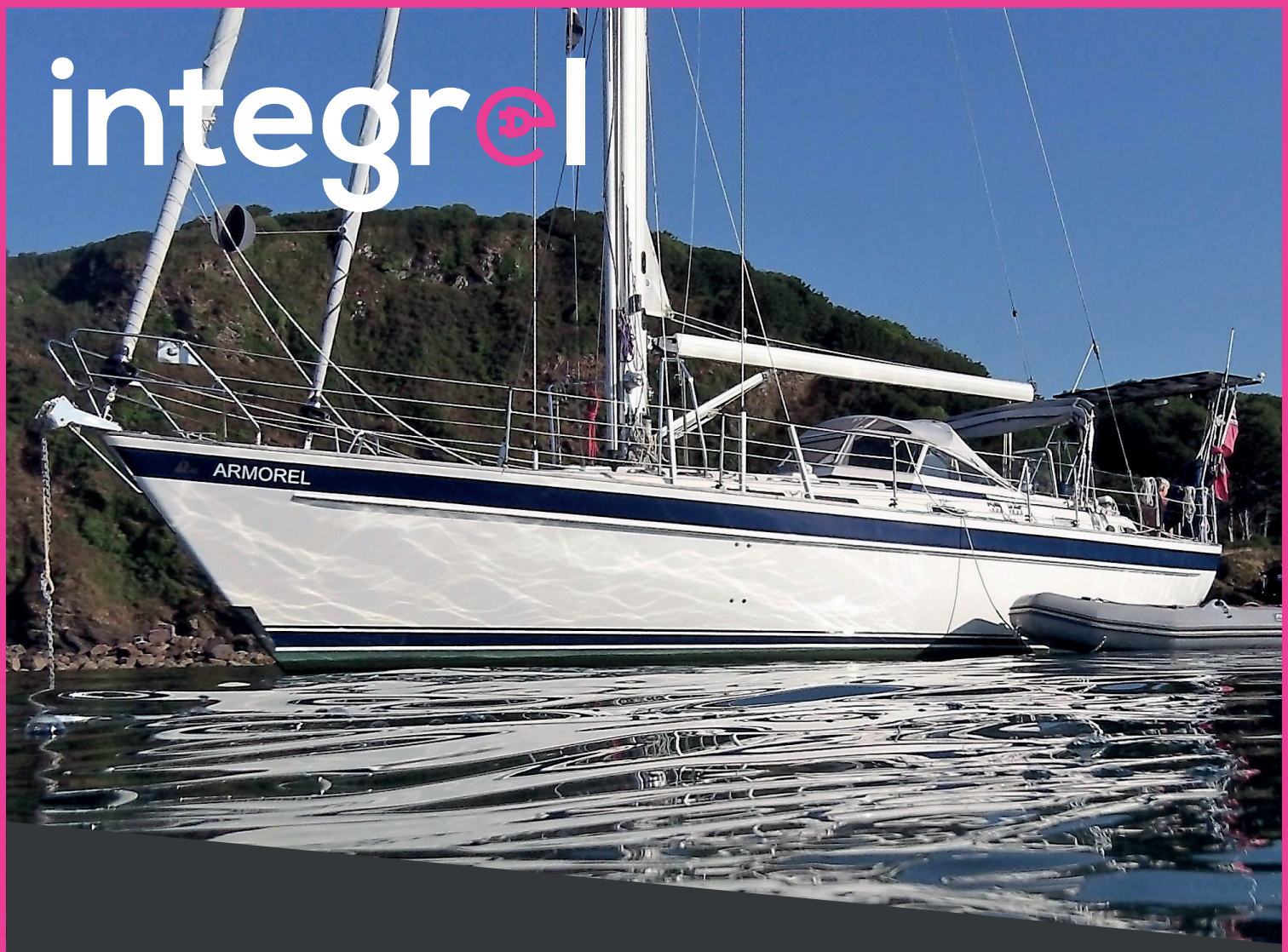
integrel



ADVANCED GENERATOR REPLACEMENT TECHNOLOGY

Completely replace your stand alone generator by using 'spare' capacity from your existing inboard engine

Generates up to 9kw of electrical power without compromising your engine's performance

Fuel savings of up to 25% by producing propulsion and power generation at optimum efficiency

Fully automatic - it just works!

WHAT IS IT?

Integrel is the future of power generation afloat, completely replacing your stand alone generator by using "spare" capacity from your existing inboard engine.

Integrel uses smart new technology to generate up to 9kW of electrical power without compromising your engine's performance. In fact, the system actively manages its output so that the engine is always running at its most fuel efficient.

By using your engine for both propulsion and power generation, both tasks are delivered at optimum efficiency, resulting in fuel savings of up to 25%. One engine, two jobs, less fuel.

