POWERBOOK

THE POWER
TO BE INDEPENDENT

MASTERVOLT

Core segments

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MASTERVOLT
THE POWER TO BE INDEPENDENT

Courtesy of Concorde Reisemobile GmbH.

The power to be independent

At Mastervolt, a fast amount of engineers with a passion for innovation, vast expertise, global focus and the desire to develop the very best, work diligently to push the envelope of what is possible in electrical system and component technology. Each product is intelligently designed for longevity and optimal performance in harsh environments, having endured grueling testing to exceed global industry standards. With engineers situated in three centers of excellence in Auckland (NZ), Amsterdam (NL) and Wisconsin (US), there is a global focus to our product development process, which takes into account where, when and how our products may be utilized.

OUR MISSION

To develop and manufacture power systems for autonomous use and in remote locations throughout the world.

OUR VISION

As a leading worldwide premium brand we desire to be the very best in what we do.

Recognized for innovation from the DAME award to the IF Design Award to the NMMA Innovation Award and many more, the engineers at Mastervolt have proven time and time again that our technology and product designs provide the finest performance, simplify installation and operation, enhance the customer experience, and stand the test of time.

Mastervolt is one of several powerful electrical companies under singular ownership. Our Marinco ship to shore power connections, accessories and power management products, plus Ancor wires and cables, enhance Mastervolt's ability to be your one-stop solution for all of your electrical needs whether powering a boat, recreational or commercial vehicle, (solar) off grid or industrial application.

The global Mastervolt family is passionate and committed to providing not only the very best products and delivery, but also to supporting our customers through superior technical support and customer service. Our customers know that we care and that a qualified, knowledgeable person will answer their call, providing timely solutions and responses regardless of where across the globe they are located. Great products and great service are a hallmark of Mastervolt.

Ultimately, our value is our ability to innovate, provide the highest quality products, technologies and systems, and superior service across the globe. It is the passion of our people and their commitment that makes the difference.

We are Mastervolt.
The Power to be Independent.

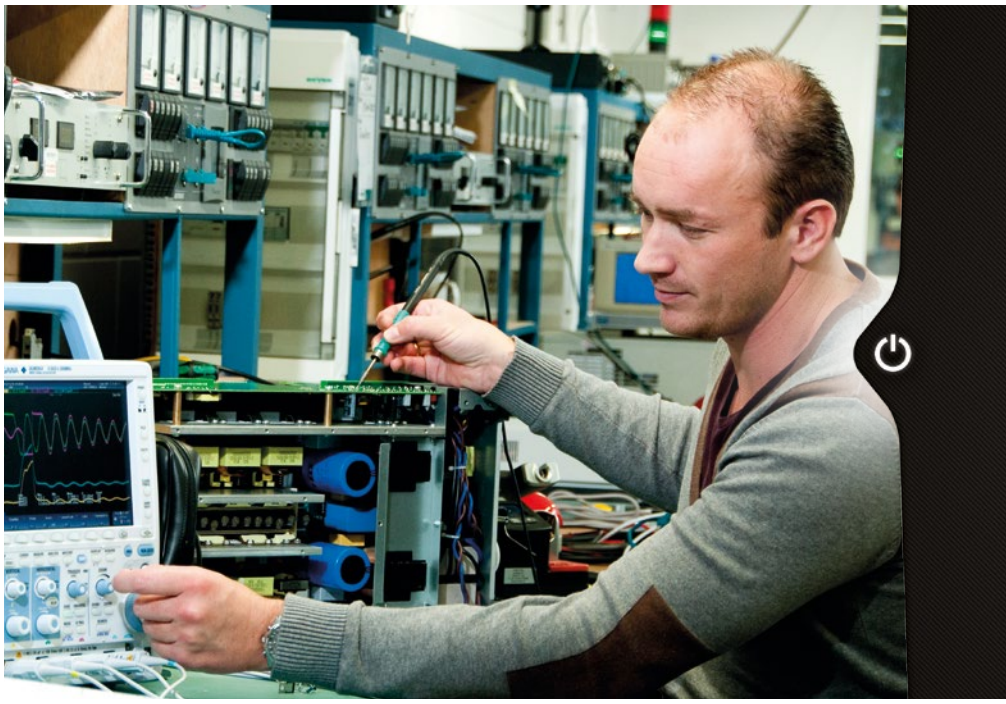
We invite you to browse this PowerBook to be inspired, and as a catalyst for what is possible in the realm of high performance electrical systems and technologies.

Why Mastervolt?

The Mastervolt philosophy is based on four pillars:

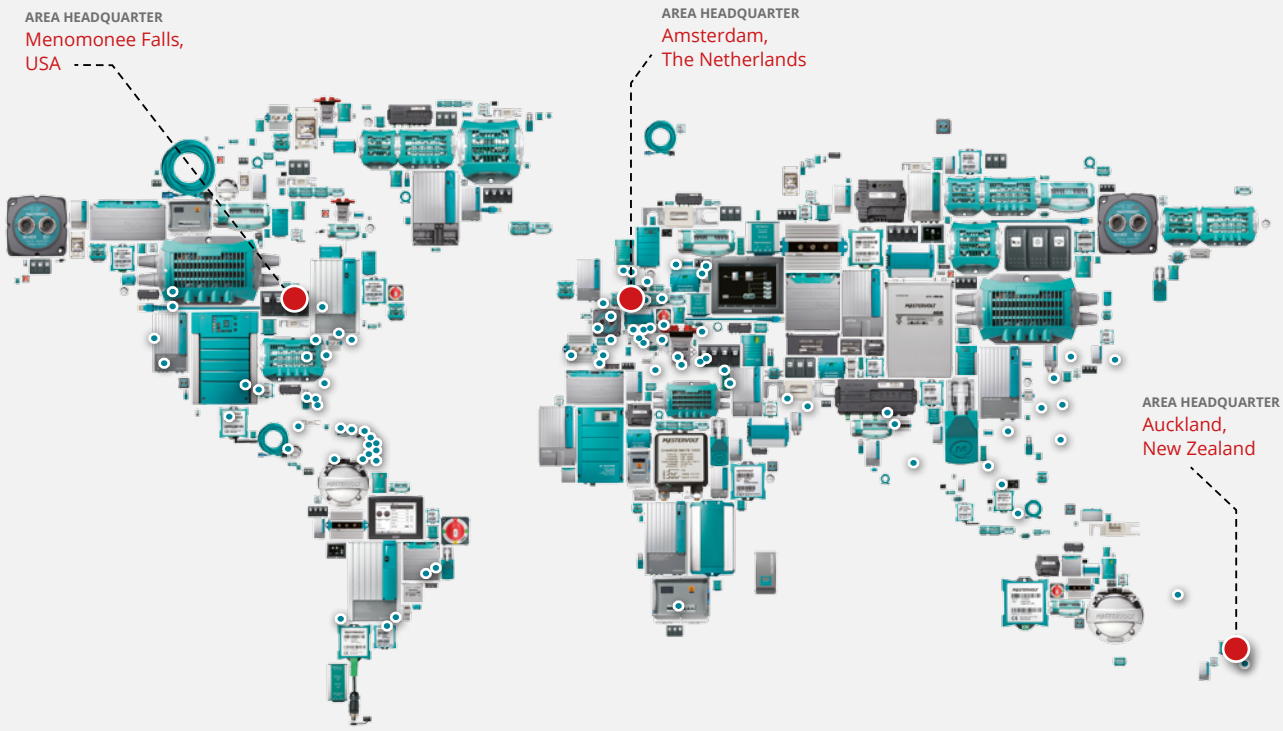
1 Innovation & product development

From power storage and conversion to digital network systems, throughout its history Mastervolt continues to be at the forefront of technology. Pioneering research is in our DNA, Mastervolt's highly skilled engineers are responsible for translating tomorrow's technology into the ultimate performance today. With comprehensive engineering processes, Mastervolt's engineers source the best components and test those components as well as all new product designs to destruction, ensuring complete satisfaction by the time the finished products, technologies and systems are installed in active customer applications. In essence, you will get the best product at the highest quality.



2 System solutions

Whatever the industry or application, Mastervolt is power solution focused, offering power components designed to easily integrate into comprehensive systems. Rather than sorting through a mix of products from different sources, Mastervolt and its sister companies, Marinco and Ancor, provide consistent quality, performance, warranty and support. From DC battery power connected by quality wire to power conversion products designed for efficiency to complete digital switching technologies that offer control and monitoring at the touch of a finger, our companies can provide the flexibility and customizable systems you desire for your applications. And, you will have access to knowledgeable technical support throughout your project, from purchase to installation. Better still, the system will feature bulletproof construction, intuitive operation, and meet global industry standards, offering you peace of mind.



3 Worldwide network

Mastervolt proudly supports its customers with ongoing service. Top class expertise and support is available throughout the world's three geographical regions; the Americas, EMEA and APAC. With offices and partners in more than 80 countries, our customers know that wherever in the world they may be, we can deliver precise and fully tailored information without delay and track the progress of any inquiry, whether simple or complex. In addition, Mastervolt continually provides educational training for all of our service providers to ensure an exceptional customer experience.

SEE **WWW.MASTERVOLT.COM/DEALER-LOCATOR** FOR A COMPLETE OVERVIEW OF OUR DEALERS AND SERVICE PARTNERS.

4 Powerful marketing

Courtesy of Ian Roman/Volvo Ocean Race.

Strong, global marketing has been an integral element of Mastervolt throughout its history; it determines which markets to develop and how to position the company and its products. It is how we communicate our strategy and vision to the marketplace. It is also how we visually express the mission and values of our brand. Everything about Mastervolt, from its informative brochures, partnerships and stylish product enclosures to its high profile exposure in all media platforms reassures customers they are investing in premium technology, cutting-edge systems, and superior support.

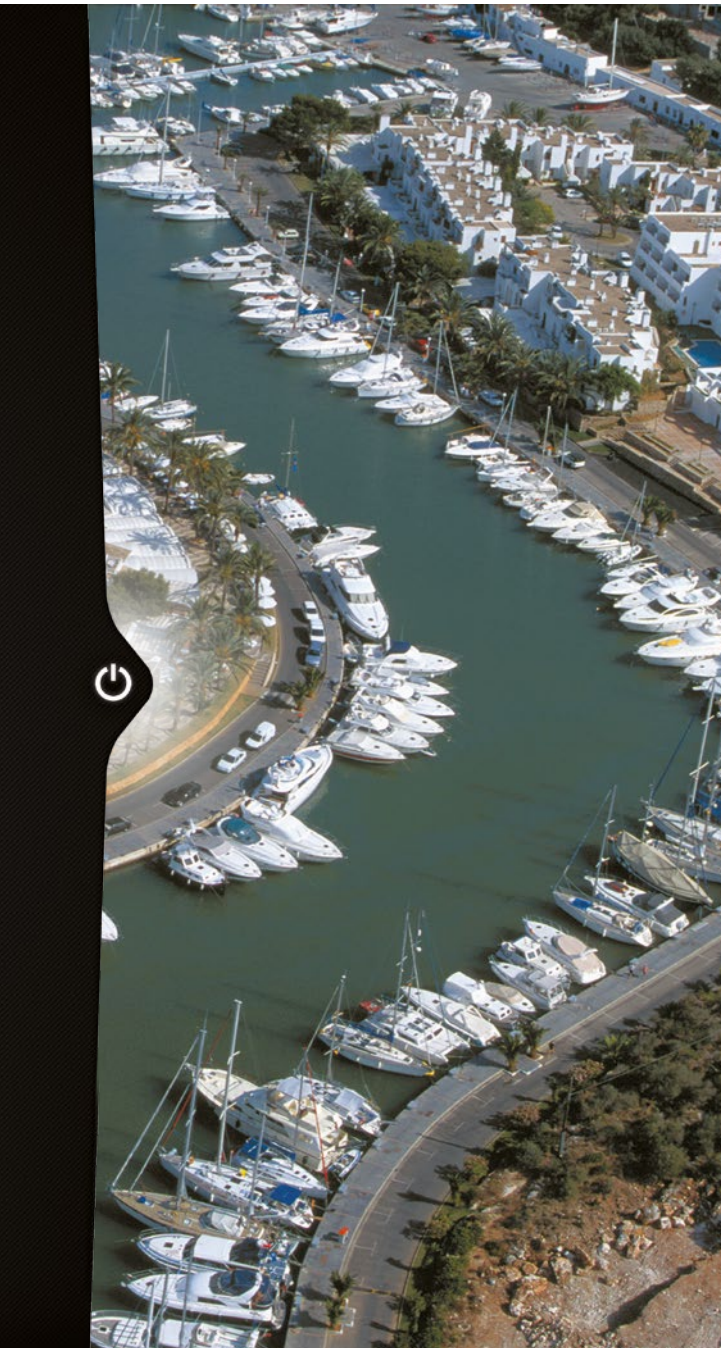
VOLVO OCEAN RACE
ROUND THE WORLD
RACE SUPPLIER

Our marketing team is continually building this A-brand image, ensuring it reaches and is well received by a truly global audience.

Mastervolt battery chargers: A long life for your battery

You want to charge your batteries safely, reliably and quickly, even if the grid power is of low quality. You also value batteries that have a long lifespan while maintaining their capacity. Mastervolt offers you the best possible solution.

The Mastervolt 3-step+ charging method ensures more power and a longer life for your batteries. Our battery chargers integrate multiple functions, charging your battery safely and completely even when they are depleted. Fast battery charging is guaranteed by the efficient use of the available grid or generator power (all Mastervolt battery chargers have a power factor correction).



Which Mastervolt battery charger best meets your needs?

Mastervolt offers two ranges of battery chargers:

- **Mass**
  For the tougher tasks in professional and semi-professional situations. With its integrated alarm functions and various certificates, the Mass is the best choice for professionals.

- **ChargeMaster**
  The ChargeMaster is suitable for recreational and semi-professional use. Easy to install, it includes a detailed display and easy three-button controls. The ChargeMaster safely charges multiple battery banks at the same time.

Choosing your battery charger

Determine:

- How many battery banks do I want to charge?
- The battery charger must have the same voltage as the battery bank.
- Rule of thumb is that 25% of the battery capacity as a charge capacity is sufficient to safely and quickly charge batteries while still supplying power to the consumers (for instance, a battery charger of 50 Amps is sufficient for a 200 Ah battery). Increase up to 50% for Mastervolt gel batteries and 100% for Mastervolt Lithium Ion batteries for faster charging.

The best battery charger for every application

The ChargeMaster can charge multiple battery banks at once, providing the ease and comfort of combined functionalities. The Mass battery charger has one main outlet to optimally charge a battery bank and guarantee a long lifespan for your batteries, even with daily and intensive use. The second outlet is used for the maintenance charge of your starter or auxiliary battery.

Robust connections

Solid metal-to-metal connections prevent corrosion and/or overheating.

Charging Lithium Ion batteries

Although Lithium Ion batteries are increasingly popular, there can be a lack of clarity when it comes to the charging process. This is not a problem with Mastervolt as the Mastervolt battery chargers communicate directly with the Li-ion battery via MasterBus.

Make the most of the available power

The Current Control function allows you to reduce the battery charger power to prevent blowing the fuse, even when the voltage drops.

MasterBus compatible

All Mastervolt battery chargers can be easily connected to a MasterBus network with only one cable and one connection. What's more, you have the option for central, local or remote monitoring, configuration and control of your system.

Specifications Mass battery chargers




	Mass 24/15-2	Mass 24/25-2	Mass 24/25-2 DNV	Mass 24/50-2
Product code	*40020156*	*40020256*	*40720266*	*40020506*
GENERAL SPECS				
Nominal output voltage	24 V	24 V	24 V	24 V
Total charge current	15 A at 28.5 V	25 A at 28.5 V	25 A at 28.5 V	50 A at 28.5 V
Number of battery outlets	2	2	2	2
Charge current second output	3 A	3 A	3 A	3 A
Recommended battery capacity	30-150 Ah	50-250 Ah	50-250 Ah	100-500 Ah
Nominal input voltage	230 V (180-265 V) - 50/60 Hz	230 V (180-265 V) - 50/60 Hz	230 V (180-265 V) - 50/60 Hz	230 V (180-265 V) - 50/60 Hz
Supplies your system without battery	yes	yes	yes	yes
Display/read-out	LED display	LED display	LED display	LED display
Dimensions, hxwxd	325 x 220 x 111 mm 12.8 x 8.7 x 4.4 inch	325 x 220 x 111 mm 12.8 x 8.7 x 4.4 inch	365 x 220 x 11 mm 14.4 x 8.7 x 4.4 inch	340 x 261 x 130 mm 13.4 x 10.3 x 5.1 inch
Weight	3.3 kg / 7.3 lb	3.3 kg / 7.3 lb	3,5 kg / 7.7 lb	4.6 kg / 10.1 lb
Approvals	CE, ABYC A-31 / RRR, RS	CE, ABYC A-31 / RRR, RS	CE, ABYC A-31, DNV, RRR, RS	CE, ABYC A-31 / RRR, RS DNV pending
TECHNICAL SPECS				
Charge characteristic*	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion
Charge voltage Bulk (25 °C)**	28.5 V (8 hours)	28.5 V (8 hours)	28.5 V (8 hours)	28.5 V (8 hours)
Charge voltage Absorption (25 °C)**	28.5 V (4 hours)	28.5 V (4 hours)	28.5 V (4 hours)	28.5 V (4 hours)
Charge voltage Float - wet (25 °C)**	26.5 V	26.5 V	26.5 V	26.5 V
Charge voltage Float - gel/AGM (25 °C)**	27.6 V	27.6 V	27.6 V	27.6 V
Temperature compensation	-60 mV/°C	-60 mV/°C	-60 mV/°C	-60 mV/°C
Voltage compensation	voltage drop compensation in DC cables up to 3 Volt	voltage drop compensation in DC cables up to 3 Volt	voltage drop compensation in DC cables up to 3 Volt	voltage drop compensation in DC cables up to 3 Volt
DC consumption	< 1 mA	< 1 mA	< 1 mA	< 1 mA
Full load consumption (230 V AC)	550 W	880 W	880 W	1800 W
Cos phi	> 0.95	> 0.95	> 0.95	> 0.95
Temperature range (ambient temp.)	-25 °C to 80 °C; > 45 °C derating power	-25 °C to 80 °C; > 45 °C derating power	-25 °C to 80 °C; > 45 °C derating power	-25 °C to 80 °C; > 45 °C derating power
Cooling	vario fan	vario fan	vario fan	vario fan
Sound level	< 48 dBA at 1 mtr	< 48 dBA at 1 mtr	< 48 dBA at 1 mtr	< 48 dBA at 1 mtr
Protection degree	IP23	IP23	IP23	IP23
Protections	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery
MasterBus compatible	yes	yes	yes	yes
CSI/DC alarm (Charger Status Interface) *Alarm on all errors or on DC errors only*	integrated in the battery charger as standard	integrated in the battery charger as standard	integrated in the battery charger as standard	integrated in the battery charger as standard

OPTIONS

	MasterView Read-out *77010050*	option	option	option	option
		Remote panel for reading the charge status of your battery charger, including error notifications.			
	MasterView Easy *77010305*	option	option	option	option
		Touch screen panel for reading charge status, current fold-back and/or Power Sharing setting.			
	MasterShunt *77020100*	option	option	option	option
		MasterBus integrated battery monitor, with detailed information on the status of your batteries for an optimised charging process, incl. voltage, current, remaining time and consumption capacity in percentage.			
	DC Distribution *77020200*	option	option	option	option
		Smallest distribution model available. It connects up to four DC devices to the DC groups, such as a battery charger, inverter, alternators and solar panels. With the included plug & play cable it can be easily connected to the MasterBus network.			
	MasterBus USB Interface *77030100*	option	option	option	option
		Communication port between MasterBus and the USB port of your PC; enables reading and configuration of your MasterBus system on the PC when combined with MasterView System software (free to download).			

MasterVision panels					
	C3-RS *70403040*	option	option	option	option
		Remote monitor for battery chargers, with a regulator for reducing grid power consumption.			
	*GMDSS remote panel* *70400050*	option	option	option	option
		Remote monitoring for Mass battery chargers, with GMDSS system monitoring functions. Battery voltage and current are displayed on the digital panel.			

					
Mass 24/75	**Mass 24/100**	**Mass 24/100-3ph**	**Mass 48/25**	**Mass 48/50**	
40020756	*40021006*	*40031006*	*40040256*	*40040506*	
24 V	24 V	24 V	48 V	48 V	
75 A at 28.5 V	100 A at 28.5 V	100 A at 28.5 V	25 A at 57 V	50 A at 57 V	
1	1	1	1	1	
n.a.	n.a.	n.a.	n.a.	n.a.	
150-750 Ah	200-1000 Ah	200-1000 Ah	100-500 Ah	100-500 Ah	
230 V (180-265 V) - 50/60 Hz	230 V (180-265 V) - 50/60 Hz	3x400 V (360-485 V)	230 V (180-265 V) - 50/60 Hz	230 V (180-265 V) - 50/60 Hz	
yes	yes	yes	yes	yes	
LED display	LED display	LED display	LED display	LED display	
420 x 318 x 130 mm 16.5 x 12.5 x 5.1 inch	420 x 318 x 130 mm 16.5 x 12.5 x 5.1 inch	420 x 318 x 130 mm 16.5 x 12.5 x 5.1 inch	420 x 318 x 130 mm 16.5 x 12.5 x 5.1 inch	420 x 318 x 130 mm 16.5 x 12.5 x 5.1 inch	
7.7 kg / 17 lb	7.7 kg / 17 lb	7.7 kg / 17 lb	4.6 kg / 10.1 lb	7.7 kg / 17 lb	
CE, ABYC A-31, RRR, RS, Lloyds, DNV	CE, ABYC A-31, RRR, RS, Lloyds, DNV	CE, ABYC A-31 / RRR, RS	CE, ABYC A-31 / RRR, RS	CE, ABYC A-31 / RRR, RS	
IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	
28.5 V (8 hours)	28.5 V (8 hours)	28.5 V (8 hours)	57 V (8 hours)	57 V (8 hours)	
28.5 V (4 hours)	28.5 V (4 hours)	28.5 V (4 hours)	57 V (4 hours)	57 V (4 hours)	
26.5 V	26.5 V	26.5 V	53 V	53 V	
27.6 V	27.6 V	27.6 V	55.2 V	55.2 V	
-60 mV/°C	-60 mV/°C	-60 mV/°C	-120 mV/°C	-120 mV/°C	
voltage drop compensation in DC cables up to 3 Volt	voltage drop compensation in DC cables up to 3 Volt	voltage drop compensation in DC cables up to 3 Volt	voltage drop compensation in DC cables up to 3 Volt	voltage drop compensation in DC cables up to 3 Volt	
< 1 mA	< 1 mA	< 1 mA	< 1 mA	< 1 mA	
2600 W	3500 W	3500 W	1800 W	3500 W	
> 0.95	> 0.95	> 0.95	> 0.95	> 0.95	
-25 °C to 80 °C; > 45 °C derating power	-25 °C to 80 °C; > 45 °C derating power	-25 °C to 80 °C; > 45 °C derating power	-25 °C to 80 °C; > 45 °C derating power	-25 °C to 80 °C; > 45 °C derating power	
vario fan	vario fan	vario fan	vario fan	vario fan	
< 48 dBA at 1 mtr	< 48 dBA at 1 mtr	< 48 dBA at 1 mtr	< 48 dBA at 1 mtr	< 48 dBA at 1 mtr	
IP23	IP23	IP23	IP23	IP23	
over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	
yes	yes	yes	yes	yes	
integrated in the battery charger as standard	integrated in the battery charger as standard	integrated in the battery charger as standard	integrated in the battery charger as standard	integrated in the battery charger as standard	
option	option	option	option	option	
option	option	option	option	option	
option	option	option	option	option	
option	option	option	option	option	
option	option	option	option	option	
option	option	option	option	option	
option	option	option	option	option	

* The charge characteristic can be set to your requirements.

