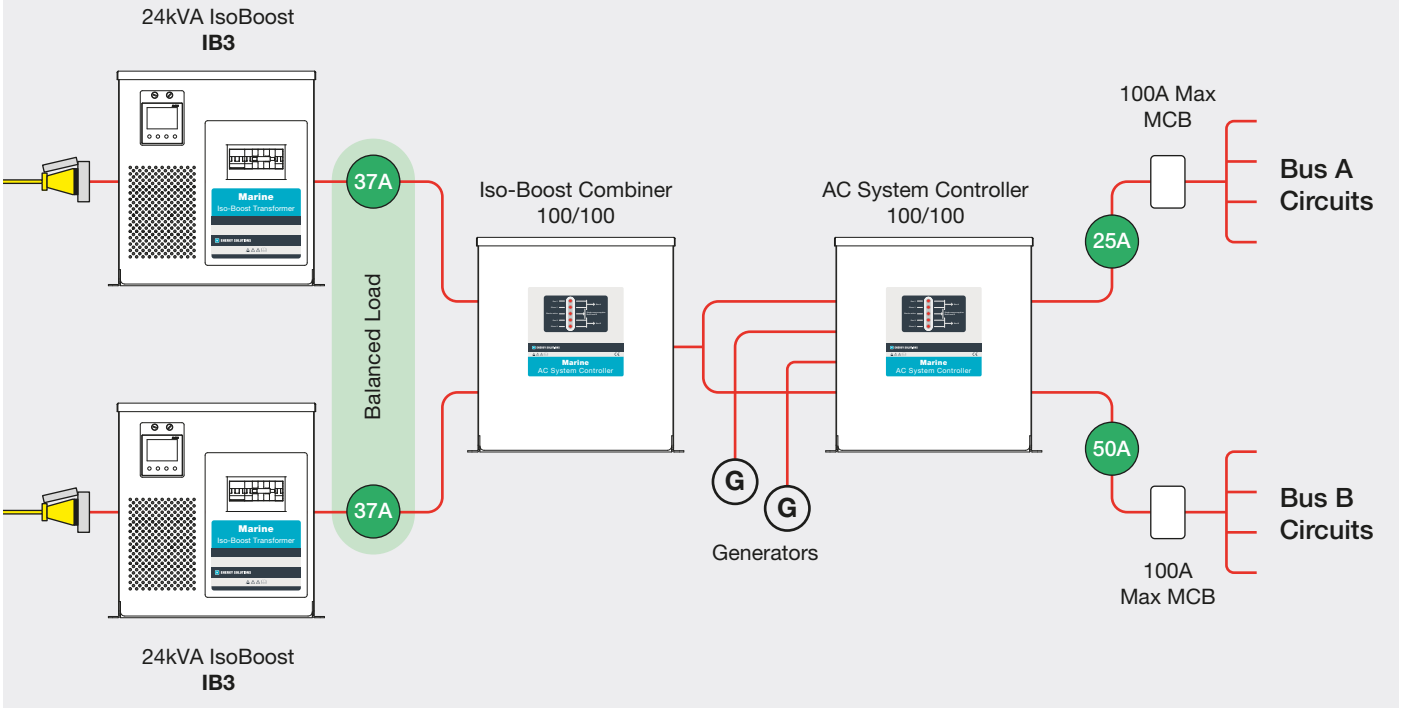
Allows for 2 x 240 volt shore cords (2 x 50 amp) and a 24 kVA generator and 12 kVA generator.
Twin shore-cords combine to supply the ships load. Mismatched bus loads are balanced 50/50 across the shore supplies.

Scheme 31



Allows for 2 x 240 volt shore cords (1 x 100 amp and 1 x 50 amp) and a 24 kVA generator and 12 kVA generator.
Twin shore-cords combine to supply the ships load. Mismatched bus loads are balanced 66/33 across the shore supplies.

Scheme 32



Allows for 2 x 240 volt shore cords (2 x 100 amp) and a 2 x 24 kVA generator.
Twin shore-cords combine to supply the ships load. Mismatched bus loads are balanced 50/50 across the shore supplies.

