

Sea going hybrid engine range price list , Jan 2022, UK£, ex VAT

10 kW hybrid Systems, based on a PRM 150 Gearbox								
Option	HB20	HB 25	HB 30	HB 35	HB 38	HB 43	HB 50	HB60
Hybrid Engine (1,2)	17,962	18,537	19,084	19,856	20,080	20,663	20,957	23,053
<i>Weight, (including control box)</i>	<i>178kg</i>	<i>187kg</i>	<i>213kg</i>	<i>237kg</i>	<i>237kg</i>	<i>287kg</i>	<i>329kg</i>	<i>345kg</i>
Optional shaft clutch (3)	2,400	2,400	2,400	2,400	2,400	2,400	2,400	2,400
Boost alternators, 3kW (4)	N/A	N/A	N/A	N/A	N/A	2,800	2,800	2,800
"Smart Morse" (5)	400	400	400	400	400	400	400	400

20 kW hybrid Systems, based on a PRM 500 Gearbox								
Option	HB70T	HB 75	HB 85T	HB 90T	HB 105T	HB 115T	HB 150	HB230
Hybrid Engine (1,2)	36,421	34,186	38,336	36,062	38,885	POA	53,248	61,267
<i>Weight, (including control box)</i>	<i>448kg</i>	<i>575kg</i>	<i>520kg</i>	<i>558kg</i>	<i>558kg</i>	<i>558kg</i>	<i>866kg</i>	<i>516kg</i>
Boost alternators 5kW (4)	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000
Optional shaft clutch (3)	2,800	2,800	2,800	2,800	2,800	2,800	2,800	2,800
"Smart Morse" (5)	400	400	400	400	400	400	400	400

Notes

1) Beta Marine heat exchanger cooled propulsion engine, Recreational Craft Directive emission compliant up to and including HB105T. Engines HB115T and above only for use by and on sale strictly to Non-recreational craft up to 24min length). With heat exchanger and header tank, water cooled exhaust manifold, fresh and sea water pumps, cast injection bend, mechanical fuel lift pump, fuel and oil filters, sump pump*, flywheel with heavy inertia ring for super smooth running at low rpm, flywheel housing, special quiet air intake filter, 12 volt starter, 65 amp 12v engine start battery charging alternator (40A on HB 20 & HB 25 with 'polyvee belt and pulleys), shutdown solenoid energised to stop, control panel "A" ("ABV" for 43BHP and above). Gearbox PRM 150 (HB20 to HB60), PRM 500 (HB70T and above). A 3M interconnection cable with multi pin plug and sockets to engage harness. Heavy duty engine feet with flexible mountings, flexible coupling disk on gearbox (20Hp to 38hp engines). Morse type end fittings for speed and gear control, engine test certificate, operators manual, red paint and three years warranty.

2) The integrated Hybrid components provide : Electric motor/generator, mechanical mounting to engine, drive belt, pulley and guard, 10kW (20kw) of electric drive power, a 5kW (10kW) generator when the engine is running, regeneration from the freewheeling propeller when under sail (depending on propeller size / type and boat speed, please consult factory), control electronics and a simple user friendly Colour LCD display, three button speed control, with two years return to base warranty.

3) Mechanical shaft clutch to disengage the propeller allowing the Hybrid's 5KW generator to run when the vessel is stationary i.e. typically at anchor, on a mooring or alongside without shorepower. Includes all mounting brackets. Weight = 12kg