** The battery charge voltage can sometimes be specified at 20 °C, so take temperature compensation into account.

Specifications ChargeMaster battery chargers




	ChargeMaster 12/10	ChargeMaster 12/15-2	ChargeMaster 12/25-3	ChargeMaster 12/35-3
Product code	*43011000*	*43011500*	*44010250*	*44010350*
GENERAL SPECS				
Nominal output voltage	12 V	12 V	12 V	12 V
Total charge current	10 A at 14.25 V	15 A at 14.25 V	25 A at 13.25 V	35 A at 14.4 V
Number of battery outlets	1	2	3	3
Charge current second output	n.a.	15 A	25 A	35 A
Charge current third output	n.a.	n.a.	25 A	35 A
Recommended battery capacity	25-100 Ah	30-150 Ah	50-250 Ah	70-350 Ah
Nominal input voltage	230 V (180-265 V) - 50/60 Hz	230 V (180-265 V) - 50/60 Hz	120/230 V (90-265 V) - 50/60 Hz	120/230 V (90-265 V) - 50/60 Hz
AC connection	cable + plug	cable + plug	2 mtr AC cable	connector strips
Supplies your system without battery	no	no	yes	yes
Display/read-out	1 LED	1 LED	LED display	LED display
Dimensions, hxwxd	180 x 121 x 50 mm 7.1 x 4.8 x 2 inch	206 x 121 x 50 mm 8.1 x 4.8 x 2 inch	234 x 132 x 60 mm 9.2 x 5.2 x 2.4 inch	291 x 210 x 131 mm 11.5 x 8.3 x 5.2 inch
Weight	1 kg / 2.2 lb	1 kg / 2.2 lb	1.8 kg / 4 lb	4 kg / 9 lb
Fastening	4x screw	4x screw	4x screw	with supplied mounting bracket or 4x screw for wall mounting or 4x screw for floor installation
Approvals	CE, ABYC A-31	CE, ABYC A-31	CE, ABYC A-31, SAE J1171/ ISO 8846 ignition protected	CE, ABYC A-31, SAE J1171/ ISO 8846 ignition protected
TECHNICAL SPECS				
Charge characteristic*	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion
Charge voltage Bulk (25 °C)**	14.25 V (6 hours)	14.25 V (6 hours)	14.4 V (8 hours)	14.4 V (8 hours)
Charge voltage Absorption (25 °C)**	14.25 V (6 hours)	14.25 V (6 hours)	14.25 V (4 hours)	14.25 V (4 hours)
Charge voltage Float - wet (25 °C)**	13.25 V	13.25 V	13.25 V	13.25 V
Charge voltage Float - gel/AGM (25 °C)**	13.8 V	13.8 V	13.8 V	13.8 V
Temperature compensation	no	no	-30 mV/°C	-30 mV/°C
Voltage compensation	automatic	automatic	automatic	automatic
DC consumption	< 1 mA	< 1 mA	< 2 mA	< 5 mA
Full load consumption (230 V AC)	170 W	250 W	450 W	575 W
Current Control function	no	no	no	yes, via MasterBus
Cos phi	> 0.95	> 0.95	≥ 0.98	≥ 0.98
Temperature range (ambient temp.)	-25 °C to 60 °C, > 40 °C derating	-25 °C to 60 °C, > 40 °C derating	-25 °C to 60 °C, > 40 °C derating	-25 °C to 60 °C, > 40 °C derating
Cooling	natural cooling	vario fan	vario fan	vario fan
Sound level	< 30 dbA at 1 mtr	< 52 dBA at 1 mtr	< 52 dBA at 1 mtr	< 52 dBA at 1 mtr
Protection degree	IP65	IP21	IP23	IP23
Protections	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery
MasterBus compatible	no	no	yes	yes
CSI/DC alarm *Alarm on all errors or on DC errors only*	no	no	yes, using a Multipurpose Contact Output (product code 77030500)	yes, using a Multipurpose Contact Output (product code 77030500)

OPTIONS					
	MasterView Read-out *77010050*	n.a.	n.a.	option	option
	Remote panel for reading the charge status of your battery charger, including error notifications.				
	MasterView Easy *77010305*	n.a.	n.a.	option	option
	Touch screen panel for reading charge status, current fold-back and/or Power Sharing setting.				
	MasterShunt *77020100*	option	option	option	option
	MasterBus integrated battery monitor, with detailed information on the status of your batteries for a optimised charging process, incl. voltage, current, remaining time and consumption capacity in percentage.				
	DC Distribution *77020200*	n.a.	n.a.	option	option
	Smallest distribution model available. It connects up to four DC devices to the DC groups, such as a battery charger, inverter, alternators and solar panels. With the included plug & play cable it can be easily connected to the MasterBus network.				
	MasterBus USB Interface *77030100*	n.a.	n.a.	option	option
	Communication port between MasterBus and the USB port of your PC; makes possible reading and configuration of your MasterBus system on the PC when combined with MasterView System software (free to download).				
	Multipurpose Contact Output *77030500*	n.a.	n.a.	option	option
	MasterBus controllable potential-free contact, with alarm notification on the onboard system (low voltage or no AC), replacement of the CSI alarm contact.				

ChargeMaster 12/50-3	ChargeMaster 12/70-3	ChargeMaster 12/100-3
44010500	*44010700*	*44011000*
12 V	12 V	12 V
50 A at 14.4 V	70 A at 14.4 V	100 A at 14.4 V
3	3	3
50 A	10 A	10 A
50 A	10 A	10 A
100-500 Ah	140-700 Ah	200-1000 Ah
120/230 V (90-265 V) - 50/60 Hz	120/230 V (90-265 V) - 50/60 Hz	120/230 V (90-265 V) - 50/60 Hz
connector strips	connector strips	connector strips
yes	yes	yes
LED display	LCD display	LCD display
291 x 210 x 131 mm 11.5 x 8.3 x 5.2 inch	362 x 277 x 150 mm 14.3 x 11 x 5.9 inch	362 x 277 x 150 mm 14.3 x 11 x 5.9 inch
4 kg / 9 lb	7 kg / 16 lb	7 kg / 16 lb
with supplied mounting bracket or 4x screw for wall mounting or 4x screw for floor installation	with supplied mounting bracket or 4x screw for wall mounting or 4x screw for floor installation	with supplied mounting bracket or 4x screw for wall mounting or 4x screw for floor installation
CE, ABYC A-31, SAE J1171/ ISO 8846 ignition protected	CE, ABYC A-31, SAE J1171/ ISO 8846 ignition protected	CE, ABYC A-31, SAE J1171/ ISO 8846 ignition protected
IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion
14.4 V (8 hours)	14.4 V (8 hours)	14.4 V (8 hours)
14.25 V (4 hours)	14.25 V (4 hours)	14.25 V (4 hours)
13.25 V	13.25 V	13.25 V
13.8 V	13.8 V	13.8 V
-30 mV/°C	-30 mV/°C	-30 mV/°C
automatic	automatic	automatic
< 5 mA	< 5 mA	< 5 mA
825 W	1200 W	1700 W
yes, via MasterBus	yes, via MasterBus	yes, via MasterBus
≥ 0.98	≥ 0.98	≥ 0.98
-25 °C to 60 °C, > 40 °C derating	-25 °C to 60 °C, > 40 °C derating	-25 °C to 60 °C, > 40 °C derating
vario fan	vario fan	vario fan
< 52 dBA at 1 mtr	< 52 dBA at 1 mtr	< 52 dBA at 1 mtr
IP23	IP23	IP23
over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery
yes	yes	yes
yes, using a Multipurpose Contact Output (product code 77030500)	yes, using a Multipurpose Contact Output (product code 77030500)	yes, using a Multipurpose Contact Output (product code 77030500)
option	option	option
option	option	option
option	option	option
option	option	option
option	option	option
option	option	option

In addition to the Mastervolt battery chargers, we also supply the Marinco Charge Pro™ series.

We would like to refer to our global product catalog where we offer the most extended product portfolio globally under the Marinco brand.

www.marinco.com

MARINCO

The following models are also available in OEM version with a WAGO 770-113 connector and 25 cm cable:

- ChargeMaster 12/25-3
- ChargeMaster 12/35-3
- ChargeMaster 12/70-3
- ChargeMaster 12/100-3

* The charge characteristic can be set to your requirements.
** The battery charge voltage can sometimes be specified at 20 °C, so take temperature compensation into account.

Specifications ChargeMaster battery chargers

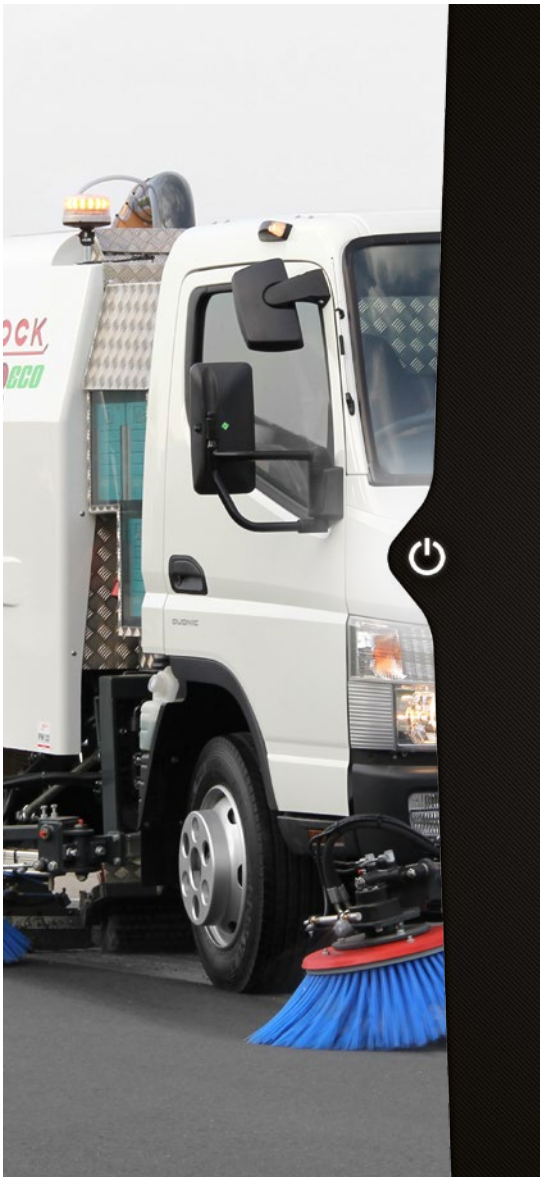



	ChargeMaster 24/6	ChargeMaster 24/12-3	ChargeMaster 24/20-3	ChargeMaster 24/30-3
Product code	*43020600*	*44020120*	*44020200*	*44020300*
GENERAL SPECS				
Nominal output voltage	24 V	24 V	24 V	24 V
Total charge current	6 A at 28.5 V	12 A at 26.5 V	20 A at 28.8 V	30 A at 28.8 V
Number of battery outlets	1	3	3	3
Charge current second output	n.a.	12 A	20 A	30 A
Charge current third output	n.a.	12 A	20 A	30 A
Recommended battery capacity	25-70 Ah	24-120 Ah	40-200 Ah	60-300 Ah
Nominal input voltage	230 V (180-265 V) – 50/60 Hz	120/230 V (90-265 V) – 50/60 Hz	120/230 V (90-265 V) – 50/60 Hz	120/230 V (90-265 V) – 50/60 Hz
AC connection	socket	2 mtr AC cable	connector strips	connector strips
Supplies your system without battery	no	yes	yes	yes
Display/read-out	1 LED	LED display	LED display	LED display
Dimensions, hxwxd	180 x 121 x 50 mm 7.1 x 4.8 x 2 inch	234 x 132 x 60 mm 9.2 x 5.2 x 2.4 inch	291 x 210 x 131 mm 11.5 x 8.3 x 5.2 inch	291 x 210 x 131 mm 11.5 x 8.3 x 5.2 inch
Weight	1 kg / 2.2 lb	1.8 kg / 4 lb	4 kg / 9 lb	4 kg / 9 lb
Fastening	4x screw	4x screw	with the supplied mounting bracket or 4x screw for wall mounting or 4x screw for floor installation	with the supplied mounting bracket or 4x screw for wall mounting or 4x screw for floor installation
Approvals	CE, ABYC A-31	CE, ABYC A-31, SAE J1171/ ISO 8846 ignition protected	CE, ABYC A-31, SAE J1171/ ISO 8846 ignition protected	CE, ABYC A-31, SAE J1171/ ISO 8846 ignition protected
TECHNICAL SPECS				
Charge characteristic*	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion
Charge voltage Bulk (25 °C)**	28.5 V (6 hours)	28.8 V (8 hours)	28.8 V (8 hours)	28.8 V (8 hours)
Charge voltage Absorption (25 °C)**	28.5 V (6 hours)	28.5 V (4 hours)	28.5 V (4 hours)	28.5 V (4 hours)
Charge voltage Float - wet (25 °C)**	26.5 V	26.5 V	26.5 V	26.5 V
Charge voltage Float - gel/AGM (25 °C)**	27.6 V	27.6 V	27.6 V	27.6 V
Temperature compensation	no	-60 mV/°C	-60 mV/°C	-60 mV/°C
Voltage compensation	automatic	automatic	automatic	automatic
DC consumption	< 1 mA	< 2 mA	< 2.5 mA	< 2.5 mA
Full load consumption (230 V AC)	210 W	435 W	660 W	925 W
Current Control functie	no	no	yes, via MasterBus	yes, via MasterBus
Cos phi	> 0.95	≥ 0.98	≥ 0.98	≥ 0.98
Temperature range (ambient temp.)	-25 °C to 60 °C, > 40 °C derating power	-25 °C to 60 °C, > 25 °C derating power	-25 °C to 60 °C, > 40 °C derating power	-25 °C to 60 °C, > 40 °C derating power
Cooling	natural cooling	vario fan	vario fan	vario fan
Sound level	< 30 dbA at 1 mtr	< 52 dBA at 1 mtr	< 52 dBA at 1 mtr	< 52 dBA at 1 mtr
Protection degree	IP65	IP23	IP23	IP23
Protections	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery
MasterBus compatible	no	yes	yes	yes
CSI/DC alarm *Alarm on all errors or on DC errors only*	yes, open collector output	yes, using a Multipurpose Contact Output (product code 77030500)	yes, using a Multipurpose Contact Output (product code 77030500)	yes, using a Multipurpose Contact Output (product code 77030500)

OPTIONS					
	MasterView Read-out *77010050*	n.a.	option	option	option
		Remote panel for reading the charge status of your battery charger, including error notifications.			
	MasterView Easy *77010305*	n.a.	option	option	option
		Touch screen panel for reading charge status, current fold-back and/or Power Sharing setting.			
	MasterShunt *77020100*	option	option	option	option
		MasterBus integrated battery monitor, with detailed information on the status of your batteries for a optimised charging process, incl. voltage, current, remaining time and consumption capacity in percentage.			
	DC Distribution *77020200*	n.a.	option	option	option
		Smallest distribution model available. It connects up to four DC devices to the DC groups, such as a battery charger, inverter, alternators and solar panels. With the included plug & play cable it can be easily connected to the MasterBus network.			
	MasterBus USB Interface *77030100*	n.a.	option	option	option
		Communication port between MasterBus and the USB port of your PC; makes possible reading and configuration of your MasterBus system on the PC when combined with MasterView System software (free to download).			
	Multipurpose Contact Output *77030500*	n.a.	option	option	option
		MasterBus controllable potential-free contact, with alarm notification on the onboard system (low voltage or no AC), replacement of the CSI alarm contact.			




ChargeMaster 24/40-3	ChargeMaster 24/60-3	ChargeMaster 24/80-3	ChargeMaster 24/100-3
44020400	*44020600*	*44020800*	*44021000*
24 V	24 V	24 V	24 V
40 A at 28.8 V	60 A at 28.8 V	80 A at 28.8 V	100 A at 28.8 V
3	3	3	3
10 A	10 A	10 A	10 A
10 A	10 A	10 A	10 A
80-400 Ah	120-600 Ah	160-800 Ah	200-1000 Ah
120/230 V (90-265 V) – 50/60 Hz	120/230 V (90-265 V) – 50/60 Hz	120/230 V (90-265 V) – 50/60 Hz	120/230 V (90-265 V) – 50/60 Hz
connector strips	connector strips	connector strips	connector strips
yes	yes	yes	yes
LCD display	LCD display	LCD display	LCD display
362 x 277 x 150 mm 14.3 x 11 x 5.9 inch	362 x 277 x 150 mm 14.3 x 11 x 5.9 inch	432 x 277 x 150 mm 17 x 11 x 5.9 inch	432 x 277 x 150 mm 17 x 11 x 5.9 inch
7 kg / 16 lb	7 kg / 16 lb	8 kg / 18 lb	8 kg / 18 lb
with the supplied mounting bracket or 4x screw for wall mounting or 4x screw for floor installation	with the supplied mounting bracket or 4x screw for wall mounting or 4x screw for floor installation	with the supplied mounting bracket or 4x screw for wall mounting or 4x screw for floor installation	with the supplied mounting bracket or 4x screw for wall mounting or 4x screw for floor installation
CE, ABYC A-31, SAE J1171/ ISO 8846 ignition protected	CE, ABYC A-31, SAE J1171/ ISO 8846 ignition protected	CE, ABYC A-31, SAE J1171/ ISO 8846 ignition protected	CE, ABYC A-31, SAE J1171/ ISO 8846 ignition protected
IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion	IUoUo, automatic / 3-step+ for gel/AGM/wet/Lithium Ion
28.8 V (8 hours)	28.8 V (8 hours)	28.8 V (8 hours)	28.8 V (8 hours)
28.5 V (4 hours)	28.5 V (4 hours)	28.5 V (4 hours)	28.5 V (4 hours)
26.5 V	26.5 V	26.5 V	26.5 V
27.6 V	27.6 V	27.6 V	27.6 V
-60 mV/°C	-60 mV/°C	-60 mV/°C	-60 mV/°C
automatic	automatic	automatic	automatic
< 5 mA	< 5 mA	< 5 mA	< 5 mA
1400 W	2000 W	2700 W	3375 W
yes, via MasterBus	yes, via MasterBus	yes, via MasterBus	yes, via MasterBus
≥ 0.98	≥ 0.98	≥ 0.98	≥ 0.98
-25 °C to 60 °C, > 40 °C derating power	-25 °C to 60 °C, > 40 °C derating power	-25 °C to 60 °C, > 40 °C derating power	-25 °C to 60 °C, > 40 °C derating power
vario fan	vario fan	vario fan	vario fan
< 52 dBA at 1 mtr	< 52 dBA at 1 mtr	< 52 dBA at 1 mtr	< 52 dBA at 1 mtr
IP23	IP23	IP23	IP23
over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery
yes	yes	yes	yes
yes, using a Multipurpose Contact Output (product code 77030500)	yes, using a Multipurpose Contact Output (product code 77030500)	yes, using a Multipurpose Contact Output (product code 77030500)	yes, using a Multipurpose Contact Output (product code 77030500)
option	option	option	option
option	option	option	option
option	option	option	option
option	option	option	option
option	option	option	option
option	option	option	option



The following models are also available in OEM version with a WAGO 770-113 connector and 25 cm cable:

- ChargeMaster 24/20-3
- ChargeMaster 24/30-3
- ChargeMaster 24/40-3
- ChargeMaster 24/60-3
- ChargeMaster 24/80-3
- ChargeMaster 24/100-3

* The charge characteristic can be set to your requirements.
** The battery charge voltage can sometimes be specified at 20 °C, so take temperature compensation into account.

Mastervolt sine wave inverters: Enjoy the comforts of home

Your AC installation offers you a wealth of benefits by making possible the use of any domestic appliance, from microwave oven to hairdryer, DVD player to power tools. A Mastervolt inverter allows you to easily convert the voltage of your 12 V or 24 V battery to 230V/50Hz or 120V/60Hz, so you enjoy all the comforts of home wherever you choose to go.

Complete range

Mastervolt offers a complete range of inverters from 300 Watt to 35 kWatt in AC Master, Mass Sine and Mass Sine Ultra models.

The ***AC Master*** is ideal for small and medium-sized applications, while ***Mass Sine*** and the new ***Mass Sine Ultra*** inverters are mainly intended for larger systems and for professional purposes.

Mastervolt offers inverters for 230V/50Hz as well as 120V/60Hz (American voltage).

Proven technology

Mastervolt's ***Mass Sine*** sine wave inverters have proven themselves in the most extreme conditions for over twenty years. Although the dimensions and connections of the various models have remained the same, the technology has evolved, resulting in a fast, efficient, one-on-one replacement with minimal downtime.

The Mastervolt ***AC Master*** inverters are small, lightweight and silent. Installation and operation are incredibly easy.

Completely independent

Grid power regularly fluctuates and can cause your lights to flicker. Sometimes it may even drop below 180 Volt, causing some devices to stop functioning. The Mastervolt sine wave inverter ensures a perfect 230 Volt, and makes power problems a thing of the past. The pure sine wave technology also helps protect your equipment against failures, humming or interference on monitors or TV's and ensure a longer lifespan.

QUOTE

"With Mastervolt we mount a reliable battery (management) system with variable components and very good documentation. Remote maintenance is possible through the Internet, and completes the whole system. We have been working for more than seven years with Mastervolt and projects are always solution-oriented and skillfully addressed. One can speak of truly outstanding technical support and in such a partnership, we can trust in."

ARMIN DIETZ, LEITER KUNDENSERVICE CONCORDE REISMOBILE, GERMANY

No humming with HF technology

Our use of high-frequency switch technology means you can say goodbye to humming transformers and hello to efficiency. Mastervolt inverters are also small and lightweight to ensure easy installation.

Efficient use of batteries

A high efficiency when inverting and an automatic economy mode when there is no consumption gives you longer use of your batteries.

High peak power during start up

The Mastervolt sine wave inverter can provide up to 200% surge capacity to equipment that requires extra power during start up.

New Mass Sine Ultra

Our new Mass Sine Ultra models extend the Mass Sine range. The latest V6 technology increases the efficiency and enables multiple units to work in parallel and 3-phase configuration.

Simple and safe to connect

The inverters feature robust connection technology, internal in the larger models and a plug & play socket with cable for the smaller models.

MasterBus compatible

Every Mass Sine inverter can be easily connected to a MasterBus network with only one cable and one connection. You can also choose central, local or remote monitoring, configuration and control of your system.

Specifications Mass Sine sine wave inverters




AVAILABLE Q1 2015


	Mass Sine 12/800	Mass Sine 12/1200	Mass Sine 12/2000	Mass Sine Ultra 12/3500
Product code 230 V	*24010800*	*24011200*	*24012000*	*26013500*
Product code 120 V			*25012000*	
(see page 28-29 for specifications)				
GENERAL SPECS				
Nominal battery voltage	12 V	12 V	12 V	12 V
Recommended battery capacity	>100 Ah	>150 Ah	>200 Ah	>600 Ah
Output voltage (± 5%)	230 V – 50 Hz (± 0 .01 Hz)	230 V – 50 Hz (± 0 .01 Hz)	230 V – 50 Hz (± 0 .01 Hz)	230 V – 50 Hz (± 0 .01 Hz)
P30 power at 40 °C, cos phi 1	800 W	1200 W	2000 W	3500 W
Continuous power at 40 °C, cos phi 1	650 W	1000 W	1800 W	3500 W
Peak load	1600 W	2400 W	4000 W	7000 W
Output waveform	true sine	true sine	true sine	true sine
AC connection	internal	internal	internal	internal
Efficiency	92%	92%	92%	93%
Display/read-out	LED display	LED display	LED display	LED display
Parallel configuration	no	no	no	yes, up to 10 units
3-Phase configuration	no	no	no	yes
Dimensions, hxwxd	325 x 220 x 111 mm 12.8 x 8.7 x 4.4 inch	340 x 261 x 130 mm 13.4 x 10.3 x 5.1 inch	420 x 318 x 136 mm 16.5 x 12.5 x 5.4 inch	472 x 318 x 175 mm 18.6 x 12.5 x 6.9 inch
Weight	3.9 kg / 8.6 lb	8 kg / 17.4 lb	14.6 kg / 32.2 lb	15 kg / 33.1 lb
Approvals	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31
TECHNICAL SPECS				
Technology	HF switch mode	HF switch mode	HF switch mode	V6 HF switch mode
Low battery voltage, switches off at	10 V, ± 0.5 V	10 V, ± 0.5 V	10 V, ± 0.5 V	10 V, dynamic window
Low battery voltage, switches on at	11 V, ± 0.5 V	11 V, ± 0.5 V	11 V, ± 0.5 V	11 V, ± 0.5 V
High battery voltage, switches off at	15.5 V, ± 0.5 V	15.5 V, ± 0.5 V	15.5 V, ± 0.5 V	15.5 V, ± 0.5 V
High battery voltage, switches on at	14.5 V, ± 0.5 V	14.5 V, ± 0.5 V	14.5 V, ± 0.5 V	14.5 V, ± 0.5 V
Max. ripple on DC (battery)	5% RMS	5% RMS	5% RMS	5% RMS
Input current (nominal load)	73 A	110 A	183 A	275 A
No load power consumption:				
• 'on' mode (230 V)	470 mA – 5.6 W	450 mA – 5 W	480 mA – 6 W	480 mA – 6 W
• stand-by (scan mode)	65 mA – 0.8 W	43 mA – 0.5 W	50 mA – 0.6 W	50 mA – 0.6 W
Minimal DC fuse (slow blow)**	100 A	150 A	250 A	400 A
Minimal cable size	25 mm^2	50 mm^2	70 mm^2	95 mm^2
Harmonic distortion typical	< 5%	< 5%	< 5%	< 5%
Cos Phi	all power factors allowed	all power factors allowed	all power factors allowed	all power factors allowed
Transfer system	The Masterswitch and Systemswitch can be connected to all sine wave inverters	The Masterswitch and Systemswitch can be connected to all sine wave inverters	The Masterswitch and Systemswitch can be connected to all sine wave inverters	The Masterswitch and Systemswitch can be connected to all sine wave inverters
Temperature range (ambient temp.)	-25 °C to 80 °C; > 40 °C derating power	-25 °C to 80 °C; > 40 °C derating power	-25 °C to 80 °C; > 40 °C derating power	-25 °C to 80 °C; > 40 °C derating power
Cooling	natural/forced	natural/forced	natural/forced	natural/forced
Sound level	48 dBA at 1 mtr	48 dBA at 1 mtr	48 dBA at 1 mtr	48 dBA at 1 mtr
Protection degree	IP23	IP23	IP23	IP23
Protections	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery
MasterBus compatible	yes, using a MasterBus Inverter Interface or AC Power Analyser	yes, using a MasterBus Inverter Interface or AC Power Analyser	yes, using a MasterBus Inverter Interface or AC Power Analyser	yes

OPTIONS					
	C4-RI *70404110*	option	option	option	n.a.
		Remote control on/off for the Mass Sine sine wave inverter.			
	MasterView Easy *77010305*	option	option	option	option
		Touch screen panel for reading charge status, current fold-back and/or Power Sharing setting.			
	Masterlink/MICC *70403105*	option	option	option	n.a.
		Battery consumption meter for 2 batteries, 12/24 V DC with LCD read-out, remote control for Mass Sine inverter and Mass battery charger or Mass Combi.			
	MasterBus Inverter Interface *77030700*	option	option	option	n.a.
		Integrates the Mass Sine inverter in a MasterBus network.			
	AC Power Analyser *77031200*	option	option	option	n.a.
		Integrates the Mass Sine inverter in a MasterBus network and visualizes the AC voltage, current and power.			