	AC System Controllers	IsoBoost Combiners
Model	**ES-ACCO-2S2G-100-50-US**	**IB3-COMB-2S-PARR-050-100**
Description	Automatic AC source selector for installations with 2 x generators and 2 x shore cords	Shore Cord Combiner
Input Voltage	240 V / 120 V split phase	240 V / 120 V split phase or 230 V single Phase
Input Current Gen 1	100 A	N/A
Input Current Shore 1	50 A	100 A
Input Current Gen 2	50 A	N/A
Input Current Shore 2	50 A	50 A
Bus 1 Current Capacity	150 A	100 A
Bus 2 Current Capacity	50 A	50 A
Local Indication	Shore1, 2 Gen 1, 2 and bus tie in use	See Manual
Connection Types	Stud terminals	Stud Terminals
Over Current Protection	No - external	
Isolation	No - external	
Enclosure Material	Powder coated zintec (RAL9016 traffic white)	Powder coated zintec (RAL9016 traffic white)
IP Rating	IP 21	IP 21
Weight	104Kg (230lb)	112Kg (247lb)
Dimensions mm (HXWXD)	314 x 381 x 470	314 x 381 x 470
Dimensions Inch (HXWXD)	12.36 x 15 x 18.5	12.36 x 15 x 18.5
	The Custom Range	
	In our custom range we offer the range in a variety of enclosure types; from bulkhead mounted enclosures to floor mounted bayed cabinets. We offer AC change over systems for 110 volt, 230 volt, 240/120 volt, 208 volt and 400 volt systems.	

Energy Solutions IsoBoost Transformers				
	1 : 1 or 15% voltage boost	1 : 1 or 10% voltage boost	1 : 1 or 15% voltage boost	1 : 1 or 400V to 230V dropdown
	USA	EURO	USA	EURO
	12kVA ISO-Boost	**15kVA ISO-Boost**	**24kVA ISO-Boost**	**24kVA ISO-Boost**
Input voltage	208V or 240V (Input auto switching)	208V or 230V (Input auto switching)	208V or 240V (Input auto switching)	400V or 230V (Input auto switching)
Input Currant (at max load)	50A @ 240V	63A @ 230V	100A @ 240V	104A @ 230V 63A @ 400V
Output voltage (Nominal)	240V / 120V	230V	240V / 120V	230V
Output Current (1:1)	50A	63A	100A	100A
Output Current (Boost)	43A	57A	85A	100A
Frequency	50Hz / 60Hz	50Hz / 60Hz	50Hz / 60Hz	50Hz / 60Hz
Common characteristics				
Power Monitor	Included (All models)			
Input device	Isolator			
Output device	Circuit breaker			
Enclosure material	Powder coated zintec (RAL9016 traffic white)			
IP rating	IP 21			
Weight	104Kg (230lb)	115Kg (253lb)	185Kg (408lb)	185Kg (408lb)
Dimensions mm (HxWxD)	314 x 381 x 470	314 x 381 x 470	504.5 x 508 x 620	504.5 x 508 x 620
Dimensions inch (HxWxD)	12.36 x 15 x 18.5	12.36 x 15 x 18.5	19.86 x 20 x 24.41	19.86 x 20 x 24.41

Power standards

The **European** power standard is based on a nominal supply voltage of 230 volts with an acceptable deviation of +10% and -6%. This equates to a supply voltage range of 216 – 253 volts. Whilst equipment may operate outside of this range the supply would be considered outside acceptable range.

The **American** power standard is based on a nominal supply voltage of 240 / 120 volts with an acceptable deviation of +6% and -6%. This equates to a supply voltage range of 225 – 254 volts. Whilst equipment may operate outside of this range the supply would be considered outside acceptable range.

Both models allow for compliant voltage on board with a supply voltage below 200 volts.

Boost Function Variants

Euro Boost version

The transformer operates in 1:1 mode down to 215 volts

Below 215 volts it drops into boost mode – which boosts the supply voltage by 10%. This table gives an indication of voltages that will be seen in 1:1 mode and boost mode.