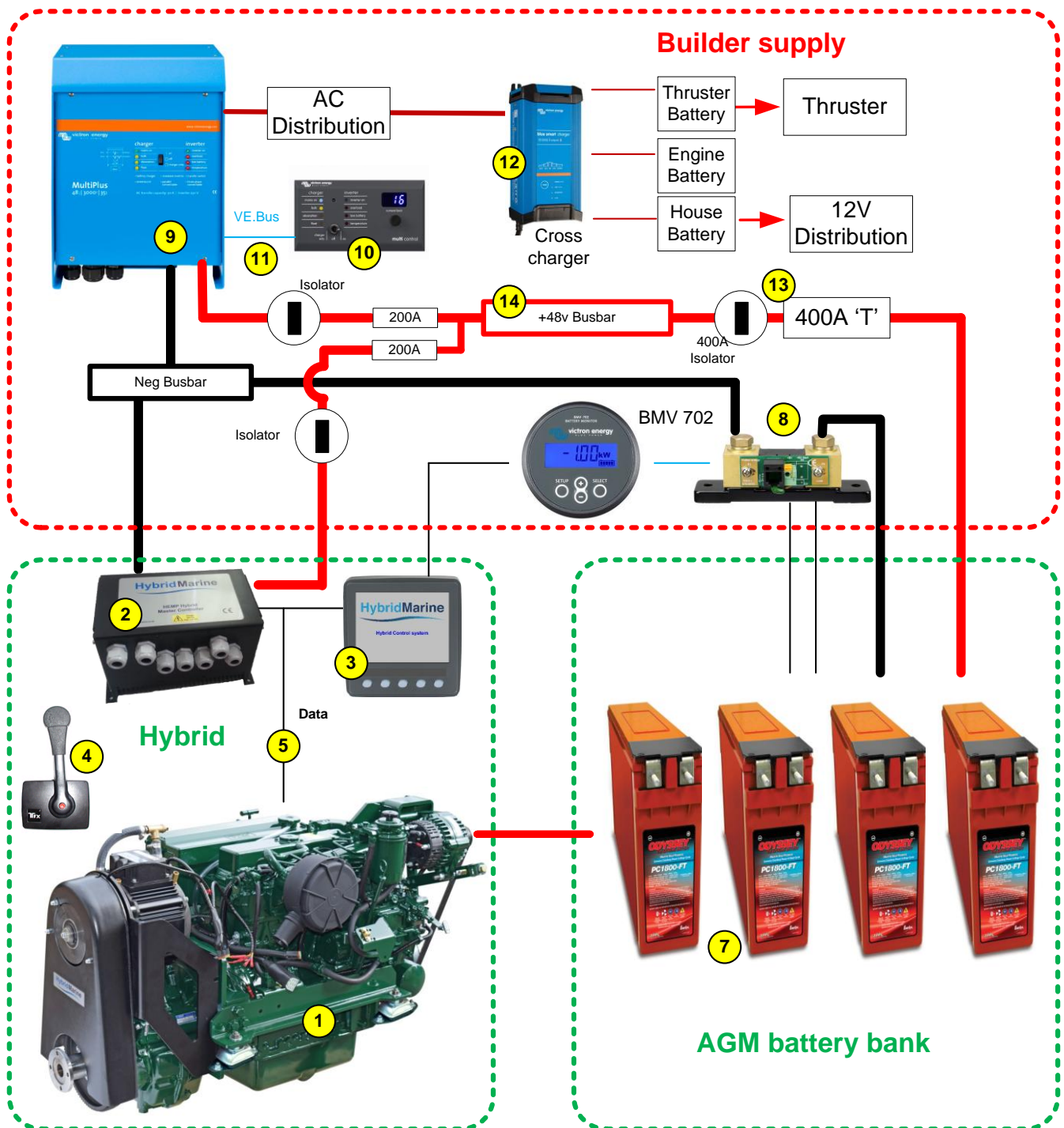
4) The boost alternators provide an additional 3kW (5kW) generation capability at 48V. Alternators work in parallel to the hybrid generator to boost charging when underway. The alternators will also provide 3kW (5kW) charging with gearbox in neutral (at 1,200RPM). Not suitable for charging Lithium batteries , contact factory for Lithium options.

5) "Smart" Morse control lever provides speed / direction control for both engine and electric drive modes.

Excludes

- Batteries
- High current distribution components (cables, fuses, isolations switches, busbars etc)
- Ancillary components (charger, Inverter Dc-Dc converters etc).
- Installation or commissioning