				AVAILABLE Q1 2015 	
	Mass Sine 24/800	**Mass Sine 24/1500***	**Mass Sine 24/2500***	**Mass Sine Ultra 24/4000**	**Mass Sine 24/5000***
	24020800	*24021500*	*24022500*	*26024000*	*24095100*
			25022500		
	24 V	24 V	24 V	24 V	24 V
	>50 Ah	>150 Ah	>200 Ah	>350 Ah	>400 Ah
	230 V – 50 Hz (± 0 .01 Hz)	230 V – 50 Hz (± 0 .01 Hz)	230 V – 50 Hz (± 0 .01 Hz)	230 V - 50 Hz (±0.01 Hz)	230 V – 50 Hz (± 0 .01 Hz)
	800 W	1500 W	2500 W	4000 W	5000 W
	650 W	1200 W	2000 W	3500 W	4000 W
	1600 W	2900 W	5000 W	7000 W	9000 W
	true sine	true sine	true sine	true sine	true sine
	internal	internal	internal	internal	internal
	92%	92%	92%	91%	92%
	LED display	LED display	LED display	LED display	LED display
	no	no	no	yes, up to 10 units	no
	no	no	no	yes	no
	325 x 220 x 111 mm 12.8 x 8.7 x 4.4 inch	340 x 261 x 130 mm 13.4 x 10.3 x 5.1 inch	420 x 318 x 130 mm 16.5 x 12.5 x 5.1 inch	472 x 318 x 175 mm 18.6 x 12.5 x 6.9 inch	470 x 315 x 254 mm 18.5 x 12.4 x 10 inch
	3.9 kg / 8.6 lb	8 kg / 17.4 lb	14.6 kg / 32.2 lb	15 kg / 33.1 lb	25 kg / 55.1 lb
	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31	CE, ABYC	CE, E-mark, ABYC A-31
	HF switch mode	HF switch mode	HF switch mode	V6 HF switch mode	HF switch mode
	19 V, ± 0.5 V	19 V, ± 0.5 V	19 V, ± 0.5 V	19 V, dynamic window	19 V, ± 0.5 V
	22 V, ± 0.5 V	22 V, ± 0.5 V	22 V, ± 0.5 V	22 V, ± 0.5 V	22 V, ± 0.5 V
	32 V, ± 0.5 V	32 V, ± 0.5 V	33 V, ± 0.5 V	32 V, ± 0.5 V	32 V, ± 0.5 V
	30 V, ± 0.5 V	30 V, ± 0.5 V	31 V, ± 0.5 V	31 V, ± 0.5 V	30 V, ± 0.5 V
	5% RMS	5% RMS	5% RMS	< 10%	5% RMS
	36 A	68 A	115 A	152 A	230 A
	240 mA – 5.6 W	200 mA – 5 W	250 mA – 6 W	250 mA – 6 W	250 mA – 6 W
	35 mA – 0.8 W	25 mA – 0.6 W	25 mA – 0.6 W	25 mA – 0.6 W	50 mA – 1.2 W
	63 A	100 A	160 A	250 A	1x 250 A of 2x 125 A
	16 mm^2	25 mm^2	50 mm^2	70 mm^2	2x 70 mm^2
	< 5%	< 5%	< 5%	< 5%	< 5%
	all power factors allowed	all power factors allowed	all power factors allowed	all power factors allowed	all power factors allowed
	The Masterswitch and Systemswitch can be connected to all sine wave inverters	The Masterswitch and Systemswitch can be connected to all sine wave inverters	The Masterswitch and Systemswitch can be connected to all sine wave inverters	The Masterswitch and Systemswitch can be connected to all sine wave inverters	The Masterswitch and Systemswitch can be connected to all sine wave inverters
	-25 °C to 80 °C; > 40 °C derating power	-25 °C to 80 °C; > 40 °C derating power	-25 °C to 80 °C; > 40 °C derating power	-25 °C to 80 °C; > 40 °C derating power	-25 °C to 80 °C; > 40 °C derating power
	natural/forced	natural/forced	natural/forced	natural/forced	natural/forced
	48 dBA at 1 mtr	48 dBA at 1 mtr	48 dBA at 1 mtr	48 dBA at 1 mtr	48 dBA at 1 mtr
	IP23	IP23	IP23	IP 23	IP23
	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery
	yes, using a MasterBus Inverter Interface or AC Power Analyser	yes, using a MasterBus Inverter Interface or AC Power Analyser	yes, using a MasterBus Inverter Interface or AC Power Analyser	yes	yes, using a MasterBus Inverter Interface or AC Power Analyser
	option	option	option	n.a.	option
	option	option	option	option	option
	option	option	option	n.a.	option
	option	option	option	n.a.	option
	option	option	option	n.a.	option

* Also available in 60 Hz:
• 1500 W model: product code ***24121500***
• 2500 W model: product code ***24122500***
• 5000 W model: product code: ***24195100***

** DC fuse depends on the cable size.

Specifications AC Master sine wave inverters




	AC Master 12/300	AC Master 12/500	AC Master 24/300	AC Master 24/500
Product code 230 V (universal socket)	*28010300*	*28010500*	*28020300*	*28020500*
GENERAL SPECS				
Nominal battery voltage	12 V	12 V	24 V	24 V
Minimum battery capacity	≥60 Ah	≥100 Ah	≥30 Ah	≥50 Ah
Output voltage (± 5%)	230 V – 50 Hz (± 0.1%)	230 V – 50 Hz (± 0.1%)	230 V – 50 Hz (± 0.1%)	230 V – 50 Hz (± 0.1%)
Continuous power at 25 °C, cos phi 1	300 W	500 W	300 W	500 W
Continuous power at 40 °C, cos phi 1	250 W	400 W	250 W	400 W
Peak load	600 W	800 W	600 W	800 W
Output waveform	true sine	true sine	true sine	true sine
Efficiency	90%	90%	91%	91%
AC connection	universal	universal	universal	universal
Display/read out	LED display	LED display	LED display	LED display
Dimensions, hxwxd	210 x 130 x 60 mm 8.3 x 5.1 x 2.4 inch	210 x 130 x 60 mm 8.3 x 5.1 x 2.4 inch	210 x 130 x 60 mm 8.3 x 5.1 x 2.4 inch	210 x 130 x 60 mm 8.3 x 5.1 x 2.4 inch
Weight	1.16 kg / 2.55 lb	1.22 kg / 2.69 lb	1.16 kg / 2.55 lb	1.22 kg / 2.69 lb
Approvals	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31
TECHNICAL SPECS				
Technology	HF switch mode	HF switch mode	HF switch mode	HF switch mode
Low battery voltage, switches off at	10 V, ± 0.5 V	10 V, ± 0.5 V	20 V, ± 0.5 V	20 V, ± 0.5 V
Low battery voltage, switches on at	11 V, ± 0.5 V	11 V, ± 0.5 V	22 V, ± 0.5 V	22 V, ± 0.5 V
High battery voltage, switches off at	16 V, ± 0.5 V	16 V, ± 0.5 V	32 V, ± 0.5 V	32 V, ± 0.5 V
High battery voltage, switches on at	14.5 V, ± 0.5 V	14.5 V, ± 0.5 V	29 V, ± 0.5 V	29 V, ± 0.5 V
Max. ripple on DC (battery)	10% RMS	10% RMS	10% RMS	10% RMS
Input current (nominal load)	22.5 A	37.5 A	11 A	19 A
No load power consumption:				
• 'on' mode (230 V)	0.58 A – 7 W	0.58 A – 7 W	0.29 A – 7 W	0.29 A – 7 W
• standby (scan mode)	0.33 A – 4 W	0.33 A – 4 W	0.16 A – 4 W	0.16 A – 4 W
Minimal DC fuse (slow blow)*	40 A	80 A	20 A	40 A
DC cable	included	included	included	included
Harmonic distortion typical	< 6%	< 6%	< 6%	< 6%
Cos Phi	all power factors allowed	all power factors allowed	all power factors allowed	all power factors allowed
Temperature range (ambient temp.)	0 °C to 40 °C, derating power ≥ 40 °C	0 °C to 40 °C, derating power ≥ 40 °C	0 °C to 40 °C, derating power ≥ 40 °C	0 °C to 40 °C, derating power ≥ 40 °C
Switch off at	50 °C (auto recover after cooling down)	50 °C (auto recover after cooling down)	50 °C (auto recover after cooling down)	50 °C (auto recover after cooling down)
Cooling	natural/forced	natural/forced	natural/forced	natural/forced
Sound level	53 dBA at 1 mtr	53 dBA at 1 mtr	53 dBA at 1 mtr	53 dBA at 1 mtr
Protection degree	IP23	IP23	IP23	IP23
Protections	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery
MasterBus compatible	no	no	no	no

* DC fuse depends on the cable size.

In addition to the Mastervolt sine wave inverters, we also supply the Marinco Inverter series.

We would like to refer to our global product catalog where we offer the most extended product portfolio globally under the Marinco brand.

www.marinco.com

MARINCO

For detailed specifications, dimensional drawings, 3D files, images, certificates and manuals see ■ www.mastervolt.com/inverters

QUOTE

" I think that in the next years the (solar) off grid market will grow and this will require a lot of professionalism. The Mastervolt concept of systems is unique in this market: equipment designed to work at peak performance, that communicate and manage an integrated system. Brand, professionalism and recognized expertise of Mastervolt in the energy management of stand-alone sources generates confidence among customers".

DIEGO VOLPI, MANAGING DIRECTOR
DISTRIBUTOR MASTERVOLT ITALY

Mastervolt Combis: Battery charging, power inverting & more, all in one compact casing

The Mastervolt Combi literally 'combines' an advanced battery charger and silent-running inverter in one remarkably compact device. But that isn't all, on top of that it adds extra functionality. This includes power support, system paralleling, secondary battery charging and even solar charging using maximum power point tracking (MPPT). There is also the possibility to create 3-phase power. This all means that the Combi can become your ideal solution for a wide range of needs, from low power recreational use right up to full-on, high power industrial applications.

Versatility in power supply

Every model of the Mastervolt Combi is highly versatile, so using one greatly simplifies installation. This single product not only brings you fast and complete charging of your starter and service batteries, it also provides a silent, robust and clean AC power supply. Multiple AC outputs allow heavy-draw items to be separated from the most critical equipment, making sure they don't unintentionally deplete your batteries. The AC inputs facilitate both mains and generator connections, which the Combi can support with additional power if your loads require more than either can provide.

Essentially, just this one product can handle all the power requirements in an autonomous system.

Modern technology

The unique design of the Combi range is typically Mastervolt. Rather than installing heavy transformers, our high-frequency technology offers major benefits in terms of compact size, a lightweight chassis and silent running (there is no transformer hum). If that's not enough, the Mass Combi Ultra goes even further with its revolutionary Vx converters. When heavy loads are started up, peak power performance is improved yet further, so you will get exceptionally high efficiency and low 'no load' current demands.

Perfect in a MasterBus system

Designed for system compatibility, the Mastervolt Combi fits perfectly into a MasterBus system. The network will allow you to easily control and monitor your product, as well as optimizing the configuration to your needs. In addition, the internal communication between other MasterBus products in your system can even boost the overall electrical performance.

Which Mastervolt Combi will suit your application the best?

■ **Mass Combi**

If you need inverter power of up to 2500 W, the Mass Combi series provides the perfect solution. Ideal for recreational applications, both marine and mobile, it is also highly capable of supporting professional systems with peak loads that remain within its specifications.

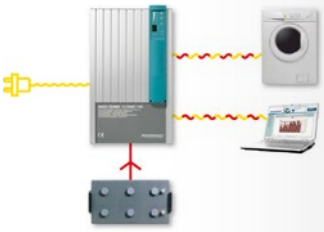
■ **Mass Combi Ultra**

For inverter power of 3000 W and beyond, your solution will be in the Mass Combi Ultra range. This product houses the very latest technology, with the fastest digital signal processor (DSP) controls, and the ultra-compact V6 converter design that allows the Combi Ultra to remain lightweight whilst also taking up very little space. Additional functionality includes two AC inputs, an integrated MPPT solar charge regulator and parallel plus 3-phase power application. In short, this rugged device supports everything your off grid, high power installation will need.

Combined functionality

- Charges two individual battery banks.
- Supplies 12, 24 or 48 Volt DC power.
- Inverts to 230V/50Hz or 120V/60Hz of pure sine wave power.
- Generator/mains support by power boosting from the battery when AC power is limited.
- Seamless switching between generator and AC grid.
- Paralleling Combis for more power, even in 3-phase operation.
- Automatic transfer between charging and inverting functions.
- Integrated MPPT solar charge regulation.

A Mastervolt Combi for extra power



If you require more power than the grid or generator can provide, the Mass Combi will make up the shortfall by inverting from the battery. The Combi also ensures that the battery is recharged once the peak demand has passed.

Not just any battery charger

The built-in battery charger uses Mastervolt's proven 3-step+ charging technology to allow best charging of all battery types, including our advanced Lithium Ion models. The battery charger supplies a maximum charge current, even with a higher charge voltage, and speeds up the complete recharging of your batteries.

Highest yield from solar power

The design of the integrated MPPT solar charge regulator in the Mass Combi Ultra is based on Mastervolt's extensive experience in the field of grid connected solar energy. Compared to most regulators on the market, it offers a far higher yield from solar power for recharging your batteries.

Two AC inputs

The Mass Combi Ultra has two separate AC inputs for generator or mains supply, both adjusted to the specific characteristics of each power source. Thanks to the ultra-fast controls, transfer to and from the inverter is seamless, preventing any flickering in the lights, or the unintentional powering down of sensitive devices.

Ease of installation

A small and lightweight chassis makes a huge difference with the ease of installation, and with the added advantage of robust connection terminals optimised for installers; this all drastically reduces labour time and costs.

Specifications Mass Combi




	Mass Combi 12/1200-60	Mass Combi 12/2000-100	Mass Combi 12/2500-100	Mass Combi 12/4000-200
Product code 230 V	*36011205*	*36012005*	*36012505*	*36014005*
Product code 120 V			*37012505*	*37014005*
(see page 28-29 for specifications)				
GENERAL SPECS SINE WAVE INVERTER				
Nominal DC voltage	12 V (10-15 V)	12 V (10-15 V)	12 V (10-15 V)	12 V (10-15 V)
Continuous power at 25 ˚C, cos phi 1	1200 W - 5.3 A	2000 W - 8.7 A	2500 W - 10.9 A	3750 W - 16.5 A
Surge capability (5 sec, resistive)	2400 W - 10.5 A	4000 W - 17.5 A	5000 W - 21.8 A	7500 W - 32 A
Parallel use (to double the power)	no	yes	yes	no
Parallel with grid/generator (for more power)	yes	yes	yes	yes
Output voltage (± 5%)	230 V – 50 Hz, ± 0,05% (60 Hz adjustable, ± 0,05%)	230 V – 50 Hz, ±0,05% (60 Hz adjustable, ±0,05%)	230 V – 50 Hz, ±0,05% (60 Hz adjustable, ±0,05%)	230 V – 50 Hz, ±0,05% (60 Hz adjustable, ±0,05%)
Output waveform	true sine	true sine	true sine	true sine
Efficiency	90%	90%	90%	90%
DC consumption at 230 V	<9 W	<9 W	<9 W	<9 W
Search mode consumption	0.5 W	0.5 W	0.5 W	1 W
GENERAL SPECS BATTERY CHARGER				
Nominal input voltage	230 V (180-265 V) 45-65 Hz	230 V (180-265 V) 45-65 Hz	230 V (180-265 V) 45-65 Hz	230 V (180-265 V) 45-65 Hz
Max. charge current (adjustable)	60 A at 14.25 V	100 A at 14.25 V	100 A at 14.25 V	200 A at 14.25 V
Primary AC consumption (full charge)	1035 W - 4.5 A	1656 W - 7.2 A	1656 W – 7.2 A	3312 W - 14.4 A
Charge voltage 25 °C (absorption/float)	14.25/13.25 V	14.25/13.25 V	14.25/13.25 V	14.25/13.25 V
Second charge output, 3-step	5 A	5 A	5 A	2 x 5 A
Temperature sensor battery	delivered as standard with 6 m cable and telejack plug	delivered as standard with 6 m cable and telejack plug	delivered as standard with 6 m cable and telejack plug	delivered as standard with 6 m cable and telejack plug
GENERAL SPECS				
Display/read-out	LED display	LED display	LED display	LED display
Dimensions, hxwxd	371 x 318 x 143 mm 14.6 x 12.5 x 5.6 inch	496 x 318 x 156 mm 19.5 x 12.5 x 6.1 inch	496 x 318 x 156 mm 19.5 x 12.5 x 6.1 inch	496 x 318 x 279 mm 19.5 x 12.5 x 11 inch
Weight	7.8 kg / 17.2 lb	11 kg / 24.3 lb	11 kg / 24.3 lb	21 kg / 46.3 lb
Approvals	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31
TECHNICAL SPECS				
Charge characteristic	IUoUo, automatic / 3-step+ for gel / AGM / wet / Lithium Ion	IUoUo, automatic / 3-step+ for gel / AGM / wet / Lithium Ion	IUoUo, automatic / 3-step+ for gel / AGM / wet / Lithium Ion	IUoUo, automatic / 3-step+ for gel / AGM / wet / Lithium Ion
Max. current first output	50 A	50 A	50 A	50 A
Max. current shortbreak / inverter output	25 A	25 A	25 A	25 A
Transfer time	10 ms	10 ms	10 ms	10 ms
Ground relais	yes, adjustably by DIP switch	yes, adjustably by DIP switch	yes, adjustably by DIP switch	yes, adjustably by DIP switch
Temperature range (ambient temp.)	-25 °C to 80°C, > 25 °C derating power	-25 °C to 80 °C, > 25 °C derating power	-25 °C to 80 °C, > 25 °C derating power	-25 °C to 80 °C, > 25 °C derating power
Cooling	maintenance free vario fans	maintenance free vario fans	maintenance free vario fans	maintenance free vario fans
Sound level	≤ 48 dBA at 1 mtr	≤ 48 dBA at 1 mtr	≤ 48 dBA at 1 mtr	≤ 48 dBA at 1 mtr
Protection degree	IP23	IP23	IP23	IP23
Protections	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery
MasterBus compatible	yes, in combination with a MasterBus Combi Interface	yes, in combination with a MasterBus Combi Interface	yes, in combination with a MasterBus Combi Interface	yes, in combination with a MasterBus Combi Interface

OPTIONS

	Remote ICC *70405000*	option	delivered as standard	option	delivered as standard
		Indication of DC consumption, charge phase, AC present, failure, with on/off/'charger only' switch & 6 metre cable.			
	Remote APC *70405010*	option	option	option	option
		Indication of AC consumption, AC voltage, fuse value of the grid/generator connection, with Power Sharing.			
	Masterlink/MICC *70403105*	option	option	option	option
		Battery consumption metre for 2 batteries, 12/24 V DC with LCD read-out, remote control for Mass Sine inverter and Mass battery charger or Mass Combi.			
	MasterView Easy *77010305*	option	option	option	option
		In combination with a Mastervolt Combi Interface. Touch screen panel for reading charge status, current fold-back and/or Power Sharing setting.			
	MasterBus Combi Interface *77030475*	option	option	delivered as standard	option
		Integrates the Mass Combi in a MasterBus network.			

						
	Mass Combi 24/1200-35	**Mass Combi 24/2000-60**	**Mass Combi 24/2500-60**	**Mass Combi 24/4000-120***	**Mass Combi 48/2500-35**	**Mass Combi 48/5000-70**
	36021205	*36022005*	*36022505*	*36024005*	*36042505*	*36045005*
			37022505	*37024005*		
	24 V (20-31 V)	24 V (20-31 V)	24 V (20-31 V)	24 V (20-31 V)	48 V (40-62 V)	48 V (40-62 V)
	1200 W - 5.3 A	2000 W - 8.7 A	2500 W - 10.9 A	3750 W - 16.5 A	2500 W - 10.9 A	5000 W - 21.8 A
	2400 W - 10.5 A	4000 W - 17.5 A	5000 W - 21.8 A	7500 W - 32 A	5000 W - 21.8 A	8000 W - 35 A
	no	yes	yes	no	yes	no
	yes	yes	yes	yes	yes	yes
	230 V – 50 Hz, ±0,05% (60 Hz adjustable, ±0,05%)	230 V – 50 Hz, ±0,05% (60 Hz adjustable, ±0,05%)	230 V – 50 Hz, ±0,05% (60 Hz adjustable, ±0,05%)	230 V – 50 Hz, ±0,05% (60 Hz adjustable, ±0,05%)	230 V – 50 Hz, ±0,05% (60 Hz adjustable, ±0,05%)	230 V – 50 Hz, ±0,05% (60 Hz adjustable, ±0,05%)
	true sine	true sine	true sine	true sine	true sine	true sine
	92%	93%	93%	93%	93%	93%
	<9 W	<9 W	<9 W	<9 W	<9 W	<9 W
	0.5 W	0.5 W	0.5 W	1 W	0.5 W	1 W
	230 V (180-265 V) 45-65 Hz	230 V (180-265 V) 45-65 Hz	230 V (180-265 V) 45-65 Hz	230 V (180-265 V) 45-65 Hz	230 V (180-265 V) 45-65 Hz	230 V (180-265 V) 45-65 Hz
	35 A at 28.5 V	60 A at 28.5 V	60 A at 28.5 V	120 A at 28.5 V	35 A at 57 V	70 A at 57 V
	1170 W - 5.1 A	1965 W - 8.5 A	1965 W - 8.5 A	3900 W - 17 A	2295 W - 10 A	4590 W - 20 A
	28.5/26.5 V	28.5/26.5 V	28.5/26.5 V	28.5/26.5 V	57/53 V	57/53 V
	5 A	5 A	5 A	2 x 5 A	n.a.	n.a.
	delivered as standard with 6 m cable and telejack plug	delivered as standard with 6 m cable and telejack plug	delivered as standard with 6 m cable and telejack plug	delivered as standard with 6 m cable and telejack plug	delivered as standard with 6 m cable and telejack plug	delivered as standard with 6 m cable and telejack plug
	LED display	LED display	LED display	LED display	LED display	LED display
	371 x 318 x 143 mm 14.6 x 12.5 x 5.6 inch	496 x 318 x 156 mm 19.5 x 12.5 x 6.1 inch	496 x 318 x 156 mm 19.5 x 12.5 x 6.1 inch	496 x 318 x 279 mm 19.5 x 12.5 x 11 inch	496 x 318 x 156 mm 19.5 x 12.5 x 6.1 inch	496 x 318 x 279 mm 19.5 x 12.5 x 11 inch
	7.8 kg / 17.2 lb	11 kg / 24.3 lb	11 kg / 24.3 lb	21 kg / 46.3 lb	11 kg / 24.3 lb	21 kg / 46.3 lb
	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31
	IUoUo, automatic / 3-step+ for gel / AGM / wet / Lithium Ion	IUoUo, automatic / 3-step+ for gel / AGM / wet / Lithium Ion	IUoUo, automatic / 3-step+ for gel / AGM / wet / Lithium Ion	IUoUo, automatic / 3-step+ for gel / AGM / wet / Lithium Ion	IUoUo, automatic / 3-step+ for gel / AGM / wet / Lithium Ion	IUoUo, automatic / 3-step+ for gel / AGM / wet / Lithium Ion
	50 A	50 A	50 A	50 A	50 A	50 A
	25 A	25 A	25 A	25 A	25 A	25 A
	10 ms	10 ms	10 ms	10 ms	10 ms	10 ms
	yes, adjustably by DIP switch	yes, adjustably by DIP switch	yes, adjustably by DIP switch	yes, adjustably by DIP switch	yes, adjustably by DIP switch	yes, adjustably by DIP switch
	-25 °C to 80 °C, > 25 °C derating power	-25 °C to 80 °C, > 25 °C derating power	-25 °C to 80 °C, > 25 °C derating power	-25 °C to 80 °C, > 25 °C derating power	-25 °C to 80 °C, > 25 °C derating power	-25 °C to 80 °C, > 25 °C derating power
	maintenance free vario fans	maintenance free vario fans	maintenance free vario fans	maintenance free vario fans	maintenance free vario fans	maintenance free vario fans
	≤ 48 dBA at 1 mtr	≤ 48 dBA at 1 mtr	≤ 48 dBA at 1 mtr	≤ 48 dBA at 1 mtr	≤ 48 dBA at 1 mtr	≤ 48 dBA at 1 mtr
	IP23	IP23	IP23	IP23	IP23	IP23
	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery
	yes, in combination with a MasterBus Combi Interface	yes, in combination with a MasterBus Combi Interface	yes, in combination with a MasterBus Combi Interface	yes, in combination with a MasterBus Combi Interface	yes, in combination with a MasterBus Combi Interface	yes, in combination with a MasterBus Combi Interface

* Only available in 120 V version, the 230 V model has been replaced by the Mass Combi Ultra 24/3500-100 (product code 38023500).

	option	delivered as standard	option	delivered as standard	option	option
	option	option	option	option	option	option
	option	option	option	option	option	option
	option	option	option	option	option	option
	option	option	delivered as standard	option	delivered as standard	delivered as standard