Integrel is completely automatic, working in the background with no direct input from you. It requires no maintenance other than a periodic belt change, offering substantial savings on fuel and maintenance costs across its lifetime.

HOW DOES IT WORK?

Your existing inboard engine has a significant amount of spare capacity most of the time. ***Integrel*** uses this spare capacity to generate electrical energy either for immediate consumption or to charge the battery banks. As that spare capacity increases and decreases with engine revs, ***Integrel*** adjusts its power generation accordingly.

Effectively, the ***Integrel*** generator is like an alternator on steroids. Permanent magnets embedded in the rotor improve the internal magnetic coupling, delivering exceptionally high power and efficiency.

But such high power needs to be handled carefully. Our system controller is programmed with information about the propeller and engine, plus the main elements of the boat's electrical system. This allows the controller to calculate in real time exactly how much additional load can be added to bring the engine to its most efficient point at any given engine speed.

Propulsion is always prioritised and the electrical power is ramped up slowly to avoid any shock loading on the engine.

WHAT DO I NEED TO DO?

Integrel is fully automatic and almost no user intervention is required. Simply start the main engine and it will start generating power.

All of the information regarding your boat's energy system is available on the dedicated user interface, including the amount of diesel fuel that you have in your tank.

When the engine is not running, all of the boat's electrical systems automatically continue to be supported by the energy stored in the batteries; the more batteries, the greater the boat's electrical autonomy.

When the batteries need recharging, a reminder appears on the screen indicating the battery level and advising that the engine should be started. Because the generator is so powerful, the engine only needs to be run at idle, or a little above, to recharge the batteries very rapidly.

WHAT'S IN THE BOX?

The standard *Integrel* system consists of:

- 9kW engine mounted ***Integrel*** generator
- Engine mounting kit
- ***Integrel*** system controller
- 48v battery sensor
- ***Integrel*** 600W 48v to 12/24/36v battery to battery charger
- 5" touch screen user interface
- 48v 10kWh advanced lead acid battery bank
- Wiring loom and fuses
- 3kW 48v inverter/charger

Additional options and upgrades:

- Additional battery storage can be added in 10kWh increments. Lithium ion batteries are available as an option
- Inverter/charger is also available in 5kW, 8kW, 10kW and 15kW
- ***Integrel*** battery to battery charger is upgradable in 600W increments to 2400W
- Simrad multi-function display
- Further battery sensors can be added to monitor the house and engine start batteries

TECHNICAL SPECIFICATION

Integrel power generator

Type	High power density, asynchronous
Nominal output voltage	48v
Maximum output current	170A (software governed)
Max electrical power at 800rpm (engine revs)	3.5kW
Max electrical power at 1400 rpm (engine revs)	9.0kW (software governed)

Battery sensor

Sensor type	Stabilised Hall effect sensor with 18 bit ADC
Voltage range	1mV to 100V +/-1mV
Current range	1mA to 300A +/- 1mA
Temperature	-77C to 190C +/- 0.5C
Data communications type	CAN
Onboard processor	PIC with 8k of static RAM and 16-bit ADC

Controller

Current sensor type	Stabilised Hall effect sensor with 18-bit ADC
Voltage, current and temperature specifications	As for battery sensor
Processors	Dual processors for real time data processing and system oversight
Main control loop	10mS response time
Rectifier	High efficiency bridge rectifier with <1V drop across the diodes
Rectifier voltage and current range	Up to 1,600V and 250A with full open circuit tolerance
Onboard memory	96MB for data logging; 8K FRAM
External switching	Single analogue switch
Stabilised DC DC converter	12v to 57.6v at 4A using planar transformers; 94% efficient
RPM measurement	0 to 15,000 rpm +/- 1RPM
External temperature sensing	Sensing for alternator stator, diode pack and electronics
Data communications	J1939/NMEA200 and proprietary CAN Bluetooth and USB connectivity
Isolation	Fully isolated
Fuel monitoring	(Available on engines with an ECU)
Status indicator	Traffic light LEDs
Battery types supported	Lead acid or lithium ion
Battery capacity supported	From 10kWh to 40kWh in 10kWh increments

Battery to battery charger

Voltage ranges	48v to 12v/24v/36v up to 2.4kW in 600W increments
Power output	Modular
Efficiency	Up to 96%
Data communications	CAN and Bluetooth addressable and controllable

Low voltage disconnect

Voltage	As per battery sensor
Stand by power	100 micro amps
Temperature sensor	
Autonomous operation	

User interface

Screen 5" touch screen with optional smart phone/tablet interface

integrel
A Triskel Marine Product

Unit 1, Marine Renewable Energy Park, North Quay, Hayle, TR27 4DD

+44(0) 1736 755466

enquiries@triskelmarine.co.uk | www.triskelmarine.co.uk