Hybrid, AGM battery, reference design

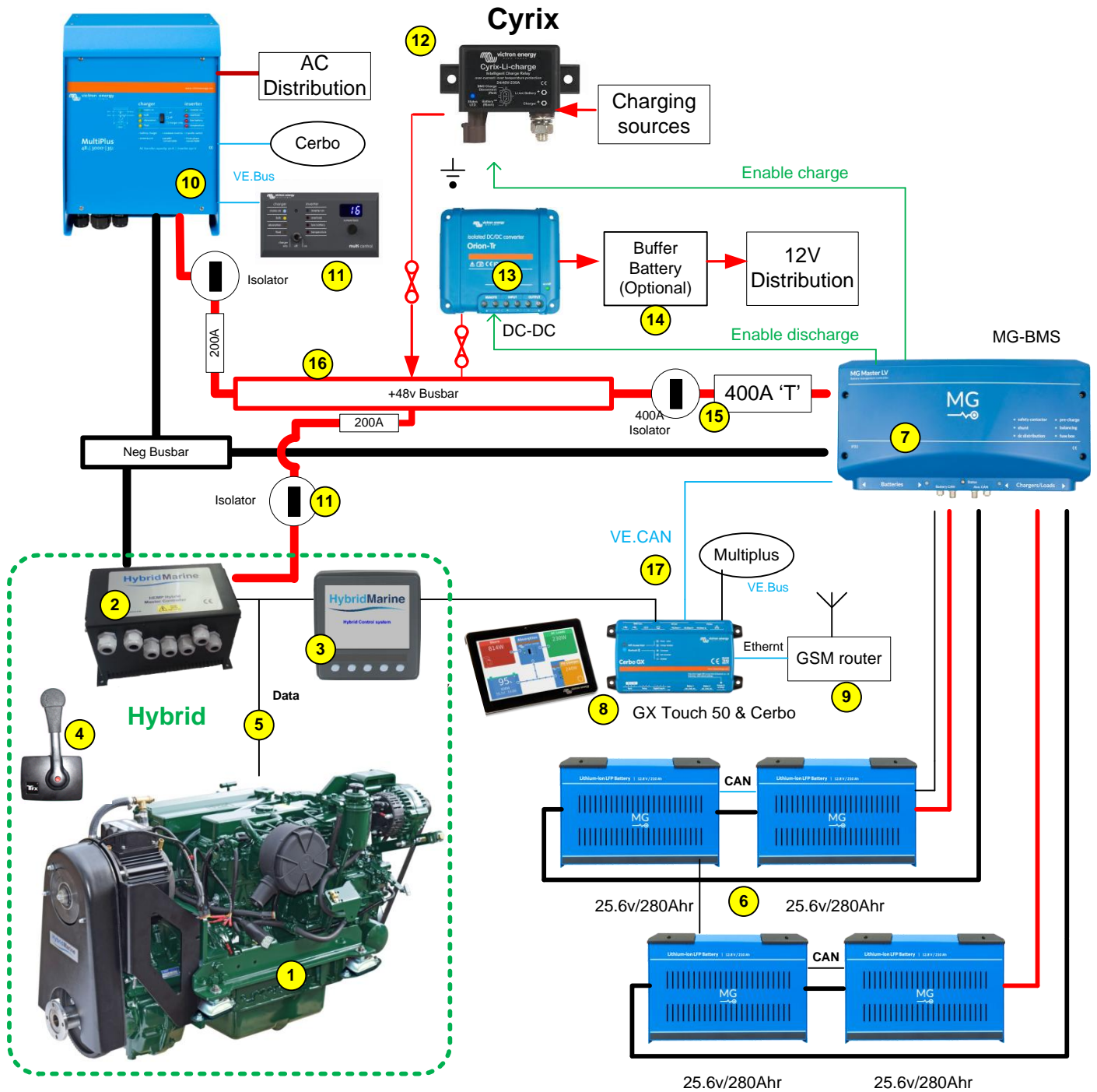


Hybrid	
Item #	Description
1	Hybrid engine
2	Hybrid Control box
3	Hybrid Display
4	Smart Morse control
5	Interconnecting data cables for hybrid system

Batteries , AGM (Lead/Acid)	
Item #	Description
7	AGM battery bank. Minimum size is four Odyssey PC1800, 12V batteries in a series chain. This provides 160Ah @ 48V. Usable energy is 6kWh when cycled from 100% down to 20% of capacity. Further series chains can be added to increase capacity.

Boat yard supply			
Item #	Description	Supplier	Order code
8	Battery monitor, BMV 702	Victron	BAM010702000
9	Multiplus 48V/5000/70 (other size units available)	Victron	PMP485021010
10	Digital Multi control panel GX	Victron	DMC000200010R
11	VE.Bus cable: Multiplus to Digital Multi control (length to suit)	Victron	
12	Cross charger, 12V, three outputs Blue Smart IP22 12/15/(3)	Victron	BPC121544002
13	Primary protection, 400A "T" fuse :	Aquafax	8-25121
	"T" Fuse holder	Aquafax	8-25502
14	DC distribution components, cables, fuses, isolators, bus bars etc. All components should be rated for 48V operation		

MG Lithium reference design



Hybrid Marine supplied	
Item #	Description
1	Hybrid engine
2	Hybrid Control box
3	Hybrid Display
4	Smart Morse control
5	Interconnecting data cables for hybrid system