Specifications
Mass Combi Ultra

AVAILABLE Q1 2015

UPCOMING MODEL

UPCOMING MODEL

	Mass Combi Ultra 12/3000-150	Mass Combi Ultra 24/3500-100	Mass Combi Ultra 24/5000-125	Mass Combi Ultra 24/7000-200
Product code	*38013000*	*38023500*	*38025000*	*38027000*
GENERAL SPECS				
Display/read-out	LED display	LED display	LED display	LED display
Dimensions, hxwxd	472 x 318 x 175 mm 18.6 x 12.5 x 6.9 inch	472 x 318 x 175 mm 18.6 x 12.5 x 6.9 inch	522 x 318 x 175 mm 20.6 x 12.5 x 6.9 inch	472 x 318 x 330 mm 18.6 x 12.5 x 13.0 inch
Weight	15 kg / 33.1 lb	15 kg / 33.1 lb	30 kg / 66.1 lb	30 kg / 66.1 lb
Approvals	CE, ABYC	CE, ABYC	CE, ABYC	CE, ABYC
TECHNICAL SPECS				
Charge characteristic	IUoU, automatic 3-step+ for AGM/gel/Lithium Ion/ flooded/flooded traction/ spiral/NiCad	IUoU, automatic 3-step+ for AGM/gel/Lithium Ion/ flooded/flooded traction/ spiral/NiCad	IUoU, automatic 3-step+ for AGM/gel/Lithium Ion/ flooded/flooded traction/ spiral/NiCad	IUoU, automatic 3-step+ for AGM/gel/Lithium Ion/ flooded/flooded traction/ spiral/NiCad
Ground relay	adjustable	adjustable	adjustable	adjustable
Temperature range (ambient temp.)	-25 °C to 60 °C, derating > 40 °C	-25 °C to 60 °C, derating > 40 °C	-25 °C to 60 °C, derating > 40 °C	-25 °C to 60 °C, derating > 40 °C
Protection degree	IP23	IP23	IP23	IP23
Protections	over temperature, AC over load, AC short circuit, DC short circuit, high battery, low battery	over temperature, AC over load, AC short circuit, DC short circuit, high battery, low battery	over temperature, AC over load, AC short circuit, DC short circuit, high battery, low battery	over temperature, AC over load, AC short circuit, DC short circuit, high battery, low battery
MasterBus compatible	yes	yes	yes	yes
SPECS SINE WAVE INVERTER				
Nom. DC voltage	12 V (9.5 – 15.5 V)	24 V (19 – 32 V)	24 V (19 – 32 V)	48 V (38 – 62 V)
Output voltage (± 2%)	230 V - 50/60 Hz (± 0.005%) adjustable	230 V - 50/60 Hz (± 0.005%) adjustable	230 V - 50/60 Hz (± 0.005%) adjustable	230 V - 50/60 Hz (± 0.005%) adjustable
Output waveform	true sine wave, Thd < 1% under standard conditions	true sine wave, Thd < 1% under standard conditions	true sine wave, Thd < 1% under standard conditions	true sine wave, Thd < 1% under standard conditions
Cont. power at 40 °C, cos phi 1	3000 W	3500 W	5000 W / 7000 W	5000 W / 7000 W
Surge capability	5400 W	7000 W	10000 W / 14000 W	10000 W / 14000 W
Parallel configuration	yes, up to 10 standard	yes, up to 10 standard	yes	yes
3-Phase configuration	yes	yes	yes	yes
Max. efficiency	90%	91%	92%	93%
Max. ripple on DC (battery)	< 10%	< 10%	< 10%	< 10%
No-load power consumption (ON/inverter OFF/OFF)	16 W / 2 W / 0 W	16 W / 2 W / 0 W	n.a.	n.a.
SPECS BATTERY CHARGER				
Nom. input voltage	180 – 275 V	180 – 275 V	180 – 275 V	180 – 275 V
Nom. battery voltage	12 V	24 V	24 V	48 V
Max. charge current at 40 °C	150 A at 14.25V	100 A at 28.5 V	125 A at 28.5 V	200 A at 28.5 V
Charge method secondary charger	IUoU, automatic 3-step+ or constant voltage	IUoU, automatic 3-step+ or constant voltage	IUoU, automatic 3-step+ or constant voltage	IUoU, automatic 3-step+ or constant voltage
Secondary charger output voltage	12 V	12/24 V adjustable	12/24 V adjustable	12/24 V adjustable
Secondary charger output current	10 A	10 A	10 A	10 A
Temperature sensor battery	yes, included	yes, included	yes, included	yes, included
SPECS TRANSFER SYSTEM				
Generator input (switched)	50 A	50 A		
Mains input (switched)	30 A	30 A		
AC output 1	67 A	67 A		
AC output 2 (switched)	50 A	50 A		
Transfer time	seamless (UPS, < 1 ms)	seamless (UPS, < 1 ms)		
Transfer voltage range (adjustable)	180 – 275 V	180 – 275 V		
Transfer frequency range (adjustable)	35 – 65 Hz	35 – 65 Hz		
Power Sharing / Generator / Mains Support	yes	yes		
SOLAR INPUT DC SPECS				
Input voltage range	15-100 V	15-100 V		
Max. PV power	500 Wp	500 Wp		
Max. input current	18 A	18 A		
Max. charge current	30 A at 14.25 V	15 A at 28.5 V		
MPP voltage range at nom. power	35-80 V	35-80 V		

	AVAILABLE Q1 2015	UPCOMING MODEL	UPCOMING MODEL
			
	Mass Combi Ultra 48/3500-50	**Mass Combi Ultra 48/5000-60**	**Mass Combi Ultra 48/7000-100**
	38043500	*38045000*	*38047000*
	LED display	LED display	LED display
	472 x 318 x 175 mm 18.6 x 12.5 x 6.9 inch	522 x 318 x 175 mm 20.6 x 12.5 x 6.9 inch	472 x 318 x 330 mm 18.6 x 12.5 x 13.0 inch
	15 kg / 33.1 lb	30 kg / 66.1 lb	30 kg / 66.1 lb
	CE, ABYC	CE, ABYC	CE, ABYC
	IUoU, automatic 3-step+ for AGM/gel/Lithium Ion/ flooded/flooded traction/ spiral/NiCad	IUoU, automatic 3-step+ for AGM/gel/Lithium Ion/ flooded/flooded traction/ spiral/NiCad	IUoU, automatic 3-step+ for AGM/gel/Lithium Ion/ flooded/flooded traction/ spiral/NiCad
	adjustable	adjustable	adjustable
	-25 °C to 60 °C, derating > 40 °C	-25 °C to 60 °C, derating > 40 °C	-25 °C to 60 °C, derating > 40 °C
	IP23	IP23	IP23
	over temperature, AC over load, AC short circuit, DC short circuit, high battery, low battery	over temperature, AC over load, AC short circuit, DC short circuit, high battery, low battery	over temperature, AC over load, AC short circuit, DC short circuit, high battery, low battery
	yes	yes	yes
	48 V (38 – 62 V)	48 V (38 – 62 V)	48 V (38 – 62 V)
	230 V - 50/60 Hz (± 0.005%) adjustable	230 V - 50/60 Hz (± 0.005%) adjustable	230 V - 50/60 Hz (± 0.005%) adjustable
	true sine wave, Thd < 1% under standard conditions	true sine wave, Thd < 1% under standard conditions	true sine wave, Thd < 1% under standard conditions
	3500 W	5000 W / 7000 W	5000 W / 7000 W
	7000 W	10000 W / 14000 W	10000 W / 14000 W
	yes, up to 10 standard	yes	yes
	yes	yes	yes
	93%	93%	93%
	< 10%	< 10%	< 10%
	16 W / 2 W / 0 W	n.a.	n.a.
	180 – 275 V	180 – 275 V	180 – 275 V
	48 V	48 V	48 V
	50 A at 57 V	60 A at 57 V	100 A at 57 V
	IUoU, automatic 3-step+ or constant voltage	IUoU, automatic 3-step+ or constant voltage	IUoU, automatic 3-step+ or constant voltage
	12/24 V adjustable	12/24 V adjustable	12/24 V adjustable
	10 A	10 A	10 A
	yes, included	yes, included	yes, included
	50 A		
	30 A		
	67 A		
	50 A		
	seamless (UPS, < 1 ms)		
	180 – 275 V		
	35 – 65 Hz		
	yes		
	15-100 V		
	500 Wp		
	18 A		
	7.5 A at 57 V		
	35-80 V		

Separate second charger

All Mass Combi Ultras have an integrated second charger which (in most cases) can charge both 12 V and 24 V batteries; a practical function that simplifies installation and reduces costs for the end user.

Quiet operation

The Mass Combi Ultra provides a high yield that, combined with the Active Optima Cooling concept, ensures minimal use of the fan. The advanced thermal design offers an optimal performance when needed, and quiet operation when required. The Combi can provide up to 50% of the charging current or inverter capacity without fan cooling.

Parallel and 3-phase operation

The Mass Combi Ultra functionality goes beyond stand-alone operation; the design allows parallel and 3-phase operation for larger applications up to 35 kW.

Specifications 120 V Mass Sine inverters

	Mass Sine 12/2000	Mass Sine 24/2500
Product code 120 V	*25012000*	*25022500*
GENERAL SPECS		
Nominal battery voltage	12 V	24 V
Recommended battery capacity	>200 Ah	>200 Ah
Output voltage (± 5%)	120 V – 60 Hz (± 0 .01 Hz)	120 V – 60 Hz (± 0 .01 Hz)
P30 power at 104 °F, cos phi 1	2000 W	2500 W
Continuous power at 104 °F, cos phi 1	1800 W	2000 W
Peak load	4000 W	5000 W
Output waveform	true sine	true sine
AC connection	internal	internal
Efficiency	92%	92%
Display/read-out	LED display	LED display
Parallel configuration	no	no
3-Phase configuration	no	no
Dimensions, hxwxd	16.5 x 12.5 x 5.1 inch 420 x 318 x 130 mm	16.5 x 12.5 x 5.1 inch 420 x 318 x 130 mm
Weight	32.2 lb / 14.6 kg	32.2 lb / 14.6 kg
Approvals	CE, E-mark, ABYC A-31	CE, E-mark, ABYC A-31
TECHNICAL SPECS		
Technology	HF switch mode	HF switch mode
Low battery voltage, switches off at	10 V, ± 0.5 V	19 V, ± 0.5 V
Low battery voltage, switches on at	11 V, ± 0.5 V	22 V, ± 0.5 V
High battery voltage, switches off at	15.5 V, ± 0.5 V	33 V, ± 0.5 V
High battery voltage, switches on at	14.5 V, ± 0.5 V	31 V, ± 0.5 V
Max. ripple on DC (battery)	5% RMS	5% RMS
Input current (nominal load)	183 A	115 A
No load power consumption:		
• 'on' mode (120 V)	480 mA – 6 W	250 mA – 6 W
• stand-by (scan mode)	50 mA – 0.6 W	25 mA – 0.6 W
Minimal DC fuse (slow blow)*	250 A	160 A
Minimal cable size	70 mm^2	50 mm^2
Harmonic distortion typical	< 5%	< 5%
Cos Phi	all power factors allowed	all power factors allowed
Transfer system	The Masterswitch and Systemswitch can be connected to all sine wave inverters	The Masterswitch and Systemswitch can be connected to all sine wave inverters
Temperature range (ambient temp.)	-13 °F to 176 °F -25 °C to 80 °C; derating > 104 °F / 40 °C	-13 °F to 176 °F -25 °C to 80 °C; derating > 104 °F / 40 °C
Cooling	natural/forced	natural/forced
Sound level	48 dBA at 1 mtr	48 dBA at 1 mtr
Protection degree	IP23	IP23
Protections	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery
MasterBus compatible	yes, using a MasterBus Inverter Interface or AC Power Analyser	yes, using a MasterBus Inverter Interface or AC Power Analyser

* DC fuse depends on the cable size.

OPTIONS			
	C4-RI *70404110*	option	option *Remote control on/off for the Mass Sine sine wave inverter.*
	MasterView Easy *77010305*	option	option *Touch screen panel for reading charge status, current fold-back and/or Power Sharing setting.*
	Masterlink/MICC *70403105*	option	option *Battery consumption meter for 2 batteries, 12/24 V DC with LCD read-out, remote control for Mass Sine inverter and Mass battery charger or Mass Combi.*
	MasterBus Inverter Interface *77030700*	option	option *Integrates the Mass Sine inverter in a MasterBus network.*
	AC Power Analyser *77031200*	option	option *Integrates the Mass Sine inverter in a MasterBus network and visualizes the AC voltage, current and power.*

Specifications 120 V Mass Combi




	Mass Combi 12/2500-100	Mass Combi 12/4000-200	Mass Combi 24/2500-60	Mass Combi 24/4000-120
Product code 120 V	*37012505*	*37014005*	*37022505*	*37024005*
GENERAL SPECS SINE WAVE INVERTER				
Nominal DC voltage	12 V (10-15 V)	12 V (10-15 V)	24 V (20-31 V)	24 V (20-31 V)
Continuous power at 77 ˚F, cos phi 1	2500 W - 20.8 A	3750 W - 16.5 A	2500 W - 20.8 A	3750 W - 31 A
Surge capability (5 sec, resistive)	5000 W - 38 A	7500 W - 32 A	5000 W - 38 A	7500 W - 62 A
Parallel use (to double the power)	yes	no	yes	no
Parallel with grid/generator (for more power)	yes	yes	yes	yes
Output voltage (± 5%)	120 V – 60 Hz, ±0,05%	120 V – 60 Hz, ±0,05%	120 V – 60 Hz, ±0,05%	120 V – 60 Hz, ±0,05%
Output waveform	true sine	true sine	true sine	true sine
Efficiency	90%	90%	93%	93%
DC consumption at 120 V	<9 W	<18 W	<9 W	<18 W
Search mode consumption	0.5 W	1 W	0.5 W	1 W
GENERAL SPECS BATTERY CHARGER				
Nominal input voltage	120 V – 45-65 Hz	120 V – 45-65 Hz	120 V – 45-65 Hz	120 V – 45-65 Hz
Max. charge current (adjustable)	100 A at 14.25 V	200 A at 14.25 V	60 A at 28.5 V	100 A at 28.5 V
Primary AC consumption (full charge)	1700 W – 14.5 A	3400 W - 29 A	2000 W - 17 A	3500 W - 29 A
Charge voltage 77 °F (absorption/float)	14.25/13.25 V	14.25/13.25 V	28.5/26.5 V	28.5/26.5 V
Second charge output, 3-step	5 A	2 x 5 A	5 A	2 x 5 A
Temperature sensor battery	delivered as standard with 6 m cable and telejack plug	delivered as standard with 6 m cable and telejack plug	delivered as standard with 6 m cable and telejack plug	delivered as standard with 6 m cable and telejack plug
GENERAL SPECS				
Display/read-out	LED display	LED display	LED display	LED display
Dimensions, hxwxd	19.5 x 12.5 x 6.1 inch 496 x 318 x 156 mm	19.5 x 12.5 x 6.1 inch 496 x 318 x 156 mm	19.5 x 12.5 x 6.1 inch 496 x 318 x 156 mm	19.5 x 12.5 x 6.1 inch 496 x 318 x 156 mm
Weight	24.3 lb / 11 kg	46.3 lb / 21 kg	24.3 lb / 11 kg	46.3 lb / 21 kg
Approvals	CE, ABYC A-31	CE, ABYC A-31	CE, ABYC A-31	CE, ABYC A-31
TECHNICAL SPECS				
Charge characteristic	IUoUo, automatic / 3-step+ for gel / AGM / wet / Lithium Ion	IUoUo, automatic / 3-step+ for gel / AGM / wet / Lithium Ion	IUoUo, automatic / 3-step+ for gel / AGM / wet / Lithium Ion	IUoUo, automatic / 3-step+ for gel / AGM / wet / Lithium Ion
Max. current first output	50 A	50 A	50 A	50 A
Max. current shortbreak / inverter output	35 A	35 A	35 A	35 A
Transfer time	10 ms	10 ms	10 ms	10 ms
Ground relais	yes, adjustably by DIP switch	yes, adjustably by DIP switch	yes, adjustably by DIP switch	yes, adjustably by DIP switch
Temperature range (ambient temp.)	-13 °F to 176 °F -25 °C to 80 °C; derating > 77 °F / 25 °C	-13 °F to 176 °F -25 °C to 80 °C; derating > 77 °F / 25 °C	-13 °F to 176 °F -25 °C to 80 °C; derating > 77 °F / 25 °C	-13 °F to 176 °F -25 °C to 80 °C; derating > 77 °F / 25 °C
Cooling	maintenance free vario fans	maintenance free vario fans	maintenance free vario fans	maintenance free vario fans
Sound level	≤ 48 dBA at 1 mtr	≤ 48 dBA at 1 mtr	≤ 48 dBA at 1 mtr	≤ 48 dBA at 1 mtr
Protection degree	IP23	IP23	IP23	IP23
Protections	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery	over temperature, over load, short circuit, high battery, low battery
MasterBus compatible	yes, in combination with a MasterBus Combi Interface	yes, in combination with a MasterBus Combi Interface	yes, in combination with a MasterBus Combi Interface	yes, in combination with a MasterBus Combi Interface

OPTIONS

	Remote ICC *70405000*	option	delivered as standard	option	delivered as standard
		Indication of DC consumption, charge phase, AC present, failure, with on/off/'charger only' switch & 6 metre cable.			
	Remote APC *70405010*	option	option	option	option
		Indication of AC consumption, AC voltage, fuse value of the grid/generator connection, with Power Sharing.			
	Masterlink/MICC *70403105*	option	option	option	option
		Battery consumption metre for 2 batteries, 12/24 V DC with LCD read-out, remote control for Mass Sine inverter and Mass battery charger or Mass Combi.			
	MasterView Easy *77010305*	option	option	option	option
		In combination with a Mastervolt Combi Interface. Touch screen panel for reading charge status, current fold-back and/or Power Sharing setting.			
	MasterBus Combi Interface *77030475*	delivered as standard	option	delivered as standard	option
		Integrates the Mass Combi in a MasterBus network.			

Mastervolt DC-DC converters: For 12, 24 and 48 V

A DC-DC converter can provide other voltages than applied in your basic system. By using a DC-DC converter, other voltages can be reached. They also ensure that all your equipment has a stable power supply with the right voltage.

Mac & Magic series

- Professional use.
- Battery charger and dimmer function.
- Parallel connection.
- Adjustable output voltage.
- Voltage stabilisation for a longer lifespan of halogen lights, etc.

DC Master series

- Recreational and semi-professional use.
- Easy to install using included mounting bracket.
- Excellent price/performance ratio.

The Magic models can regulate the voltage both up and down to ensure an optimal voltage stabilisation, even when the battery voltage fluctuates due to heavy loads. The galvanic isolation between input and output prevents disruptions to, for instance, communication equipment.

Masterstrokes

- No unnecessary heat development due to the use of smart electronics.
- Continuous output voltage.
- Easy to install.

Please note

- Choose the right input/output voltage.
- Do you require galvanic isolation?
- Desired output power.

QUOTE

"Mastervolt equipment has already proven itself in the previous Volvo Ocean Races. It performed well as a lightweight, high-performance product, and Mastervolt's global network means participants will always have access to support should it be needed. We'll be staying with Mastervolt not just for this Volvo Ocean Race, but also for 2017-18 as well."

WILL BEST, MANAGING DIRECTOR
DIVERSE YACHT SERVICES, UNITED KINGDOM

Programmable via desktop or laptop/PC

Remote control the Mac or Magic via your laptop or PC or configure your personal preferences. The device has a communication port and easy installation with a PC-Link and MasterAdjust software.

Complete package DC Master

All DC Master converters are delivered with mounting bracket, screws and fasteners.

Energy-saving dimmer function

Many standard light dimmers convert part of the energy to heat and also lose unnecessary energy. The Mastervolt Mac & Magic converters regulate the power supply efficiently and without excessive heat build-up, up to 580 Watts for optimal safety (multiple Mac or Magic converters can be used for multiple lamps).

3-Step+ battery charger

Connected to the 24 V main battery, can also be used as an advanced 3-step+ battery charger for 12/24 V gel, AGM, wet or Lithium Ion batteries (Mac & Magic models only).

Parallel operation

If you have many/heavy power-consuming devices onboard, the parallel use of several units allows capacities of 40, 60 or more Amps. Advanced high-frequency technology with modern microprocessors ensures minimum power loss when switching from 24 to 12 V and vice versa.

Solid connections

Chrome-plated brass connection block with screw terminal or chrome-plated fast-on for DC in/out.

Specifications Mac & Magic converters

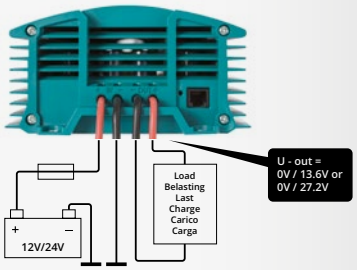



	Mac 24/12-20	Magic 24/12-20	Magic 24/24-20	Magic 12/12-20
Product code	*81200100*	*81300100*	*81300200*	*81300400*
INPUT SPECS				
Nominal input voltage	24 V	24 V	24 V	12 V
Input range	20-32 V DC	19-32 V DC	19-32 V DC	11-16 V DC
Input range, 3-step charge mode	24-32 V DC	24-32 V DC	24-32 V DC	12-16 V DC
Lower input set point*	20 V DC	20 V DC	20 V DC	10 V DC
Delay lower input set point*	30 sec.	30 sec.	30 sec.	30 sec.
OUTPUT SPECS				
Nominal output voltage*	13.6 V DC	13.6 V DC	27.2 V DC	13.6 V DC
Output voltage	10-15 V DC	10-15 V DC	20-28.5 V DC	10-15 V DC
Output voltage dimmer*	4-13 V DC	4-13 V DC	8-26 V DC	4-13 V DC
Output voltage stabilisation	2% at extremes of temperatures, load and input	2% at extremes of temperatures, load and input	2% at extremes of temperatures, load and input	2% at extremes of temperatures, load and input
Ripple	max. 1% peak peak	max. 1% peak peak	max. 1% peak peak	max. 1% peak peak
Power (max./nominal)	300 / 270 W	300 / 300 W	580 / 580 W	300 / 300 W
Max. current	20 A	20 A	20 A	20 A
Charge current - 3-step mode	16 A	16 A	16 A	16 A
Parallel configuration	yes, up to 10	yes, up to 10	yes, up to 10	yes, up to 10
GENERAL SPECS				
Galvanic isolation	no	yes	yes	yes
Voltage limited	yes	yes	yes	yes
Efficiency	>90% (at nom. input voltage, full load); 92% peak	>90% (at nom. input voltage, full load); 92% peak	>90% (at nom. input voltage, full load); 92% peak	>90% (at nom. input voltage, full load); 92% peak
Protected against over load	yes	yes	yes	yes
Protected against over temperature	yes	yes	yes	yes
Dimmer function	yes, by external momentary switch via fast-on connection, to be activated by DIP-switch setting	yes, by external momentary switch via fast-on connection, to be activated by DIP-switch setting	yes, by external momentary switch via fast-on connection, to be activated by DIP-switch setting	yes, by external momentary switch via fast-on connection, to be activated by DIP-switch setting
Alarm contact	no	yes (fast-on connector)	yes (fast-on connector)	yes (fast-on connector)
Dimensions, hxwxd	190 x 130 x 61 mm 7.5 x 5.1 x 2.4 inch	227 x 154 x 81 mm 8.9 x 6.1 x 3.2 inch	227 x 154 x 81 mm 8.9 x 6.1 x 3.2 inch	227 x 154 x 81 mm 8.9 x 6.1 x 3.2 inch
Weight	1 kg / 2.2 lb	1.8 kg / 4 lb	1.8 kg / 4 lb	1.8 kg / 4 lb
Approvals	CE	CE	CE	CE
TECHNICAL SPECS				
3-Step charge option	yes (DIP switch settings)	yes (DIP switch settings)	yes (DIP switch settings)	yes (DIP switch settings)
DC consumption	<30 mA	<115 mA	<115 mA	<115 mA
Connections input/output	screw terminals, maximum wire size 16 mm² / AWG5	screw terminals, maximum wire size 16 mm² / AWG5	screw terminals, maximum wire size 16 mm² / AWG5	screw terminals, maximum wire size 16 mm² / AWG5
Temperature range (ambient temp.)	-25 °C to 80 °C; > 40 °C derating power	-25 °C to 80 °C; > 40 °C derating power	-25 °C to 80 °C; > 40 °C derating power	-25 °C to 80 °C; > 40 °C derating power
Cooling	natural cooling	maintenance free vario fans	maintenance free vario fans	maintenance free vario fans
Sound level	< 30 dBA at 1 mtr	< 48 dBA at 1 mtr	< 48 dBA at 1 mtr	< 48 dBA at 1 mtr
Protection degree	IP21	IP21	IP21	IP21
MasterBus compatible	yes, in combination with a MasterBus Serial Interface	yes, in combination with a MasterBus Serial Interface	yes, in combination with a MasterBus Serial Interface	yes, in combination with a MasterBus Serial Interface

* Adjustable with MasterAdjust software.

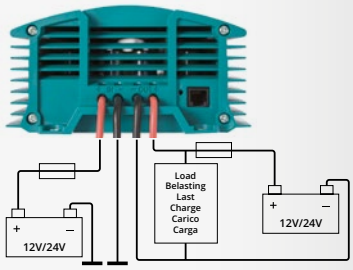
OPTIONS						
	PC-Link *21730300*	option	option	option	option	
		Interface between Magic converter and PC, in combination with the MasterAdjust software (free to download). The PC-Link can be directly connected to a computer serial port.				
	MasterView Easy *77010305*	option	option	option	option	
		In combination with a MasterBus Serial Interface.Touch screen panel for reading status and dimmer function settings.				
	MasterBus Serial Interface *77030450*	option	option	option	option	
		Integrates the Mac & Magic converters in a MasterBus network.				

Magic 12/24-10
81300300
12 V
11-16 V DC
12-16 V DC
10 V DC
30 sec.
27.2 V DC
20-28.5 V DC
8-26 V DC
2% at extremes of temperatures, load and input
max. 1% peak peak
300 / 300 W
10 A
8 A
yes, up to 10
yes
yes
>90% (at nom. input voltage, full load); 92% peak
yes
yes
yes, by external momentary switch via fast-on connection, to be activated by DIP-switch setting
yes (fast-on connector)
227 x 154 x 81 mm 8.9 x 6.1 x 3.2 inch
1.8 kg / 4 lb
CE
yes (DIP switch settings)
<115 mA
screw terminals, maximum wire size 16 mm² / AWG5
-25 °C to 80 °C; > 40 °C derating power
maintenance free vario fans
< 48 dBA at 1 mtr
IP21
yes, in combination with a MasterBus Serial Interface
option
option
option



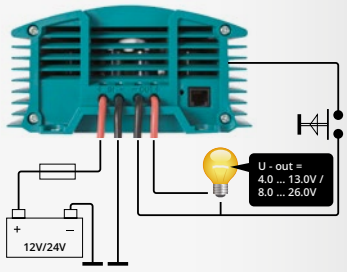
Magic as power supply

The Magic models can be fully used as a stabilised power supply: From 12 to 24 V, from 24 to 12 V or from 24 to 24 V. Inputs and outputs are galvanically isolated.