Mode – Euro 10% boost	Input voltage	Output voltage
1:1	240	240
1:1	230	230
1:1	220	220
1:1	217	217
Boost	215	236
Boost	208	229
Boost	200	220
Boost	190	209

USA Boost version

The transformer operates in 1:1 mode down to 215 volts

Below 215 volts it drops into boost mode – which boosts the supply voltage by 15%. This table gives an indication of voltages that will be seen in 1:1 mode and boost mode

Mode – USA 15% boost	Input voltage	Output voltage
1:1	250	250
1:1	240	240
1:1	230	230
1:1	220	220
1:1	217	217
Boost	215	247
Boost	208	239
Boost	200	230
Boost	190	219

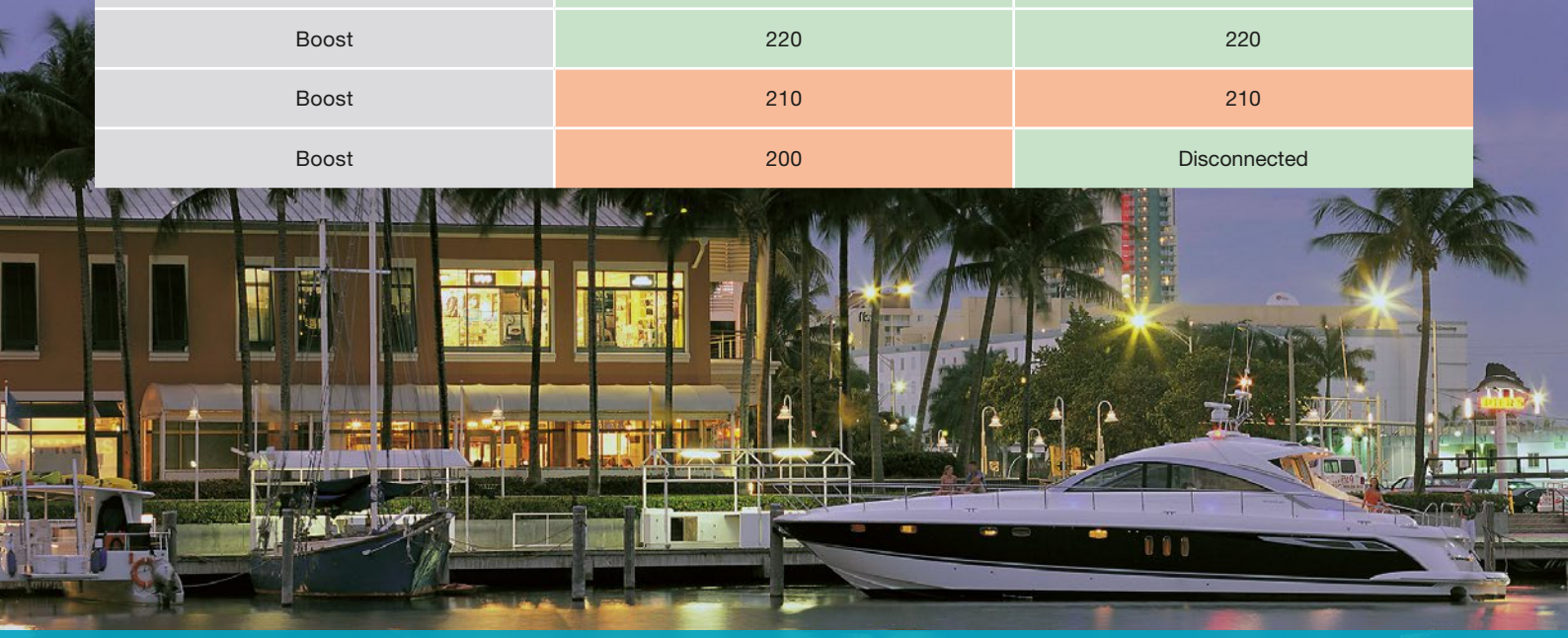
Buck Function Variant

Euro Buck version

The transformer operates in buck mode until the output voltage drops below to 200 volts (347 volts input).

There is then a ‘safety’ window which means it will not drop into 1:1 mode until the incoming voltage is below 320 volts.

Mode – Euro buck	Input voltage	Output voltage
Buck	440	254
Buck	415	240
Buck	400	230
Buck	380	220
Buck	350	202
Buck	340	Disconnected
1:1	250	250
Boost	240	240
Boost	230	230
Boost	220	220
Boost	210	210
Boost	200	Disconnected



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