Boat yard supply			
Item #	Description	Supplier	Order code
6	Lithium bank, multiples of two, MG 25.6V/280Ah/7.2kWA	MG energy	MGLFP240280
7	Battery Management Unit (BMU) MG Master LV 24-48V/600A.	MG energy	MGMLV480600
	Internal MEGA fuses required, rated at 48V, 250A	MG energy	MGFUSE0580250
8	Cerbo GX	Victron	BPP900450100
	GX Touch 50	Victron	BPP900455050
10	Multiplus 48V/5000/70 (other size units available)	Victron	PMP485021010
11	Digital Multi control panel GX	Victron	DMC000200010R
12	Cyrix-Li-Charge 24/48 (120A or 230A)	Victron	
13	48V to 12V, DC-DC converter, 360W	Victron	ORI481240110
14	Optional 12V buffer battery (for high current loads)		
15	Primary protection, 400A "T" fuse :	Aquafax	8-25121
	"T" Fuse holder	Aquafax	8-25502
16	DC distribution components, cables, fuses, isolators, bus bars etc. All components should be rated for 48V operation		
17	All interconnecting data cables for Victron and MG modules	Victron/MG	

Battery capacity

A minimum of two 25.6V MG batteries are required, connected in series (a string), to provide a 51.2V bank. This provides a capacity of 280Ah or 14kWh. The recommend discharge current id a single string is < 140A (7kW). Short periods of higher current is allowed, this will be required for operation of a single motor hybrid at its maximum output of 10kW. For a single motor hybrid the typical cruising load is around 3 to 5kW (60 to 100A) so within the continuous discharge capability of a single string (two MG batteries in series).

When designing the electrical system both propulsion and house loads should be taken into consideration. If a higher continuous current load than 140A (7kW) is required then the bank can be increased to four cells (two strings). See MG Energy Systems data sheet for more details and to make an appropriate selection.

Typically only 80% of the battery capacity is used. So for two batteries (one string) this provides a usable energy storage of 11kWh. When cruising at 3 to 5kW (60 to 100A) this gives a duration of 3.5h to 2h

Note : The reference design shows possible options for electrical components, that can support a Hybrid system, when using lithium batteries. This is not a detailed design, only a top level block diagram. Hybrid Marine takes no liability for errors or omissions in indicated options.

Design of the electrical system is the responsibility of the builder. Any Lithium battery installation requires careful attention to safety and compliance to all relevant standards. Installation, configuration and commissioning of the electrical system is the responsibility of the builder. Hybrid Marine can commission the hybrid after installation and the electrical system is fully operational.

System specification, single motor (10kW)

Ref	Parameter	Min	Typical	Max
Vbat	Main Battery supply voltage	40V	48V	58V
V12v	Auxiliary 12V supply voltage	10V	12V	15V
Ibat-peak	Peak battery current			220A
Ibat-cont	Continuous Battery current			180A
I12v	Auxiliary 12V supply current			5A
VMot	Motor Voltage range (inverter controlled)	0V		Vbat
SMot-d	Motor speed range, (inverter controlled)	0 RPM		2,600 RPM
SMot-g	Motor speed range, generator mode	0 RPM		4,000 RPM
PMot-peak	Peak Motor power rating (Vbat =48V)		10kW	
PMot-cont	Continuous Motor rating (Vbat =48V)		8.5kW	
PGen-max	Generator Max output power (vbat=58V)			6kW
RGen-nom	Generator speed for Max output power		1,900RPM	
REng-min	Min engine speed for starting generation		900RPM	
REng-nom	Engine speed for 5kW output,	Set by pulley ratio in application		

System specification, dual motor (20kW)

Ref	Parameter	Min	Typical	Max
Vbat	Main Battery supply voltage	40V	48V	58V
V12v	Auxiliary 12V supply voltage	10V	12V	15V
Ibat-peak	Peak battery current			440A
Ibat-cont	Continuous Battery current			368A
I12v	Auxiliary 12V supply current			10A
VMot	Motor Voltage range (inverter controlled)	0V		Vbat
SMot-d	Motor speed range, (inverter controlled)	0 RPM		2,600 RPM
SMot-g	Motor speed range, generator mode	0 RPM		4,000 RPM
PMot-peak	Peak Motor power rating (Vbat =48V)		20kW	
PMot-cont	Continuous Motor rating (Vbat =48V)		17kW	
PGen-max	Generator Max output power (vbat=58V)			12kW
RGen-nom	Generator speed for Max output power		1,900RPM	
REng-min	Min engine speed for starting generation		900RPM	
REng-nom	Engine speed for 10kW output,	Set by pulley ratio in application		

Typical regeneration performance (propeller freewheeling when vessel is under sail)