Mac & Magic as battery charger

A 12 V starter or emergency power battery can be charged as well as maintained by Mac or Magic units. The charging method is identical to the Mass 3-step with voltage levels adjustable by means of MasterBus PC-Link/MasterAdjust software.



Mac & Magic as dimmer

Light can be dimmed by means of a push button or plus switch, with a maximum load of 250 Watt for the Mac. A second Mac can be installed if there are multiple lamps.

Specifications
DC Master converters




Non Isolated

	DC Master 24/12-3A	DC Master 24/12-6A	DC Master 24/12-12A	DC Master 24/12-24A
Product code	*81400100*	*81400200*	*81400300*	*81400330*
INPUT SPECS				
Nominal input voltage	24 V	24 V	24 V	24 V
Input range	20-32 V DC	20-32 V DC	20-32 V DC	20-32 V DC
OUTPUT SPECS				
Nominal output voltage	13.6 V	13.6 V	13.6 V	13.6 V
Maximum power	82 W	136 W	245 W	408 W
Nominal power	41 W	82 W	164 W	326 W
Current max. 2 minutes* / continuous	6 A / 3 A	10 A / 6 A	18 A / 12 A	30 A / 24 A
Parallel configuration	yes, up to 10	yes, up to 10	yes, up to 10	yes, up to 10
DC consumption	< 10 mA	< 10 mA	< 10 mA	< 10 mA
GENERAL SPECS				
Dimensions, hxwxd	67 x 87 x 50 mm 2.6 x 3.4 x 2 inch	89 x 87 x 50 mm 3.5 x 3.4 x 2 inch	127 x 87 x 50 mm 5 x 3.4 x 2 inch	167 x 87 x 50 mm 6.6 x 3.4 x 2 inch
Weight	225 g / 0.5 lb	270 g / 0.6 lb	405 g / 0.9 lb	635 g / 1.4 lb
Approvals	CE, E-mark	CE, E-mark	CE, E-mark	CE, E-mark
Galvanic isolation	no	no	no	no
Stabilised	yes	yes	yes	yes
Connections input/output	fast-on	fast-on	fast-on	fast-on
Temperature range (ambient temp.)	-25 °C to 80 °C, > 30 C derating power	-25 °C to 80 °C, > 30 C derating power	-25 °C to 80 °C, > 30 C derating power	-25 °C to 80 °C, > 30 C derating power
Cooling	natural cooling	natural cooling	natural cooling	natural cooling
Sound level	< 30 dBA at 1 mtr	<30 dBA at 1 mtr	< 30 dBA at 1 mtr	<30 dBA at 1 mtr
Protection degree	IP53	IP53	IP53	IP53




Isolated

	DC Master 12/12-3A	DC Master 12/12-6A	DC Master 24/12-3A	DC Master 24/12-6A
Product code	*81500600*	*81500700*	*81500100*	*81500200*
INPUT SPECS				
Nominal input voltage	12 V	12 V	24 V	24 V
Input range	10-15.5 V	10-15.5 V	20-32 V DC	20-32 V DC
OUTPUT SPECS				
Nominal output voltage	13.6 V	13.6 V	13.6 V	13.6 V
Maximum power	54 W	108 W	82 W	136 W
Nominal power	41 W	81 W	41 W	82 W
Current max. 2 minutes* / continuous	4 A / 3 A	8 A / 6 A	6 A / 3 A	10 A / 6 A
Parallel configuration	yes, up to 10	yes, up to 10	yes, up to 10	yes, up to 10
DC consumption	< 100 mA	< 100 mA	< 10 mA	< 10 mA
GENERAL SPECS				
Dimensions, hxwxd	89 x 87 x 50 mm 3. 3.4 x 2 inch	217 x 87 x 50 mm 8.5 x 3.4 x 2 inch	89 x 87 x 50 mm 3.5 x 3.4 x 2 inch	127 x 87 x 50 mm 5 x 3.4 x 2 inch
Weight	290 g / 0.6 lb	820 g / 1.8 lb	290 g / 0.6 lb	410 g / 0.9 lb
Approvals	CE, E-mark	CE, E-mark	CE, E-mark	CE, E-mark
Galvanic isolation	yes	yes	yes	yes
Stabilised	yes	yes	yes	yes
Connections input/output	fast-on	fast-on	fast-on	fast-on
Temperature range (ambient temp.)	-25 °C to 80 °C, > 30 C derating power	-25 °C to 80 °C, > 30 C derating power	-25 °C to 80 °C, > 30 C derating power	-25 °C to 80 °C, > 30 C derating power
Cooling	natural cooling	natural cooling	natural cooling	natural cooling
Sound level	< 30 dBA at 1 mtr	< 30 dBA at 1 mtr	< 30 dBA at 1 mtr	< 30 dBA at 1 mtr
Protection degree	IP53	IP53	IP53	IP53

no picture available					
DC Master 24/12-50A	**DC Master 12/24-3A**	**DC Master 12/24-7A**	**DC Master 48/12-6A**	**DC Master 48/12-9A**	**DC Master 48/12-20A**
81400352	*81400400*	*81400500*	*81400600*	*81400700*	*81400800*
24 V	12 V	12 V	48 V	48 V	48 V
20-32 V DC	10-15.5 V DC	10-15.5 V DC	40-62 V DC	40-62 V DC	40-62 V DC
13.6 V	27.2 V	27.2 V	13.6 V	13.6 V	13.6 V
720 W	109 W	245 W	109 W	132 W	326 W
500 W	82 W	191 W	82 W	108 W	272 W
60 A / 50 A	4 A / 3 A	9 A / 7 A	8 A / 6 A	11 A / 9 A	24 A / 20 A
yes, up to 10	yes, up to 10	yes, up to 10	yes, up to 10	yes, up to 10	yes, up to 10
< 20 mA	< 110 mA	< 120 mA	< 15 mA	< 15 mA	< 15 mA
283 x 125 x 74 mm 11 x 4.9 x 2.9 inch	89 x 87 x 50 mm 3.5 x 3.4 x 2 inch	167 x 87 x 50 mm 6.6 x 3.4 x 2 inch	89 x 87 x 50 mm 3.5 x 3.4 x 2 inch	127 x 87 x 50 mm 5 x 3.4 x 2 inch	217 x 87 x 50 mm 8.5 x 3.4 x 2 inch
1.8 kg / 4 lb	290 g / 0.6 lb	610 g / 1.3 lb	415 g / 0.9 lb	415 g / 0.9 lb	765 g / 0.9 lb
CE, E-mark	CE, E-mark	CE, E-mark	CE, E-mark	CE, E-mark	CE, E-mark
no	no	no	no	no	no
yes	yes	yes	yes	yes	yes
screw terminal	fast-on	fast-on	fast-on	fast-on	fast-on
-25 °C to 80 °C, > 30 C derating power	-25 °C to 80 °C, > 30 C derating power	-25 °C to 80 °C, > 30 C derating power	-25 °C to 80 °C, > 30 C derating power	-25 °C to 80 °C, > 30 C derating power	-25 °C to 80 °C, > 30 C derating power
natural cooling	natural cooling	natural cooling	natural cooling	natural cooling	natural cooling
< 30 dBA at 1 mtr	<30 dBA at 1 mtr	< 30 dBA at 1 mtr	<30 dBA at 1 mtr	< 30 dBA at 1 mtr	<30 dBA at 1 mtr
IP53	IP53	IP53	IP53	IP53	IP53

			
DC Master 24/12-12A	**DC Master 24/12-24A**	**DC Master 24/24-3A**	**DC Master 24/24-7A**
81500300	*81500350*	*81500400*	*81500500*
24 V	24 V	24 V	24 V
20-32 V DC	20-32 V DC	20-32 V DC	20-32 V DC
13.6 V	13.6 V	27.2 V	27.2 V
245 W	408 W	109 W	245 W
164 W	326 W	82 W	191 W
18 A / 12 A	24 A / 30 A	4 A / 3 A	9 A / 7 A
yes, up to 10	yes, up to 10	yes, up to 10	yes, up to 10
< 10 mA	< 10 mA	< 25 mA	< 25 mA
167 x 87 x 50 mm 6.6 x 3.4 x 2 inch	217 x 87 x 50 mm 8.5 x 3.4 x 2 inch	127 x 87 x 50 mm 5 x 3.4 x 2 inch	217 x 87 x 50 mm 8.5 x 3.4 x 2 inch
590 g / 1.3 lb	850 g / 1.9 lb	590 g / 1.3 lb	820 g / 1.8 lb
CE, E-mark	CE, E-mark	CE, E-mark	CE, E-mark
yes	yes	yes	yes
yes	yes	yes	yes
fast-on	fast-on	fast-on	fast-on
-25 °C to 80 °C, > 30 C derating power	-25 °C to 80 °C, > 30 C derating power	-25 °C to 80 °C, > 30 C derating power	-25 °C to 80 °C, > 30 C derating power
natural cooling	natural cooling	natural cooling	natural cooling
< 30 dBA at 1 mtr	< 30 dBA at 1 mtr	< 30 dBA at 1 mtr	< 30 dBA at 1 mtr
IP53	IP53	IP53	IP53

* Two minutes of extra power for short power boosts.

All DC Master converters come with a mounting bracket, screws and fast-ons.

The intelligent simplicity of MasterBus

The advanced functions of custom made systems are now within easy reach thanks to the MasterBus platform (single communication protocol with high-speed CANbus technology). The intelligent, one-cable MasterBus network greatly simplifies wiring, saving you valuable space and weight. Additionally, you can automate and customize your system to meet all your requirements.

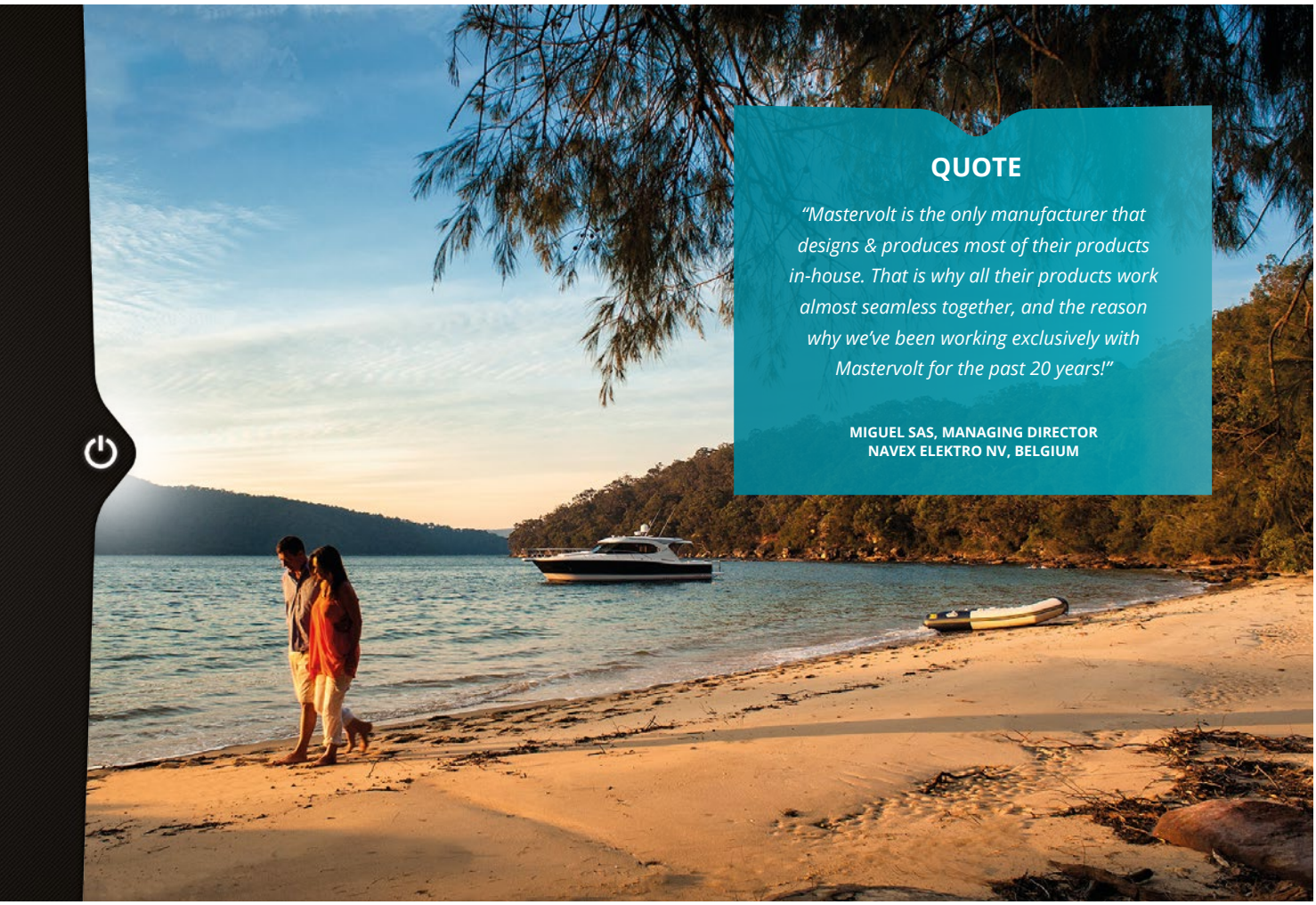
The wide range of interfaces and modules allows you to connect any equipment you wish to your MasterBus system and manage, monitor or operate it locally, centrally or even from your home address. Thanks to galvanic isolation, nearly all devices can supply power to the MasterBus, ensuring a safe and stable network.

Professional perspective

MasterBus also makes life easier for designers, builders and installers of power systems with less material, less work, less fuss and an easy testing method. Moreover, it is available in ten languages and offers the same user interface for all (Mastervolt) products, such as battery chargers, inverters, generators, batteries or other devices. All control panels have an identical layout, with or without PC software.

Easy maintenance

Replacing a component can often lead to complex configuration problems. Not with Mastervolt: The MasterBus network 'recognises' any replacement directly and automatically asks whether you want to keep the same or change your configuration. You stay well informed and with *everything under control*.



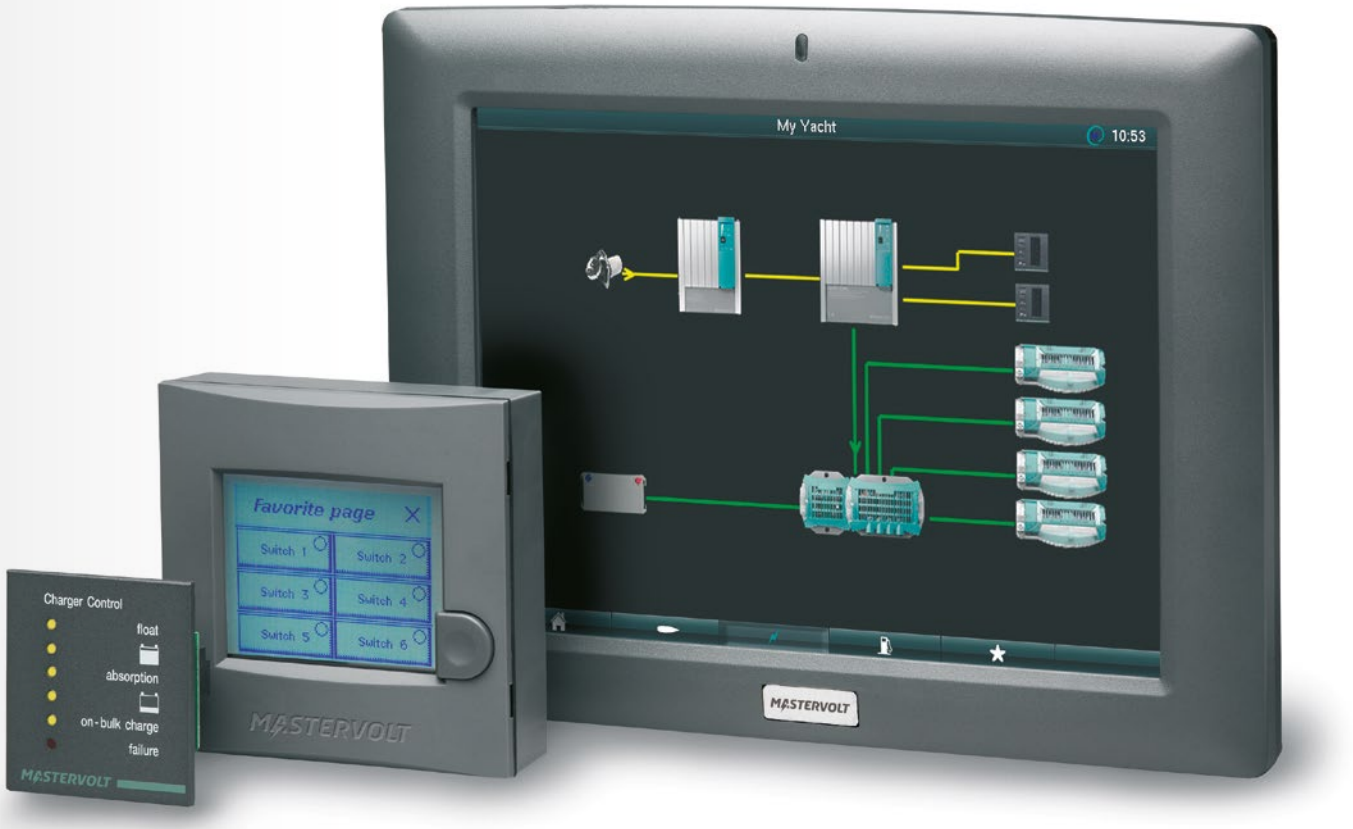
QUOTE

"Mastervolt is the only manufacturer that designs & produces most of their products in-house. That is why all their products work almost seamless together, and the reason why we've been working exclusively with Mastervolt for the past 20 years!"

MIGUEL SAS, MANAGING DIRECTOR
NAVEX ELEKTRO NV, BELGIUM

MasterView control panels: Monitor & control your MasterBus network

Fast and clear information about your onboard electrical system is vital. Usually a number of multiple panels are required to read the details of an expansive electrical system, and the interpretation of these panels and how they relate to one another is left to the user. Mastervolt puts an end to this undesirable situation with its intelligent MasterView panels.



The smartest solution: MasterView System

Mastervolt's intelligent MasterView System brings an end to cluttered, unclear and excessive information. The system is based on our in-house developed software combined with a user-friendly 10.4-inch colour touch screen. The simple yet brilliant set-up of the MasterView System intelligently connects all the power sources and loads via the MasterBus. It provides all information you need on your electrical system in one clear overview on an organised, intuitively operated panel.

Multifunctional touch screen remote panel: MasterView Easy

This multifunctional display can monitor every MasterBus product. Connected to the Mastershunt it functions as a battery monitor, connected to the generator as a generator panel. These and other functions can also take place simultaneously and you can create a favourites page showing all your main information.

MasterView Read-out

Control panel for all MasterBus products

Remote panel for reading the charge status of your battery charger, including error notifications.

	MasterView Read-out
Product code	*77010050*
Display	7 LEDs
Dimensions, hxw	60 x 65 mm / 2.4 x 2.6 inch
Weight	70 g / 0.15 lb
MasterBus connection	yes
Powered by	MasterBus
Power consumption	144 mW
Protection degree	IP21

	MasterView Read-out OEM
Product code	*77010030*

If your dashboard is full and does not offer space for a MasterView panel, this module allows you to integrate the MasterView Read-out into your own control panel.

MasterView Easy

Touchscreen control panel for all MasterBus products

This touchscreen control panel is easy to read and operate. The grey button turns the display on or off or locks it, while all other functions can be controlled using the touchscreen.

The first of three control levels provides a short system overview with all the information you may need on a daily basis. The product overview screen shows detailed information. The favourites screen can be custom designed to meet your specific needs for information and control. The MasterBus cable is used for data transfer and as a power supply for the display.

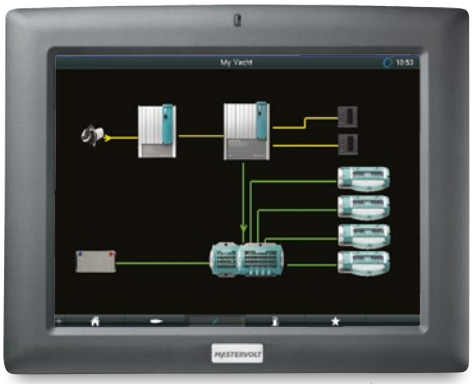
Benefits:

- Clearly lit display.
- On/off button and lock to prevent unwanted activities.
- Touchscreen control of all functions.
- White background light – red for alarm functions or night lighting.
- Buzzer and alarm function.
- Requires only one MasterBus cable for data transfer and power supply.
- Low energy consumption.
- Easy to install (flush and surface mounted).

	MasterView Easy
Product code	*77010305*
Display	3.5 inch touch screen
Dimensions, hxwxd	110 x 110 x 20 mm 4.3 x 4.3 x 0.8 inch
Weight	230 gr / 0.51 lb
MasterBus connection	yes
Powered by	MasterBus
Power consumption	160 mW
Protection degree	IP21
Languages	ENG, NL, DE, SP, IT, FRA, FIN, SWE, DEN, NOR

MasterView System:
Interactive touchscreen

This full color graphical display helps installers to configure the electrical onboard system, and is extremely easy to reproduce. Configuration, monitoring and operation becomes easier, cheaper, lighter and faster. The software makes complicated electrical systems understandable for each user. Electricity has become fun to operate!



Favourites screen
The favourites screen can be custom designed to meet your specific needs for information and control. Any information that is available on the MasterBus network can be shown in the most logical way. Multiple pages can display information, for example, one overview page, one or two breaker pages, an engine information page and a NMEA 2000 information page.

System overview
This screen gives a dynamic graphical overview of your electric system, answering any questions you have in an instant. Incorrect line voltages are shown in red, inactive circuits in grey: It couldn't be easier.

Digital switching screen
This screen shows the complete layout, lights, selected pumps and other consumers. You manage the loads by clicking the icons. The background image can be uploaded for full customisation. Alarm notifications are shown via eye-catching pop-ups.

Tank level screen
Stop guessing and know immediately the contents of up to 20 tanks. You can also install your own warning signals for full or (nearly) empty tanks. All you need to do is connect the MasterBus Tanklevel Interface to the MasterBus system.

Home screen
The home screen provides a status overview of power sources like grid power, inverters, generators and batteries. A basic form of control is possible, for example turning on and off your inverter.

	MasterView System
Product code	*77010400*
Display	10.4 inch colour touch screen
Dimensions, hxwxd	222 x 276 x 38 mm 8.7 x 10.9 x 1.5 inch
Weight	1.4 kg / 3.1 lb
MasterBus connection	by means of System Panel Controller *(delivered as standard)*
Power	by means of System Panel Controller *(delivered as standard)*
Power consumption	28 W
Protection degree	IP64 (front)
Languages	ENG, NL, DE, SP, IT, FRA, FIN, SWE, DEN, NOR

System Panel Controller
Connect the MasterView System or your PC with the MasterBus network. Provides the power and software license key for the MasterView System panel.

Delivered as standard with MasterView System.
Also available separately.

Product code	*77031900*
MasterBus powering	yes (when the PC is switched on)
Dimensions, hxwxd	91 x 185 x 33 mm 3.6 x 7.3 x 1.3 inch
Weight	± 750 g / 1.65 lb
Protection degree	IP65
Delivered with	USB cable, SPC cable, MasterBus cable, MasterBus Terminator, user's manual

The basic components of a MasterBus network

MasterShunt

MasterBus integrated battery monitor, with detailed information on the status of your batteries for an optimised charging process, including voltage, current, remaining time and consumption capacity in percentage. With an intelligent connection system, the MasterShunt is easily connected to the DC Distribution. The integrated system clock combined with command-based events custom automates the system to your needs. Example of system automation: The generator should start automatically when the batteries are almost depleted.
The MasterShunt also provides a robust built-in main fuse that can safely interrupt short-circuit currents of 20 kA.

	MasterShunt 500
Product code	*77020100*
Dimensions, hxwxd	150 x 150 x 65 mm 5.9 x 5.9 x 2.5 inch
Weight	1 kg / 2.2 lb
Battery types	gel, AGM, wet, Lithium Ion, spiral
Battery voltage	12, 24 or 48 V DC
Current	300 A continuous / 500 A for 5 minutes
MasterBus powering	yes
Main fuse	500 A T-fuse (300 A continuous at 40 °C)
System functionality	alarm, timers, auto start/ stop for the generator
Programmable alarms	warning low voltage, warning low state of charge, high voltage
Protection degree	IP21
Delivered with	MasterShunt, temperature sensor, MasterBus Terminator, MasterBus cable, isolation cover for DC connections

DC Distribution 500

The DC Distribution 500 is the smallest distribution model available. It connects up to four DC devices to the DC groups, such as a battery charger, inverter, alternators and solar panels. With the included plug & play cable it can be easily connected to the MasterBus network. The MasterView panel gives all fuses logical names, for instance, referring to the connected equipment, to ensure you receive understandable error notifications (for example: battery charger fuse defect).

	DC Distribution 500
Product code	*77020200*
Dimensions, hxwxd	150 x 216 x 65 mm 5.9 x 7.9 x 2.5 inch
Weight	1.2 kg / 2.6 lb
Battery voltage	12, 24 or 48 V DC
Current	300 A continuous / 500 A for 5 minutes
MasterBus powering	no
Standard fuses	80, 80, 125, 160 A - ANL type (deviating values can be ordered separately)
Spare fuse	125 A ANL type
Alarm	fuse monitoring
Protection degree	IP21
Delivered with	5 fuses, hex tool, MasterBus Terminator, MasterBus cable, cable protections for DC connections

Digital DC 10x10A

As the pinnacle of system intelligence, the Mastervolt Digital DC 10x10A has ten 10 A outputs for all functions including lighting, pumps, electronics, etc. It comes standard with intelligent alarm functions and luxury options include:

- Follow me home (light stays on for a specific time).
- Delayed dimming of lights (including ten built-in dimmers).
- Alarm signal for overload.
- Every output has a hardware and software fuse.
- Reset the fuses via the MasterBus network.
- Possibility of higher currents (up to 100 A) with parallel switching of multiple outputs.
- Logical blocks.

	Digital DC 10x10A
Product code	*77020400*
Dimensions, hxwxd	40 x 229 x 110 mm 1.6 x 9.0 x 4.3 inch
Weight	750 gr / 1.7 lb
MasterBus powering	yes
Power consumption	<2 mA at 12/24 V
Protection degree	IP21
DC OUTPUT	
Connection	cable max. 4 mm²
Maximum software fuse current	10 A per channel
Hardware fuse current	15 A per channel
DC INPUT	
Connections	max. 95 mm² or directly connected to MasterShunt or DC Distribution
Maximum current	100 A
Supply voltage	8-30 V DC

Integrate your MasterBus system: MasterBus Interfaces

Mastervolt offers a wide range of interfaces to increase the versatility of your MasterBus network. Connect multiple components to distribute information to your MasterBus products or connect products that require information from the MasterBus network, such as a NMEA 2000 or Modbus network, and vice versa.

All interfaces (and modules) can be installed in various ways, from DIN rails to surface mounting. Available in ten languages: English, Dutch, German, French, Spanish, Italian, Norwegian, Swedish, Finnish and Danish.

Specifications

MasterBus USB Interface

The MasterBus USB Interface enables you to read and configure the MasterBus network via your PC.

	MasterBus USB Interface
Product code	*77030100*
MasterBus powering	yes (when the PC is switched on)
Dimensions, hxwxd	66 x 78 x 32 mm 2.6 x 3.1 x 1.3 inch
Weight	± 80 g / 0.18 lb
Protection degree	IP21
Delivered with	USB connection cable, MasterBus cable, MasterBus Terminator, user's manual

MasterBus NMEA 2000 Interface

The MasterBus NMEA 2000 Interface provides the MasterBus network with NMEA 2000 information, and vice versa.

	MasterBus NMEA 2000 Interface
Product code	*77031800*
MasterBus powering	no
Dimensions, hxwxd	66 x 78 x 32 mm 2.6 x 3.1 x 1.3 inch
Weight	± 100 g / 0.22 lb
Protection degree	IP21
Delivered with	NMEA connection cable, MasterBus cable, MasterBus Terminator, user's manual

MasterBus Modbus Interface

The MasterBus Modbus Interface can provide all information from the 'closed' MasterBus network for other monitoring and operating systems by means of the Modbus protocol.

	MasterBus Modbus Interface
Product code	*77030800*
MasterBus powering	no
Dimensions, hxwxd	66 x 78 x 32 mm 2.6 x 3.1 x 1.3 inch
Weight	± 80 g / 0.18 lb
Protection degree	IP21
Delivered with	MasterBus cable, MasterBus Terminator, user's manual

MasterBus Combi Interface

This interface integrates a Mastervolt Mass Combi in a MasterBus network and allows it to be operated or monitored via a MasterView panel or PC.

	MasterBus Combi Interface
Product code	*77030475*
MasterBus powering	yes
Dimensions, hxwxd	66 x 78 x 32 mm 2.6 x 3.1 x 1.3 inch
Weight	± 80 g / 0.18 lb
Protection degree	IP21
Delivered with	Interface connection cable, MasterBus Terminator, user's manual

MasterBus Inverter Interface

The MasterBus Inverter Interface integrates the Mastervolt Mass Sine inverter in a MasterBus network and allows it to be operated and monitored via MasterView or PC.

	MasterBus Inverter Interface
Product code	*77030700*
MasterBus powering	no
Dimensions, hxwxd	66 x 78 x 32 mm 2.6 x 3.1 x 1.3 inch
Weight	± 80 g / 0.18 lb
Protection degree	IP21
Delivered with	Interface connection cable, MasterBus cable, MasterBus Terminator, user's manual

MasterBus Serial Interface

The MasterBus Serial Interface connects conventional Mastervolt products to MasterBus. Data becomes permanently available to allow configuration, operation and monitoring via MasterView panels. Suitable for Masterlink BTM-III, Mac and Magic DC-DC converters.

	MasterBus Serial Interface
Product code	*77030450*
MasterBus powering	no
Dimensions, hxwxd	66 x 78 x 32 mm 2.6 x 3.1 x 1.3 inch
Weight	± 80 g / 0.18 lb
Protection degree	IP21
Delivered with	Interface connection cable, MasterBus cable, MasterBus Terminator, user's manual

For more information, see ■ www.mastervolt.com/masterbus-interfaces

Specifications

GPRS Module: Communicate with your system via mobile phone.

GPRS Module

Communicate with your system via mobile phone, allowing you to monitor current information or operate the system by remote control via a text message or easy shortcuts.
Alarm notifications per text message are optional.

	GPRS Module
Product code	*77031000*
MasterBus powering	no
Dimensions, hxwxd	66 x 78 x 32 mm 2.6 x 3.1 x 1.3 inch
Weight	± 80 g / 0.18 lb
Protection degree	IP21
Delivered with	GPRS antenna, MasterBus cable, MasterBus Terminator, user's manual. *SIM card not included*

MasterBus Tank level Interface

This interface converts analogue sensor input signals to MasterBus data.
Selectable input signals: 4-20 mA, 0-300 Ω, 8-70 V DC.

	MasterBus Tanklevel Interface
Product code	*77030300*
MasterBus powering	no
Dimensions, hxwxd	66 x 78 x 32 mm 2.6 x 3.1 x 1.3 inch
Weight	± 80 g / 0.18 lb
Protection degree	IP21
Delivered with	MasterBus cable, MasterBus Terminator, user's manual

CZone MasterBus Bridge Interface

The CZone MasterBus Bridge Interface physically connects the MasterBus and CZone networks together enabling the two networks to communicate and act as one, providing seamless control and monitoring of devices on both networks from either MasterBus or CZone displays.

Features/functions:

- Control of Mastervolt inverters and chargers from CZone displays and switches.
- Control of MasterBus output devices (turn lights, pumps, etc. on/off).
- Control of CZone output devices (turn lights, pumps, etc. on/off) via MasterBus displays and switches.
- Display CZone acquired systems information such as tank and power levels on MasterBus displays.
- Display MasterBus acquired systems information such as tank and power levels on CZone displays.
- Transfers alarms between both systems.

	CZone Masterbus Bridge Interface
Product code	*80-911-0072-00*
MasterBus powering	no
Dimensions, hxwxd	69 x 69 x 50 mm 2.7 x 2.7 x 2 inch
Weight	145 g / 0.32 lb
Protection degree	IP65
Delivered with	MasterBus cable adapter, MasterBus Terminator, user's manual

Multipurpose Contact Output

Mastervolt's potential-free contact can be customised and programmed to give your MasterBus network unprecedented possibilities. Use it, for example, to control a ventilator or operate a generator from a different brand.

	Multipurpose Contact Output
Product code	*77030500*
Potential free contact	NO-C-NC - 1 A / 30 V DC
MasterBus powering	no
Dimensions, hxwxd	66 x 78 x 32 mm 2.6 x 3.1 x 1.3 inch
Weight	± 80 g / 0.18 lb
Protection degree	IP21
Delivered with	MasterBus cable, MasterBus Terminator, user's manual

MasterBus Repeater

Double the maximum length of your MasterBus network.

	MasterBus Repeater
Product code	*77031100*
MasterBus powering	yes
Dimensions, hxwxd	66 x 78 x 32 mm 2.6 x 3.1 x 1.3 inch
Weight	± 90 g / 0.20 lb
Protection degree	IP21
Delivered with	MasterBus cable, MasterBus Terminator, user's manual

Digital Input

Connect up to four switches to the MasterBus network. Delivery includes connection cables.

	Digital Input
Product code	*77030900*
MasterBus powering	no
Dimensions, hxwxd	66 x 78 x 32 mm 2.6 x 3.1 x 1.3 inch
Weight	± 80 g / 0.18 lb
Protection degree	IP21
Delivered with	cable with plug, MasterBus cable, MasterBus Terminator, user's manual

Digital AC 1x6A

Switches all AC loads, no matter where they are. Loads up to 6 A can be directly switched, higher loads should be switched via a relay.

	Digital AC 1x6A
Product code	*77031500*
MasterBus powering	no
Max. relay current	6 A (230 V AC single pole)
Dimensions, hxwxd	66 x 78 x 32 mm 2.6 x 3.1 x 1.3 inch
Weight	± 80 g / 0.18 lb
Protection degree	IP21
Delivered with	MasterBus cable, MasterBus Terminator, user's manual

Switch Input 3 PCB

Switch Input 3 makes Carling switches compatible with MasterBus. Multiple functions can be easily linked with this module.

	Switch Input 3 PCB
Product code	*77031300*
MasterBus powering	no
Dimensions, hxwxd	54 x 86 x 58 mm 2 x 3.4 x 2.3 inch (incl. mounting frame)
Distance between switches	26.1 mm
Weight	35 g / 0.08 lb (incl. MasterBus Terminator)
Protection degree	IP21
Delivered with	MasterBus Terminator, user's manual. *Switches and mounting frame not included*

Switch Input 4 PCB

Provides LED indications for additional information. For example: The LED will blink when a connected lamp fails.

	Switch Input 4 PCB
Product code	*77031400*
MasterBus powering	no
Dimensions, hxwxd	56 x 120 x 65 mm 2.2 x 4.7 x 2.6 inch (incl. mounting frame)
Distance between switches	27.3 mm
Weight	45 g / 0.1 lb (incl. MasterBus Terminator)
Protection degree	IP21
Delivered with	MasterBus Terminator, user's manual. *Switches and mounting frame not included*

AC Power Analyser

The AC Power Analyser is a multifunctional measuring device which can visualize the AC current and AC voltage, frequency, Cos Phi and the power of the system. On top of that it features the 'inverter control' and a free programmable 'potential free contact'.

	AC Power Analyser
Product code	*77031200*
MasterBus powering	yes
Dimensions, hxwxd	80 x 181 x 28 mm 3.1 x 7.1 x 1.1 inch
Weight	± 530 g / 1.17 lb
Protection degree	IP65
Delivered with	MasterBus cable, MasterBus Terminator, current transformer 100:5, user's manual

Use it to connect AC power devices such as generators or isolation transformers to the MasterBus network.

Practical: MasterBus accessories

MasterShunt fuses

The robust fuse (500 A/160 V DC, 20 kA short circuit current) is suitable for high short circuit currents from the batteries. Spare fuse available separately.

Product code	77049000

DC Distribution fuses

The DC Distribution standard comes with four ANL fuses: 80, 80, 125 and 160 A, and a spare fuse of 125 A.

Replacement fuses and other amperages:

Product code	
77049020	20 A
77049040	40 A
77049050	50 A
77049063	63 A
77049080	80 A
77049100	100 A
77049125	125 A
77049160	160 A
77049175	175 A
77049200	200 A
77049250	250 A
77049300	300 A
77049400	400 A
77049425	425 A
77049500	500 A

MasterBus Terminator

The Terminators ensure interference-free operation, prevent reflection of data signals and ensure high communication speeds.

Product code	77040000

MasterBus communication cable

Suitable for data traffic and powering peripheral equipment in harsh environments, this is the only cable you need for your MasterBus network. MasterBus compatible products come standard with two ports, while other equipment requires an interface. A DIY kit is optional.

Product code	
77040020	0.2 m
77040050	0.5 m
77040100	1 m
77040300	3 m
77040600	6 m
77041000	10 m
77041500	15 m
77042500	25 m
77045000	100 m

MasterBus DIY kit

Cut your own cables to length and finish, comprising:

- Professional RJ45 crimping tool.
- 50 x MasterBus RJ45 connectors.
- 50 x green MasterBus RJ45 protection boots.
- 100 m green MasterBus CAT5E UTP cable.

Product code	77050000

Separately available:

Product code	
77040010	25 x MasterBus RJ45 connectors, 8-pole
77040015	25 x green isolation caps for RJ45 connector

QUOTE

"We, as an established manufacturer and interior designers of upper class travel- and expedition vehicles, rely on the reliability of the Mastervolt system because unique special solutions for optimum power supply are often necessary. Custom designed, we can select the right components and know that we will meet our customers' expectations."

KLAUS HUNERKOPF, FOUNDER & MANAGING DIRECTOR
HÜNERKOPF SPEZIALFAHRZEUGE, GERMANY

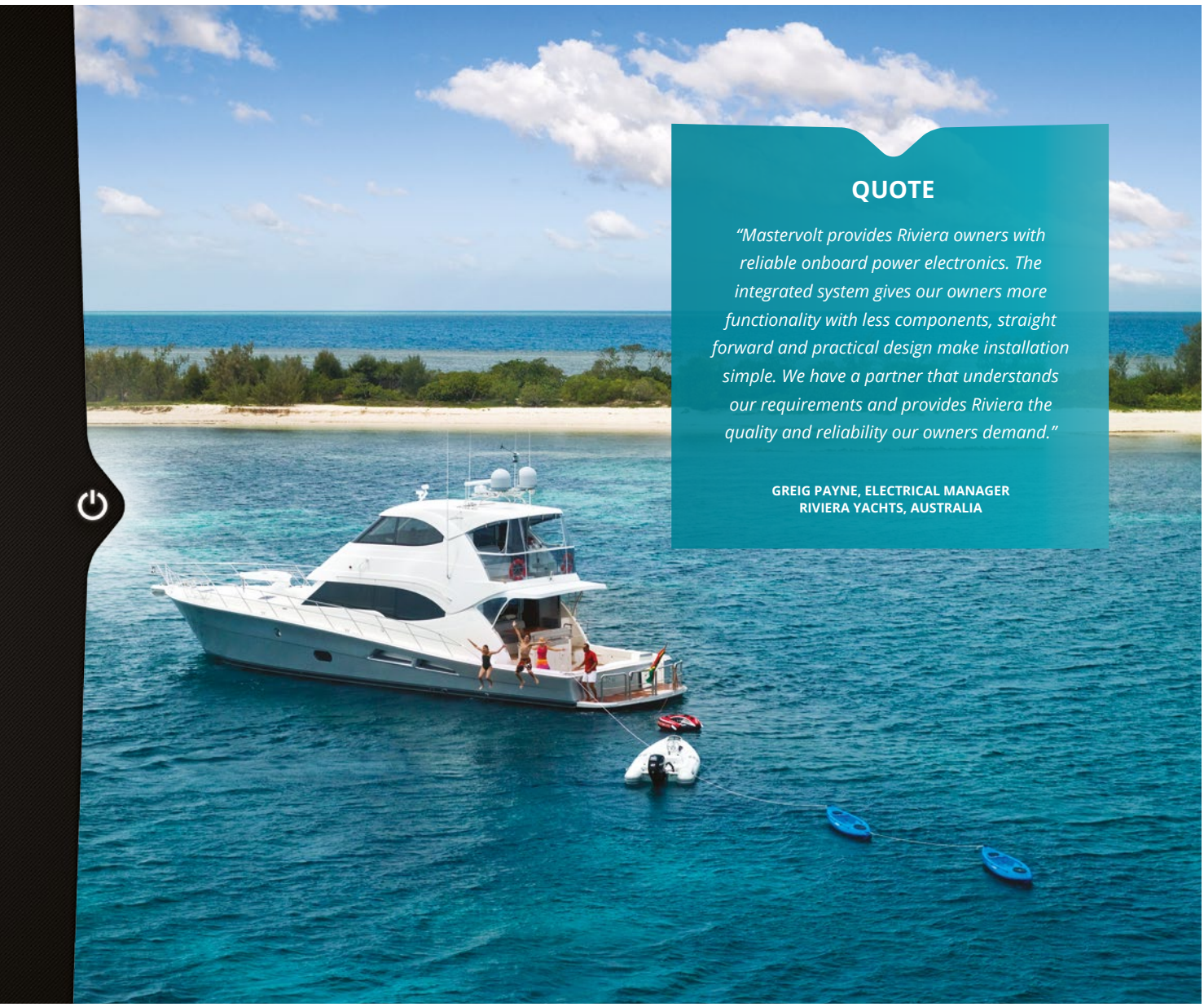
Digital switching, the future is now

By decentralising your installation, it is possible to create smarter systems with less cables and installation work. Central switchboards are replaced by decentralised power outputs, which are controlled via a bus system. These outputs power equipment such as lights, pumps and navigation equipment.

Different input modules can be connected to this bus as well. These input modules – from switches to touch screen panels – control the output modules.

This allows you to control your system from anywhere, even from your mobile phone via text messages.

Digital switching systems give you greater flexibility and facilitate enhanced integration. Without additional components like relays, timer modules and extensive cable trees, it is possible to design a smart system. Digital switching systems result in systems that are easy to operate and offer greater functionality and convenience.



QUOTE

"Mastervolt provides Riviera owners with reliable onboard power electronics. The integrated system gives our owners more functionality with less components, straight forward and practical design make installation simple. We have a partner that understands our requirements and provides Riviera the quality and reliability our owners demand."

GREIG PAYNE, ELECTRICAL MANAGER
RIVIERA YACHTS, AUSTRALIA

Networked monitoring system

The CZone™ digital control & monitoring network simplifies installation of electrical systems through the replacement of complicated, cumbersome wiring to switch and fuse panels, with state-of-the-art, robust interfaces and light NMEA 2000 network cable. It also provides a sophisticated solution via the automation of complicated control and monitoring issues associated with today's onboard systems.

Installation

Builders recognize an immediate benefit with reductions in cable usage, harness weights and installation times. The CZone system also integrates many stand-alone components into one intuitive system. Wiring is dramatically simplified as the CZone system is designed to remove complex switching clusters and wiring runs. Modules can easily be added into the system to best suit the OEM and end-users' needs.

Configuration

We provide the tools to help you determine the modules needed based on your specific requirements. You can simply program the system with the intuitive CZone configuration tool.

Integration

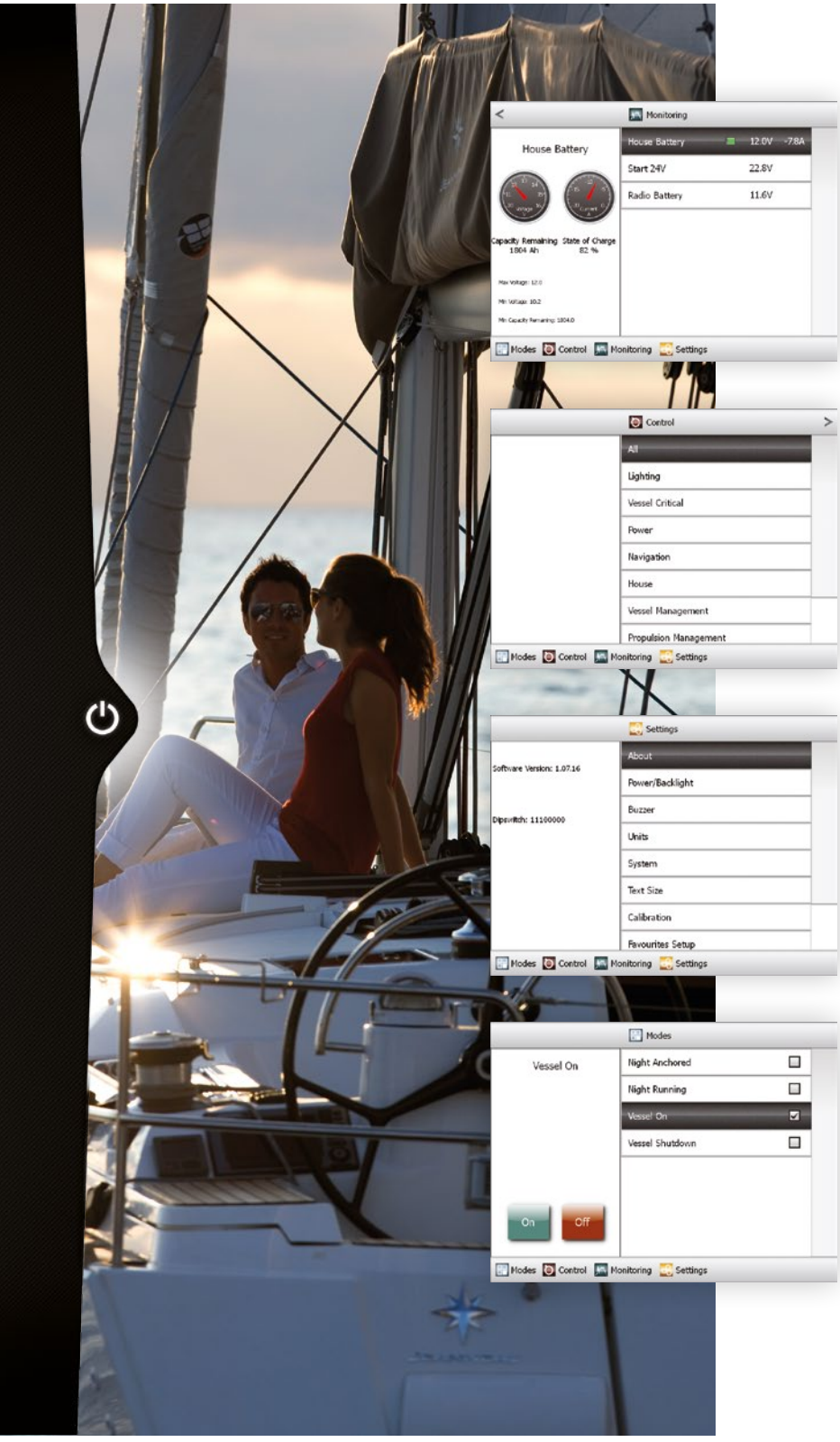
The CZone system is NMEA 2000 certified and uses the standard Micro cables and connectors. This also allows a single network backbone to be installed for multiple systems (CZone and other NMEA 2000 devices). Additionally, the CZone system can share certain monitoring functions with other NMEA 2000 compliant screens. The CZone MasterBus Bridge Interface expands the system integration to a whole new level. No other company can bring digital switching, power electronics and marine navigation systems together into one interactive, seamless system.

Versatility & security

The CZone system, designed for 9-32 V systems, features built-in timers, dimmers (including support for halogen lighting), alarms, voltage reducers and load shedding. With safety in mind, the CZone system features a manual bypass. Our No-Single-Failure-Point technology ensures a plug & play system with redudancies that is designed to handle mishaps. If a module is damaged, the system will automatically program the replacement module when it is plugged in. This means any module can be replaced without using high tech service people. Our security features allow custom configurations that can be locked.

LCD displays

The CZone displays are designed with both the manufacturer and end-user in mind. The easy-to-use display screens put the control of all components directly at your fingertips. Multiple display interfaces can be used in the same system. The scroll and click interface is simple to use in the roughest of seas or bumpiest of roads.



Monitoring

Allows user to easily monitor AC and DC power, tanks, data, alarms, and circuit status. Presents data in analogue and digital form.

Control

Breaks down the circuits into easy to identify groups for quick control, i.e. to turn on fresh water pump open 'pumps' group. User can open pumps group and select fresh water pump. This screen also allows the user to monitor the status of the circuit i.e. on, off, fault and current draw.

Settings

Allows OEM or technician access to the configuration (via password) of a system. No need for a computer to set or change configuration settings such as circuit labels, circuit breaker sizes, etc. (DI only).

Modes

Ease of operation assured. With one press of the key users can turn on a group of circuits without having to scroll, search for, and turn on the individual circuits that they need for operation of their vessel or vehicle. When leaving, simply press 'systems off' to turn off all non-essential circuits. Entertainment mode allows preset activation of lounge lights, music etc. All functions can be controlled remotely.

CZone displays are the interface between the CZone network and the user. They offer full control of circuits as well as the ability to view important onboard system information, such as tank levels and power levels (for both AC and DC supplies).

Audible and visual alarms with systems diagnostics are also provided. The displays are extremely intuitive to use with simple controls and a menu structure that is easy to follow. The 'modes of operation' feature allows the control of multiple circuits with a single push of a button. For instance, 'night running' mode turns pre-selected lights on to dim levels. These modes are all user configurable. CZone displays can be used to set the CZone system parameters for initial installation and future system maintenance (DI only).

Power control

- Turn circuits on and off including timer and light dimming control.
- Set modes of operation.

Tank levels

- View tank level information for multiple tanks and fluid types.

Data

- Displays standard NMEA 2000 information.
- Displays temperature and pressure values.
- Monitors all circuits connected to the CZone network.

Alarms/diagnostics

- Logging of circuit run time and on cycles.
- CZone network status reporting.
- Indicates alarms for onboard faults in audible and visual form (bilge pump running, smoke alarm).

Monitoring

DC power meter

- Displays voltages of multiple battery banks, includes low and high voltage alarms.
- Displays charge and discharge (Amps) of multiple battery banks.
- Displays battery capacity in ampere hours and % charge/discharge, includes low ampere hour alarm.
- Logging of battery minimum and maximum voltage levels.
- Logging of minimum battery capacity level.

AC power meter

- Displays multiple line voltages (230 and 120 V), includes high and low voltage alarm.
- Displays AC line frequencies, includes high and low frequency alarm and AC power consumption in kW.
- Logging of minimum and maximum voltage and frequency levels.
- Logging of maximum AC current.

Product codes	3.5" Display Interface
80-911-0001-00	*With power cable, black bezel*
80-911-0002-00	*With power cable, grey bezel*
80-911-0003-00	*Display Interface only, black*
80-911-0004-00	*Display Interface only, grey*
Screen size	3.5" transflective QVGA
Protection	IpX7 water ingress
Dimensions, wxhxd	105 x 165 x 62 mm 4.13 x 6.5 x 2.44 inch
Power consumption	at 12 V: 180 mA (standby 130 mA)
	Rotary knob for easy menu navigation

Product code	8" Touch screen *80-911-0064-00*
Screen size	8.4" (SVGA)
IP Level	IP64
Dimensions, wxhxd	234 x 184 x 42 mm 9.21 x 7.24 x 1.65 inch
Brightness (cd/m2)	450
Input voltage	12 V DC
Power consumption	20 W

Product code	10" Touch screen *80-911-0065-00*
Screen size	10.4" (SVGA)
IP Level	IP64
Dimensions, wxhxd	276x227x50.7 mm 10.87"x8.93"x1.99"
Brightness (cd/m2)	400
Input voltage	12 V DC
Power consumption	25 W

Integration partners

Mastervolt's CZone technology has partnered with leading electronics manufacturers including Navico's Simrad, B&G and Lowrance brands and Garmin's glass helm touchscreens*, making it simple to monitor and control the onboard power system and circuits.

CZone technology is integrated with easy-to-read graphics into chartplotters and multi-function displays. View CZone monitoring data, tank levels and battery capacity alongside radar, fish finder, video and chart plotter information or navigate to the CZone page to operate any circuit from the intuitive control page.

Integrate various sonar technologies, autopilot, connectivity, apps, engine data and multimedia. CZone mode controls, visible on the touchscreens, allow multiple circuits to be turned on and off with a single touch, all customizable to your boating needs.

With CZone technology, control and monitoring is available at the touch of your fingertips, at the helm or flybridge, at desired locations on the boat or vehicle, programmed into the remote key fob, or from an app on your tablet.

** Please check the Mastervolt site for the latest developments on integration partners.*

QUOTE

"Garmin strives to provide the easiest and most intuitive user experience to the market, and we've taken it to the next level, integrating Mastervolt's automated power and circuit management with the Garmin GPSMAP 8000 Helm Series. From controlling various lighting configurations to monitoring bait well levels and more, CZone technology puts the simplicity of automated operations at the boater's fingertips."

DAN BARTEL, VICE PRESIDENT WORLDWIDE SALES GARMIN, USA

Wireless Interface

Monitor and control your onboard systems

Mastervolt has produced a Wireless Interface that allows your iPad to interface with an onboard digital switching system for full monitoring and control of the electrical equipment via a clear and intuitive display. The interface acts as a hub for the seamless connection between the two popular Digital Switching protocols of MasterBus and CZone.

Product code	
80-911-0090-00	**Wireless Interface**
80-911-0095-00	**WI MasterBus connector**

Features:

- User-friendly homepage to monitor and control onboard circuits.
- Integrated control and monitoring of power products including battery chargers and inverters.
- Monitor AC/DC power and batteries.
- Monitor tank levels.
- Receive visible alarms.
- Connect a maximum of three devices simultaneously.
- Ability to personalise homepage to display favourite circuits, modes & monitoring.
- Customize your layout.

Hardware:

- The Wireless Interface acts as the hub between MasterBus/CZone networks and local WiFi devices.
- NOTE: WI MasterBus connector required for MasterBus connection.
- Ethernet connection to connect to other LANs.
- USB connection for configuration updates.
- Tested to FCC, CE, EMC.
- Power cable and aerial included.

CZone Interfaces

Switch Control Interface (SCI)

The Switch Control Interface provides an interface between the CZone network and the traditional mechanical switches with which manufacturers and users are familiar. The SCI simplifies your wiring, supports your existing choice of switches, protects against failures and allows for more installation options.

Signal Interface (SI)

The Signal Interface connects the CZone system to your external sensors, alarms and switching devices. The SI allows intelligent, automated operation of circuits depending on the state of the input.

Meter Interface (MI)

The Meter Interface accepts inputs from external AC and DC power metering sensors such as: AC and DC voltage and amps, AC kWatts, and DC battery capacity in amp hours and % remaining. All with user definable high and low alarms.

Switch Control Interface (SCI)

Single switch position can control multiple OI channels
Attaches to switch panels via custom SCI cable
Multiple SCI switches can control single OI channel
Output for backlighting of switch labels (dimmable)
Outputs systems on and function/fault codes to systems on LED of switches (dimmable)
Dimensions, wxhxd: 156 x 100 x 42 mm 6-3/32 x 3-29/32 x 1-5/8 inch
IPX5 water ingress protection
Programmable switch types
8 inputs per module (16 individual controls)
Sequential button press functionality

Product code	Product code
80-911-0011-00	*80-911-0012-00*
Switch Control Interface with seal	**Switch Control Interface only**

Signal Interface (SI)

Accepts inputs from traditional switch types being used to control outputs
Accepts inputs from switches to trigger alarm i.e. high water float switch
Accepts inputs from industry-standard tank senders (0-5V, 10-180 Ohm, 240-33 Ohm)
Accepts inputs from general voltaic or resistive signals, can be used for controlling outputs or to display a physical position i.e. show a hatch is partially open
LED status indicators for each input
Dimensions, wxhxd: 156 x 100 x 42 mm 6-3/32 x 3-29/32 x 1-5/8 inch
IPX5 water ingress protection
Outputs standard NMEA 2000 sentences
Resistive input range 0–1000 Ohms
Voltage sensing input range 0–34 V DC

Product code	Product code
80-911-0013-00	*80-911-0014-00*
Signal Interface with seals, connector	**Signal Interface only**

Meter Interface (MI)

AC
3 x AC voltage inputs (multi voltage)
2 x AC current inputs
Calculates true RMS power
DC
3 x DC voltage inputs (multi voltage)
2 x DC current inputs
Calculates battery capacity as ampere hours and percentage charge remaining
Resolution for current metering down to 0.1 A
GENERAL
Dimensions, wxhxd: 156 x 100 x 42 mm 6-3/32 x 3-29/32 x 1-5/8 inch
IPX5 water ingress protection
Outputs standard NMEA 2000 power monitoring sentences

Product code	Product code
80-911-0005-00	*80-911-0006-00*
Meter Interface with seal & plug	**Meter Interface only**

Note: High and low alarm levels can be set for all inputs.

Output Interface (OI)

The Output Interface provides an intelligent replacement for traditional circuit breaker and fuse panels. It has six high power, robust output channels which provide the power supply, control and fusing for a circuit as well as integrating many other features such as timers and dimmers. Connection to the unit is simple: a large 6-way plug allows connections to cables of up to 16 mm^2 (6AWG) in size, or multiple smaller conductors. No need for specialized crimp terminals and expensive crimp tools to be carried for terminations to CZone, just a blade screwdriver. A protective flexible boot offers protection to the connections from harsh environment conditions.

Output Interface (OI)

- 4 levels of backup fusing including manual override (as required by ABYC)
- Multiple channels can be bridged together to offer higher current switching
- Power consumption 12 V: 85 mA (standby 60 mA)
- Dimensions, wxhxd:
  200 x 128 x 45 mm / 7-29/32 x 5 x 1-3/4 inch
- Small, non-metallic, easy to install case
- IPX5 water ingress protection
- 6 x 20 amps circuits
- Programmable software 'fuse' sizes

Product code	Product code
80-911-0009-00	*80-911-0010-00*
Output Interface with connector and protective boot	**Output Interface only**

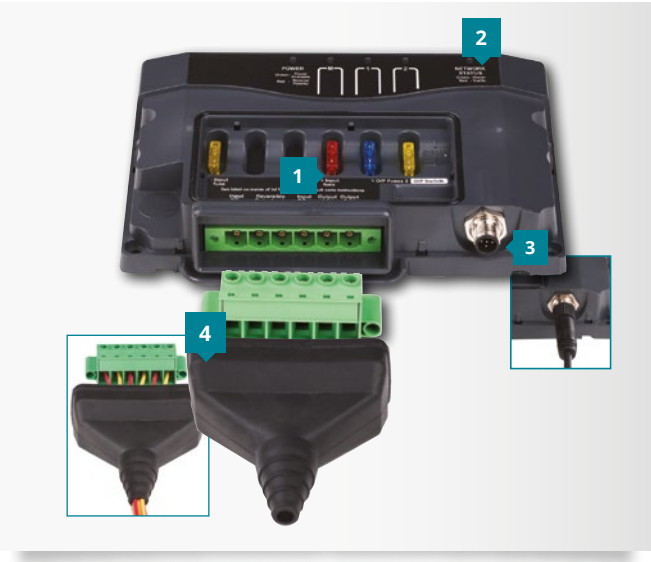
Motor Output Interface (MOI)

The Motor Output Interface has an output pair for controlling DC motors which require a reversal of polarity to change the direction of their mechanical operation. For example, a DC motor for an electric window mechanism will move the window up or down depending on the polarity of the feed to the motor. The MOI also incorporates two standard output channels as found on the OI.

Motor Output Interface (MOI)

- Single motor control and two normal channels per unit, 20 A per output
- Built-in circuit protection
- IPX5 water ingress protection
- Dimensions, wxhxd:
  200 x 128 x 45 mm
  7-29/32 x 5 x 1-3/4 inch

Product code	Product code
80-911-0007-00	*80-911-0008-00*
Motor Output Interface with connector and protective boot	**Motor Output Interface only**



1. Fuses for emergency circuit bypass.
2. Network status indicator.
3. NMEA 2000 connector.
4. Connector and protective boot.

AC Interfaces

AC Output Interface (ACOI)

Searching for a simplified way to network, monitor and control onboard AC circuits? The AC Output Interface does it all and provides circuit protection for onboard AC devices. It is easy-to-install, configure and operate the digital control system with pre-wired components for quick connections.

This is a fully customized solution to suit unique installation and application needs, including 'night running' as well as control at multiple locations. It has eight outputs (up to 50 A each), supports multiple pole designs and two separate buss feeds. To make it easy, status LEDs and manual bypass are located right at the enclosure.

Product code
80-911-0069-00

For quotation purposes only.

AC Output Interface (ACOI)
Full automation of available supply selection
Eight outputs, maximum of 50 Amps each
Provides circuit protection and control
Circuit status and run current displayed for each circuit
Status of LEDs at enclosure
Customisable to suit installation requirements
Manual bypass at enclosure
Pre-wired for quick connection
Provision for MCB/RCD's
Staggered start-up of loads
Timers
110 V, 240 V, 110/220 V
50 or 60 Hz
Supports multiple pole designs, i.e. double, triple, four pole
IPX5 enclosure
Utilises standard DIN rail mounted components for circuit protection and control
Can support two separate buss feeds i.e. 2 load groups in one box
Delayed activation of circuits, to allow generators to come up to speed
Dimensions, hxwxd: 295 x 458 x 130 mm / 11.61 x 18 x 5.1 inch *(enclosure dimensions may change depending on installation requirements)*

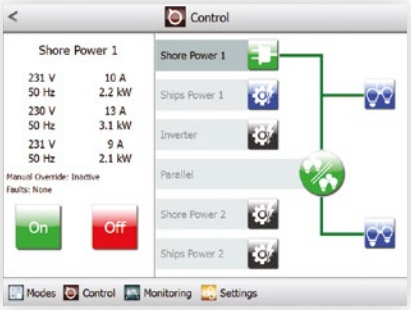
AC Mains Interface (ACMI)

A sophisticated source selector or transfer switch, the AC Mains Interface enables the user to specify the AC power source (generator, inverter, grid power). It was developed for use with the CZone digital control system, but may also be used as a stand-alone device.

The ACMI can be programmed to automatically change the supply source when the current rating is exceeded, and includes a manual bypass and user-friendly display screen that ensures easy current, voltage, frequency, and power monitoring. Other features include six monitored, over-current protected main power inputs of up to 100 A each, as well as two outputs, which enables two separate load groups and a parallel option for use with a single source. To simplify installation, the ACMI comes pre-wired.

Product code
80-911-0068-00

For quotation purposes only.



AC Mains Interface (ACMI)

Six source inputs up to 100 A *(e.g. 2x grid power, 2x generator)*
Auto changeover
Monitoring of channel status (on/off/fault)
Provision for RCDs
Provides circuit protection and control
Load shedding
Manual override at enclosure and via remote panel
Status of LEDs at enclosure
Customisable to suit installation requirements
Pre-wired for quick connection
Supports multiple pole designs, i.e. double, triple, four pole
Timer controls
110 V, 240 V, 110/220 V
50 or 60 Hz
IPX5 enclosure
Utilises standard DIN rail mounted components for circuit protection & control
Physical and software lockouts between source controls (prevents two sources from becoming connected)
Reverse polarity and bad power supply alarms including auto disconnect and lockouts
Current, voltage, frequency and power monitoring incorporated (six channels)
Two outputs (load groups), allows for two separate load groups with parallel option for use with single source
Dimensions, hxwxd: 403 x 630 x 130 mm / 15.8 x 24.8 x 5.1 inch *(enclosure dimensions may change depending on installation requirements)*

Digital Control accessories

Single tee connector

Connects a single device into the NMEA backbone.

Product code
80-911-0029-00

2 Way tee connector

Connects multiple devices into the NMEA backbone.

Product code
80-911-0047-00

4 Way tee connector

Connects multiple devices into the NMEA backbone.

Product code
80-911-0048-00

Male banking cap

Protects unused tee connector from dust and water.

Product code
80-911-0050-00

Female banking cap

Protects unused tee connector from dust and water.

Product code
80-911-0051-00

Terminating resistors

Use at either end of the NMEA backbone to complete the network. Each network must have a male and female terminator.

	Product code
Female	*80-911-0030-00*
Male	*80-911-0031-00*

Extension cable

Carries power and data along backbone to NMEA 2000 devices.

	Product code
0.5 m / 1.6 ft	*80-911-0026-00*
2 m / 6.5 ft	*80-911-0027-00*
5 m / 16 ft	*80-911-0024-00*
10 m / 32 ft	*80-911-0025-00*

Power cable for Display Interface

Supplies power for the 3.5” Display Interface.

	Product code
2 pin, 2 m / 6.5 ft	*80-911-0032-00*

Power cable

Provides power to the NMEA 2000 network and devices.

	Product code
1 m / 3.2 ft	*80-911-0028-00*

90° Elbow connector

Connects cable together in tight spaces. NMEA 2000 network.

Product code
80-911-0046-00

AC transducer

- Includes 3 voltage transformers for up to 3 voltage inputs.
- Dimensions: 69 x 140 x 50 mm / 2.75 x 5.5 x 2 inch

Product code
AC-VSEN-4

CZone wireless remote kit

Simple to set up, wireless remote control. Buttons are configurable for momentary on or latching control of circuits.

- 80 m (250 ft) operating range.
- Rolling code.

Product code
80-911-0045-00

Cable gland for SCI, silicon

Product code
80-911-0035-00

Cable gland for SI, silicon

Product code
80-911-0036-00

Cable gland for MI, silicon

Product code
80-911-0033-00

Terminal block, SI/MI, 8-way

Product code
80-911-0043-00

Terminal block, OI/MOI, 6-way

Product code
80-911-0041-00

Terminal block, MI, 6-way

Product code
80-911-0042-00

Seal boot for OI/MOI 6-wire, black silicon

Product code
80-911-0034-00

Hole plugs

	Product code
3.2 mm, for MI and SI cable glands	*80-911-0016-00*
5 mm, for SCI cable glands	*80-911-0017-00*

DC current shunt

- 450A / 50mV shunt supplied with 80-600-0021-00.
- Dimensions:
  83 x 45 x 44 mm
  3.25 x 2.8 x 2.75 inch.

Product code
LB-450-50

Through bulkhead adaptor

For use on the backbone to transition through a waterproof bulkhead or can be used to connect removable equipment such as a computer interface.

- NMEA 2000 network.

Product code
80-911-0052-00

Female field serviceable connector

For terminating bare NMEA cable.

- NMEA 2000 network.

Product code
80-911-0053-00

Male field serviceable connector

For terminating bare NMEA cable.

- NMEA 2000 network.

Product code
80-911-0054-00

Digital Control accessories

USB CAN adaptor

Connects PC to CZone network for configuration and system set up.

Product code
80-911-0044-00

Wireless Interface

Wireless monitoring and control of onboard systems from your tablet.

Product code
80-911-0090-00

CZone Network Bridge Interface

For isolating sections of a NMEA 2000 network to decrease standby current draw. Isolation when bridging between two CAN networks, (e.g. connecting CZone to Simrad Simnet). For expansion of the NMEA 2000 network when the maximum node limit for the network has been reached *(node = any device connected to the NMEA 2000 network)*. Once fitted, a further 40 nodes can be added.

Product code
80-911-0057-00

Cable assembly

SCI, to suit Rocker switches.

	Product code
0.5 meter	*80-911-0018-00*
1 meter	*80-911-0019-00*
2 meter	*80-911-0020-00*
3 meter	*80-911-0021-00*
4 meter	*80-911-0022-00*
5 meter	*80-911-0023-00*

Custom Rocker switches

Red or blue systems in operation and backlighting LEDs.

	Product code
ON/OFF, red LED	*80-911-0037-00*
Mom ON/OFF, red LED	*80-911-0038-00*
ON/OFF/ON, red LED	*80-911-0039-00*
Mom ON/OFF/mom ON, red LED	*80-911-0040-00*
Mom ON/OFF, blue LED	*80-911-0066-00*
Mom ON/OFF/mom ON, blue LED	*80-911-0071-00*

Cable assembly

SCI, to suit push buttons.

	Product code
0.5 meter	*80-911-0085-00*
1 meter	*80-911-0086-00*
2 meter	*80-911-0087-00*
5 meter	*80-911-0088-00*
8 meter	*80-911-0089-00*

Push buttons

	Product code
Momentary (ON)OFF, red LED	*80-911-0060-00*
Latching ON/OFF, red LED	*80-911-0063-00*
Momentary (ON)OFF, blue LED	*80-911-0062-00*
Latching ON/OFF, blue LED	*80-911-0061-00*

For use with CZone systems only.

- Momentary and latched actuation options available.
- Blue and red circuit status indication LED options.
- 19 mm mounting hole.
- IP67 environmental protection.
- Stainless steel components.
- Maximum 5 Amps each.

For more information, see ■ www.mastervolt.com/czone

Current transformer

Max. current 150 A AC.
One CT-10-3 current transformer is supplied with ACSM. A second current transformer must be ordered if a twin line system is in use.
Supplied with 80-600-0023-00.
Dimensions: 37.5 x 39 x 14 mm / 1.5 x 1.55 x .55 inch.
Hole size: 12 mm / 0.5 inch.

Product code
CT-10-3

Heavy-duty current transformer

Max. current 150 A AC.
CT-HD is available for systems with large mains cables, too large for CT-10-3 (order separately).
Dim.: Ø 47 x 10.5 mm / 1.85 x 0.4 inch.
Hole size: 32 mm / 1.25 inch.

Product code
CT-HD

Surge protection module

Protect your electronics from being damaged by harmful high voltage spikes. When fitted to the battery supply these modules look for sudden increases in voltage then switch into protection mode to absorb and suppress the high energy spike.

	Product code
12 V DC	*80-707-00004-00*
24 V DC	*80-707-00005-00*

CZone MasterBus Bridge Interface

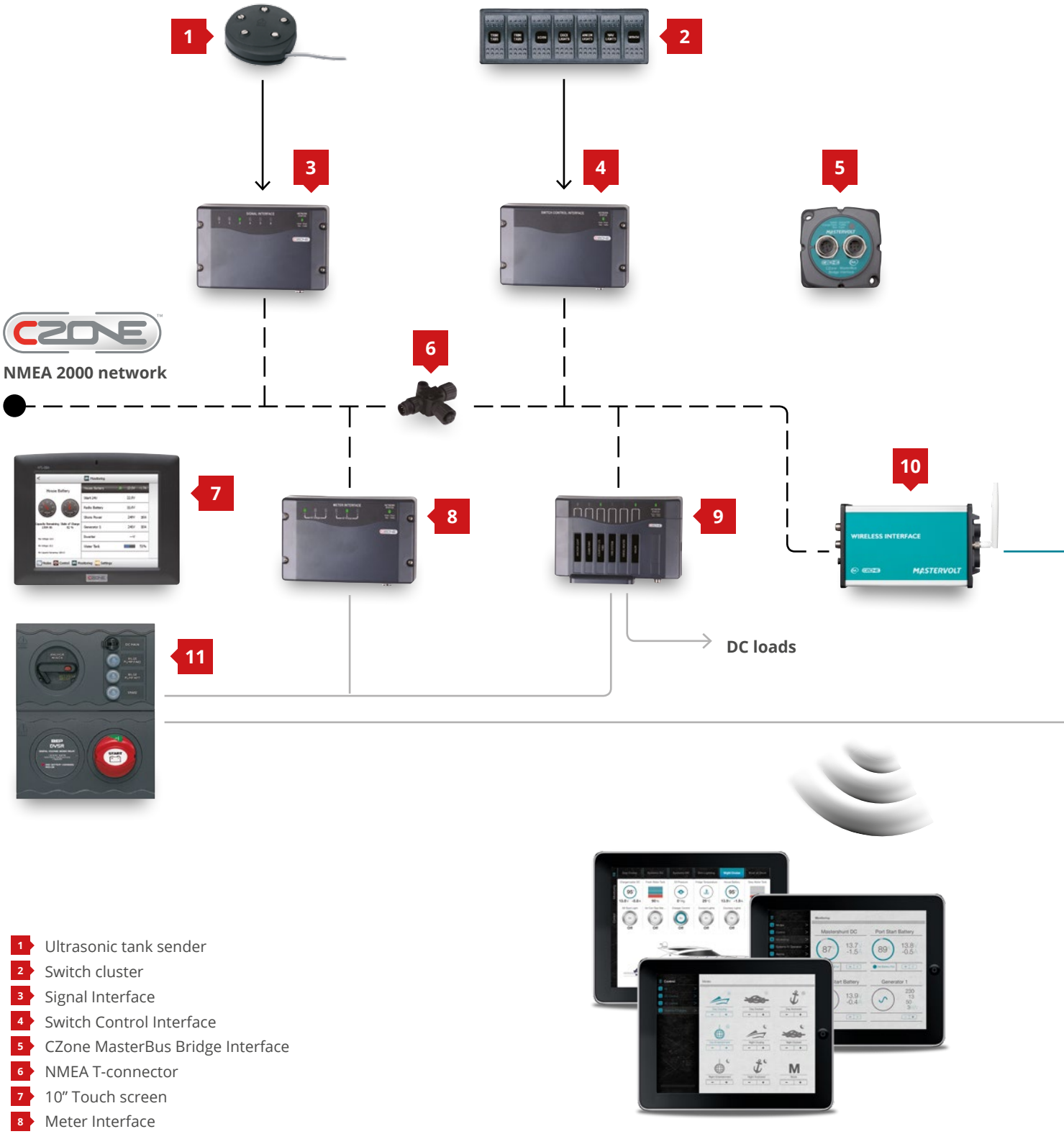
The CZone MasterBus Bridge Interface physically connects the MasterBus and CZone networks together enabling the two networks to communicate and act as one, providing seamless control and monitoring of devices on both networks from either MasterBus or CZone displays.

Features/functions:

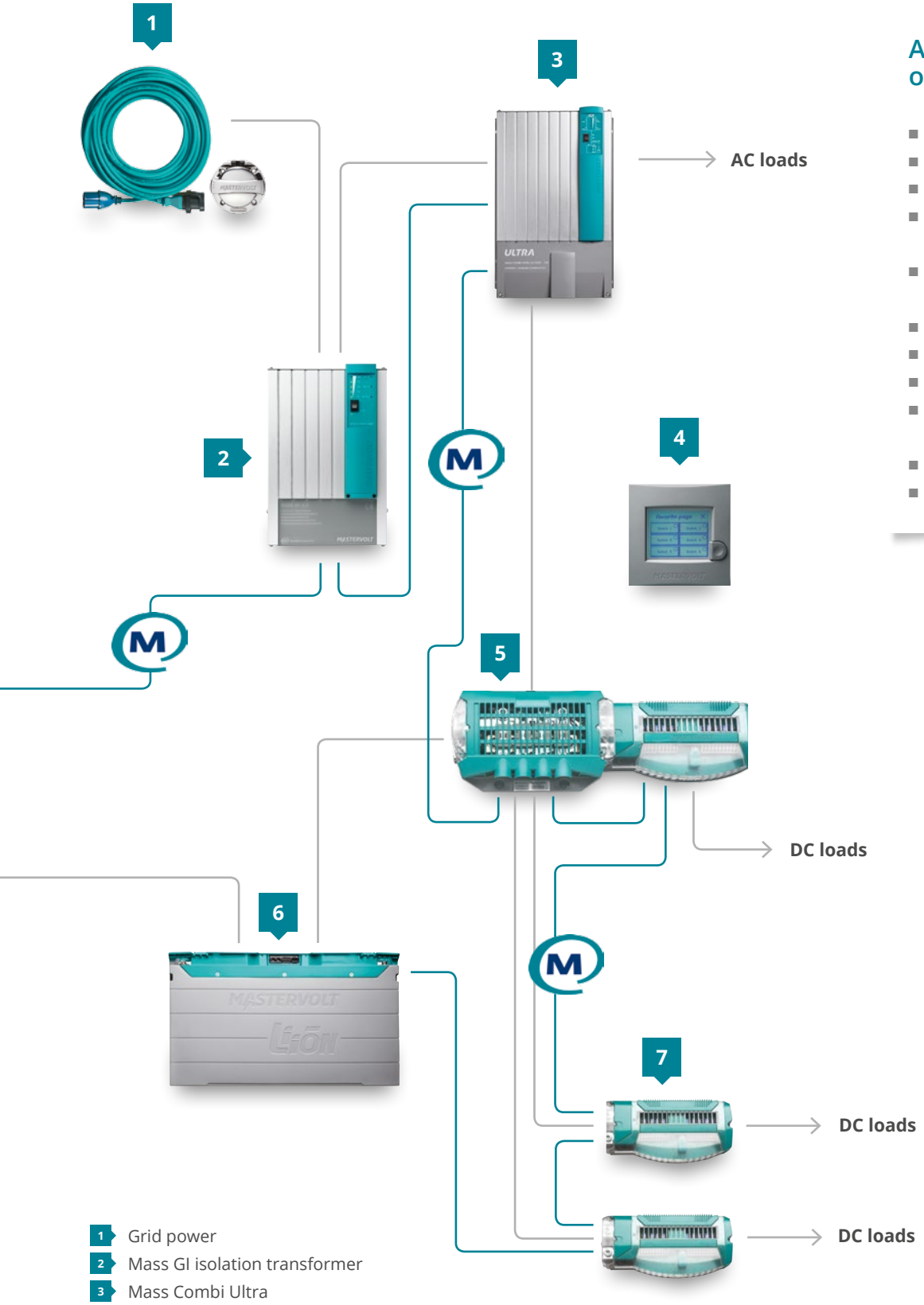
- Control of Mastervolt inverters and chargers from CZone displays and switches.
- Control of MasterBus output devices (turn lights, pumps, etc. on/off).
- Control of CZone output devices (turn lights, pumps, etc. on/off) via MasterBus displays and switches.
- Display CZone acquired systems information such as tank and power levels on MasterBus displays.
- Display MasterBus acquired systems information such as tank and power levels on CZone displays.
- Transfers alarms between both systems.

	CZone MasterBus Bridge Interface
Product code	*80-911-0072-00*
MasterBus powering	no
Dimensions, hxwxd	69 x 69 x 50 mm 2.7 x 2.7 x 2 inch
Weight	145 g / 0.32 lb
Protection degree	IP65
Delivered with	MasterBus cable adapter, MasterBus Terminator, user's manual

Fully integrated CZone MasterBus system



1. Ultrasonic tank sender
2. Switch cluster
3. Signal Interface
4. Switch Control Interface
5. CZone MasterBus Bridge Interface
6. NMEA T-connector
7. 10” Touch screen
8. Meter Interface
9. Output Interface
10. Wireless Interface
11. Battery distribution panel

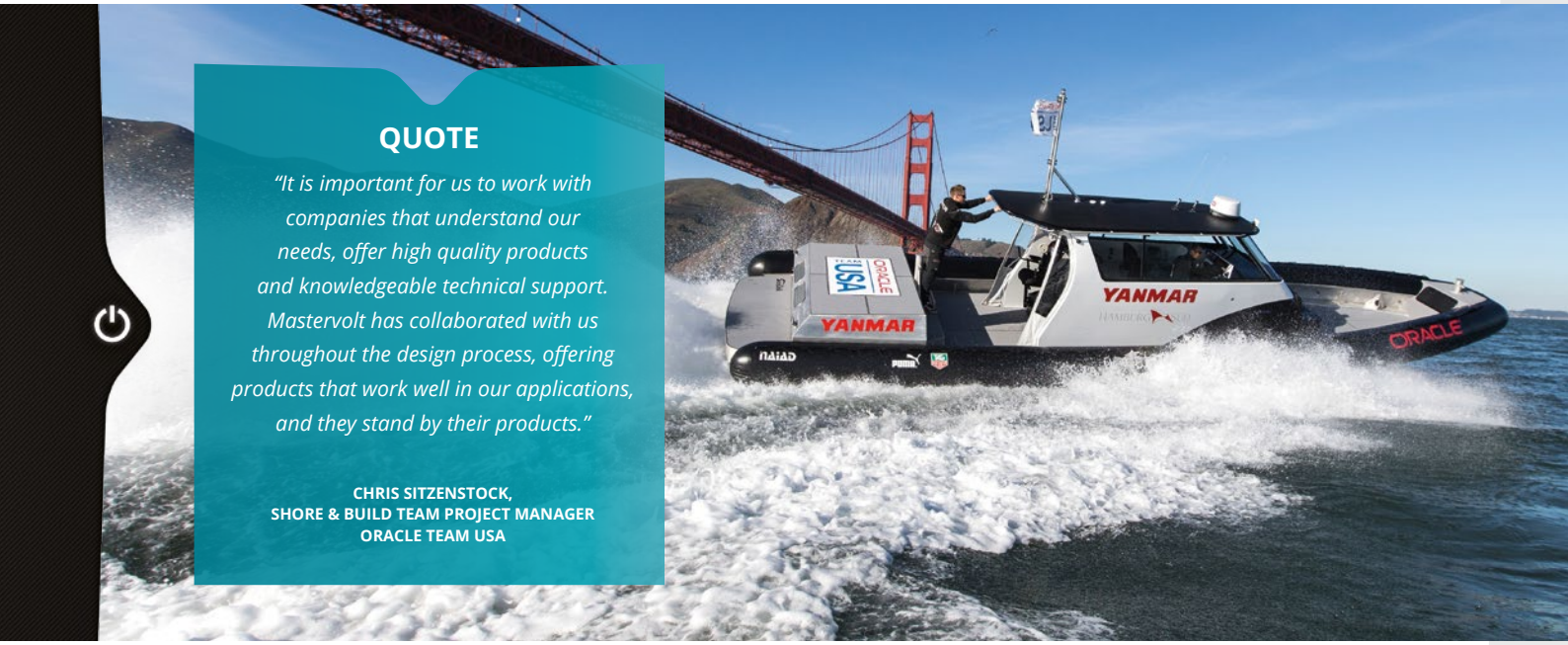


Advantages of one system:

- Fewer cables
- Less weight
- Installation time savings
- Increased flexibility in terms of design changes
- 'Superyacht' power and load management capabilities
- Remotely accessible
- Easy to maintain
- Integrated solution
- Single button 'mode' selection
- Redundant and safe
- Global service network.

1. Grid power
2. Mass GI isolation transformer
3. Mass Combi Ultra
4. MasterView Easy
5. DC Distribution, Digital DC 10x10
6. Mastervolt Lithium Ion Ultra 12 V (service battery)
7. Digital DC 10x10

Charge regulators and alternators: For rapidly recharged batteries



QUOTE

"It is important for us to work with companies that understand our needs, offer high quality products and knowledgeable technical support. Mastervolt has collaborated with us throughout the design process, offering products that work well in our applications, and they stand by their products."

CHRIS SITZENSTOCK,
SHORE & BUILD TEAM PROJECT MANAGER
ORACLE TEAM USA

The already present alternator on the main engine is designed to charge the starter battery. As a result the combination is not ideal for fast and full charging of other batteries. Especially if you want to charge the batteries over a short time or when powering a heavy load.

There are two options to solve this issue:

Equip the standard alternator with a Mastervolt Alpha Pro MB charge regulator. This charge regulator maximizes the output of alternators by regulating the alternator in a way that batteries receive the optimum charge. The proven 3-step+ charge method guarantees fast and safe charging of your batteries.

You can also choose a powerful second Mastervolt Alpha alternator with Alpha Pro MB charge regulator. This combination was specifically designed for charging service batteries, and allows you to charge quickly and turn off your engine when you want.

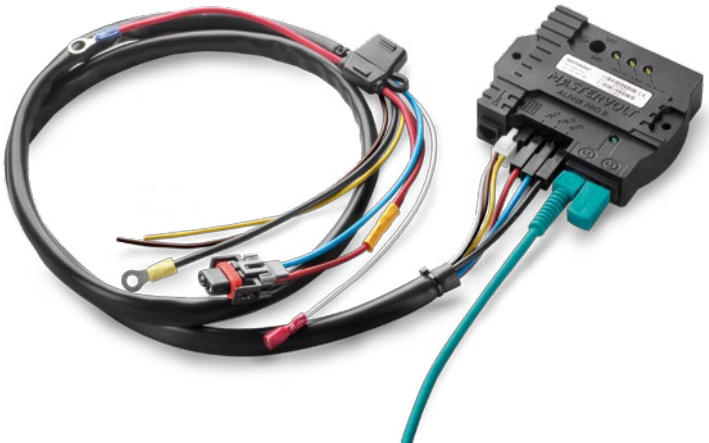
Alpha Pro MB charge regulators

- Suitable for 12 and 24 V.
- Including plug & play connection cable, also for Bosch alternators.
- Automatic voltage and temperature compensation.
- MasterBus compatible.

Alpha alternator series

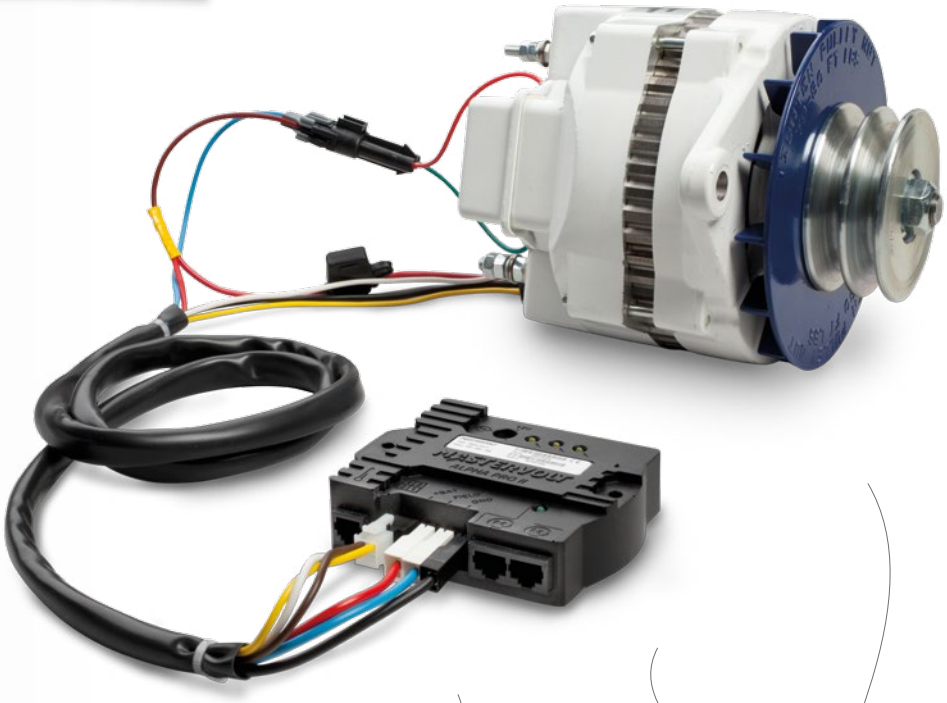
- Fast & complete charging of all batteries.
- Power supply for all consumers.
- 12 V and 24 V versions.
- 75 A to 150 A charge current.
- Standard delivered with Alpha Pro MB charge regulator for an optimal performance and longer-lasting batteries.

The charge regulator measures the battery temperature and adjusts the charging process accordingly, resulting in a safe and fast charge. Therefore the battery is always kept in good condition.



TIP:

A second alternator on the main engine, combined with a larger battery bank and inverter, could be an alternative for a generator.



For all engine types

Alpha alternators are equipped with several fixations for customised alternator brackets, available from your installer or engine supplier.
Some engine brands come with Mastervolt alternator brackets as an option.

Fast charging, even at a stationary rpm

Standard alternators only supply the specified capacity at a high rpm.
The Mastervolt Alpha alternator is specifically designed to charge powerfully, even with a low engine rpm.

Alpha Pro MB: Easy to operate

Easy operation LEDs on the body of the regulator indicate the charge phase. The charge regulator is designed as a 'fit all' solution, just one unit is needed for both 12 and 24 V applications, with a simple selector switch to set the regulator to the right voltage. The unit can also be used on any other brand of alternator that has a standard Bosch connector, with a cable supplied as standard.

MasterBus connectivity

The Alpha Pro MB is compatible with MasterBus, allowing easy monitoring via a MasterView touch screen. In a MasterBus system the voltage drop over the battery cable and the battery temperature will be compensated automatically.

Multi-belt pulley

The 12/130 and 24/75 models are also available with a multi-belt pulley.

Performs above 40 °C

Forced cooling by fan operation of the pulley provides a lot of power in higher temperatures, especially close to the engine.

Specifications Alpha Pro MB

	Alpha Pro MB
Product code	*45512000*
GENERAL SPECS	
Link to MasterShunt	yes
Connection to Mastervolt alternator	yes
Connection to Bosch alternator	yes
Cooling	fanless
Nominal output voltage	12 V / 24 V
Cable length regulator/alternator	1.5 mtr oil resistant connection cable
Cable length temperature sensor	6 mtr
Connection plug regulator/alternator	Alpha/Mastervolt
Display/read-out	LED display
MasterBus powering	yes
Dimensions, hxwxd	90 x 109 x 30 mm 3.5 x 4.3 x 1.2 inch
Weight	0.4 kg / 0.9 lb
Approvals	CE
TECHNICAL SPECS	
Charge characteristic	IUoUo, automatic / 3-step+ for gel/AGM/ wet/Lithium Ion
Charge voltage Bulk	14.25 V / 28.5 V
Charge voltage Absorption	14.25 V / 28.5 V
Absorption time	4 hours, adjustable from 2 minutes to 12 hours
Charge voltage Float	13.25 V / 26.5 V
Temperature compensation	-30 mV / °C
Voltage compensation	voltage drop compensation in DC cables up to 3 V
Alternator type	various

Specifications Alpha alternators

	12/90 MB	12/130 MB*	24/75 MB*	24/110 MB	24/150 MB
Product code	*48512090*	*48512130*	*48524075*	*48524110*	*48524150*
GENERAL SPECS					
Charge regulation	the Alpha Pro MB regulator comes standard with all models	the Alpha Pro MB regulator comes standard with all models	the Alpha Pro MB regulator comes standard with all models	the Alpha Pro MB regulator comes standard with all models	the Alpha Pro MB regulator comes standard with all models
Charge current	90 A	130 A	75 A	110 A	150 A
Cable length regulator/alternator	1.5 metre, oil resistant connection cable - delivered as standard	1.5 metre, oil resistant connection cable - delivered as standard	1.5 metre, oil resistant connection cable - delivered as standard	1.5 metre, oil resistant connection cable - delivered as standard	1.5 metre, oil resistant connection cable - delivered as standard
Belt section	2xA	2xA	2xA	2xA	2xA
Isolated from mass	yes	yes	yes	yes	yes
Directions of revolutions	2	2	2	2	2
Mounting	five to six, six o'clock & five past six	six o'clock	six o'clock	six o'clock	five to six, six o'clock & five past six
Dimensions	go to www.mastervolt.com/alternators for the drawings	go to www.mastervolt.com/alternators for the drawings	go to www.mastervolt.com/alternators for the drawings	go to www.mastervolt.com/alternators for the drawings	go to www.mastervolt.com/alternators for the drawings
Weight	5.5 kg / 12.1 lb	10.1 kg / 22.3 lb	10.1 kg / 22.3 lb	10.1 kg / 22.3 lb	13.1 kg / 28.9 lb
TECHNICAL SPECS					
Charge voltage absorption	14.25 V	14.25 V	28.5 V	28.5 V	28.5 V
Charge voltage float	13.25 V	13.25 V	26.5 V	26.5 V	26.5 V
Pulley (double) diameter	73 mm	88 mm	88 mm	88 mm	92 mm

* Available with multi-belt pulley.
Product code 12/130 model = 48512131
Product code 24/75 model = 48524076

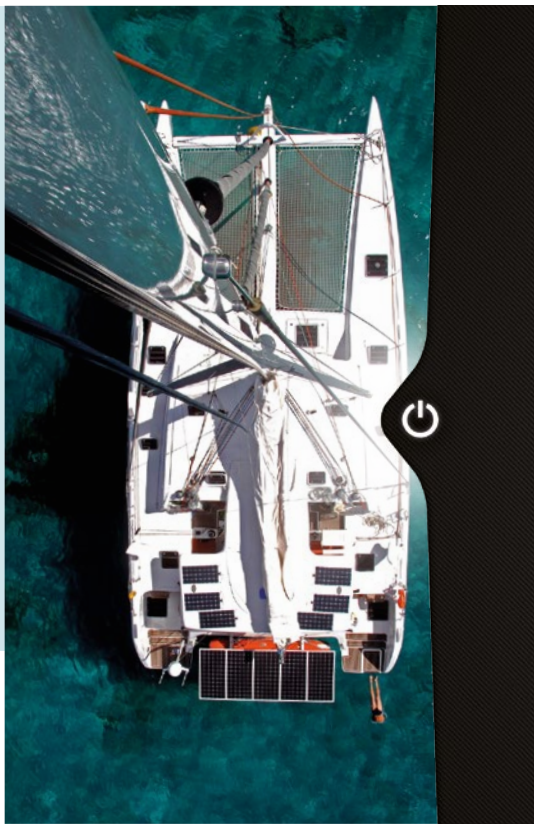
The sun as extra energy source

As photovoltaic cells generate energy when exposed to sunlight, they can provide a sustainable energy source to charge the batteries in your application.

All Mastervolt's knowhow in the field of solar power has been included in the Solar ChargeMaster, which offers maximum efficiency from the often irregular availability of sunlight. The design provides a pure charge current in all conditions while the 3-step charging method ensures a safe charging process and a longer lifespan for your batteries.

Features

- Works with nearly all solar panels (PV-modules).
- Suitable for 12 V and 24 V battery systems.
- Clear LCD display and graphics.
- 3-step charging method.
- Automatic night detection.
- Extensive alarm system (buzzer).
- Automatically switches off load when battery current is low.
- Battery temperature sensor included with each unit.
- Optional USB Interface for Solar ChargeMaster for PC and laptop.



Specifications Solar ChargeMaster

	SCM-N 20	SCM-N 40
Product code	*131802000*	*131804000*
GENERAL SPECS		
Charge current	20 A	40 A
Max. DC load	20 A	40 A
Solar input voltage window	12-50 V DC	12-50 V DC
System voltage (battery)	12/24 V auto detect	12/24 V auto detect
Display / read-out	LCD display with battery status, V, A, charge & discharge	LCD display with battery status, V, A, charge & discharge
Settings	load/disconnect, 3-step charge characteristic	load/disconnect, 3-step charge characteristic
Dimensions, hxwxd	140 x 105 x 41 mm 5.5 x 4.1 x 1.6 inch	140 x 105 x 41 mm 5.5 x 4.1 x 1.6 inch
Weight	189 g / 2 lb	189 g / 2 lb
TECHNICAL SPECS		
No-load power consumption	< 4 mA	< 4 mA
Connections	screw terminal	screw terminal
Protection degree	IP20	IP20
OPTIONS		
 USB Interface for Solar ChargeMaster *21730400*	option	option
	USB Interface and DataControl software, for faultless communication between your PC and the Solar ChargeMaster.	

PRODUCT NEWS

New MPPT Solar Charge regulators coming soon

On top of the existing models, Mastervolt will introduce a line of MPPT (Maximum Power Point Tracking) solar charge regulators. This new range has a charge current up to 60 A, and will increase the energy production of your solar panels up to 30%.

For detailed specifications, dimensional drawings, 3D files, images, certificates and manuals see ■ www.mastervolt.com/alternators

Mastervolt transfer systems: Regulates 230 V power sources

The Mastervolt transfer system helps you regulate your grid, generator or inverter power and automatically selects the right power sources at the right time. With Mastervolt you can cook and do laundry at the same time or watch TV with the airco on full blast. In addition, Mastervolt transfer systems are suitable for every installation.

The Mastervolt transfer system controls the following:

- Activating and selecting 230 V sources: Grid power, inverter and generator (adjustable to amperage of grid power, for instance 6 A).
- Prevents damaging contact between the inverter and other 230 V sources.
- Fully compatible with Mastervolt systems, and suitable for installations from other brands, other generators and/or inverters.

Masterswitch: The simple solution

- Two AC inputs, for example grid power and generator.
- One outlet to AC power group.
- Automatic switching.
- Power transfer up to 25 kW, input/output from 20 to 125 A.
- Can be combined with circuit breakers (Masterswitch Fuses).

Mass Systemswitch: The complete system solution

- Three AC inputs, for example inverter, grid power and generator.
- Three or four outlets to AC power groups.
- Automatic switching.
- Power transfer from 4.5 kW to 16 kW, input/output from 25 to 63 A.
- Information source for central energy management via MasterBus network.
- Optional automatic fuses; for larger systems this usually requires an extra casing.
- MasterBus compatible.

QUOTE

"When we evaluate a potential supplier for one of our custom built yachts we value; technical excellence, innovation capabilities, reliable solutions and world class worldwide service capabilities. After working with Mastervolt for more than 20 years, we at Baltic Yachts are comfortable in Mastervolts capabilities to deliver on all these points."

OLAV AHLÖ, PURCHASER ELECTRICAL EQUIPMENT BALTIC YACHTS OY AB LTD., FINLAND

LED indications on Systemswitch

Read out of the basic functions on the display, including indication of available power source, generator, grid power or inverter and 'load on inverter' function.

Central energy management

The MasterView Easy indicates AC current, amperage and frequency including the 'load on inverter' mode. The 12/24 V read out shows current, power (charge/discharge) and battery monitoring, and has a start/stop generator.

Smart electronics

The intelligent electronics control the switching to ensure equipment does not use too much power. Its double-pole relay is sustainable and incredibly safe.

Suitable for MasterBus

As the Mass Systemswitch is suitable for MasterBus, all the information can also be read out on, for instance, a MasterView display, including the status of the charge current and the inverter.

Specifications
AC transfer systems




	Masterswitch 5 kW	Masterswitch 10 kW	Masterswitch 25 kW	Masterswitch Fuses 5 kW
Product code 230 V	*55006010*	*55006015*	*55003500*	*55006060*
Product code 120 V	*55106000 (3 kW)*	*55106100 (7 kW)*		
(check www.mastervolt.com/transfer-systems for specifications)				
GENERAL SPECS				
Nominal input voltage	230 V (50/60 Hz)	230 V (50/60 Hz)	230 V (50/60 Hz)	230 V (50/60 Hz)
Input voltage range	200-250 V AC	200-250 V AC	200-250 V AC	200-250 V AC
Number of inputs	2	2	2	2
Number of outputs	1	1	1	2
Dimensions, hxwxd	200 x 110 x 115 mm 7.9 x 4.3 x 4.5 inch	200 x 110 x 115 mm 7.9 x 4.3 x 4.5 inch	291 x 241 x 168 mm 11.5 x 9.5 x 6.6 inch	200 x 255x115 mm 7.9 x 10 x 4.5 inch
Weight	1.2 kg / 2.6 lb	1.3 kg / 2.9 lb	3.8 kg / 8.4 lb	2.1 kg / 4.6 lb
TECHNICAL SPECS				
Connection for remote control	no	no	no	no
MasterBus compatible	no	no	no	no
LED indication on cabinet	no	no	no	no
Nominal input current generator	20 A	40 A	125 A	16 A
Nominal input current grid	20 A	40 A	125 A	16 A
Nominal input current inverter	n.a.	n.a.	n.a.	20 A
Earth leakage switch	n.a.	n.a.	n.a.	yes (1x)
Generator input switch	no	no	no	no
Time delay generator input	0-10 sec (adjustable)	0-10 sec (adjustable)	0-10 sec (adjustable)	0-10 sec (adjustable)
Nominal current shortbreak output	n.a.	n.a.	n.a.	6 A + 6 A + 6 A
Nominal current power output	20 A	40 A	125 A	6 A + 10 A
Nominal current generator output	n.a.	n.a.	n.a.	n.a.
Automatic circuit breakers	no, system dependent	no, system dependent	no, system dependent	yes
Power consumption (AC all inputs)	7 VA	7 VA	26 VA	7 VA
Power consumption (only inverter power)	no no load consumption	no no load consumption	no no load consumption	no no load consumption
Temperature range (specified)	-5 °C to 60 °C	-5 °C to 60 °C	-5 °C to 60 °C	-5 °C to 60 °C
Temperature range (allowed)	-25 °C to 70 °C (may not meet the specified tolerancies)	-25 °C to 70 °C (may not meet the specified tolerancies)	-25 °C to 70 °C (may not meet the specified tolerancies)	-25 °C to 70 °C (may not meet the specified tolerancies)
Temperature range (storage/non operating)	-60 °C to 80 °C	-60 °C to 80 °C	-60 °C to 80 °C	-60 °C to 80 °C
Relative humidity	max. 95%, non condensing	max. 95%, non condensing	max. 95%, non condensing	max. 95%, non condensing
Transfer time	switch on 12-22 ms / switch off 4-19 ms	switch on 12-22 ms / switch off 4-19 ms	switch on 12-22 ms / switch off 4-19 ms	switch on 12-22 ms / switch off 4-19 ms
Frequency watch	no	no	no	no
Cable size	0.5-10 mm^2 / AWG 20-7	0.5-10 mm^2 / AWG 20-7	4-50 mm^2 / AWG 10-1/0	0.5-10 mm^2 / AWG 20-7
Protection degree	IP55	IP55	IP55	IP55

			
	Mass Systemswitch 6 kW	**Mass Systemswitch 10 kW**	**Mass Systemswitch 16 kW**
	55008005	*55008105*	*55008205*
	230 V (50/60 Hz)	230 V (50/60 Hz)	230 V (50/60 Hz)
	200-250 V AC	200-250 V AC	200-250 V AC
	3	3	3
	3	4	4
	340 x 261 x 144 mm 13.4 x 10.3 x 5.7 inch	340 x 261 x 144 mm 13.4 x 10.3 x 5.7 inch	340 x 261 x 144 mm 13.4 x 10.3 x 5.7 inch
	4.4 kg / 9.7 lb	4.9 kg / 10.8 lb	5 kg / 11 lb
	yes	yes	yes
	yes	yes	yes
	indication voltage sources present and 'load on inverter' mode	indication voltage sources present and 'load on inverter' mode	indication voltage sources present and 'load on inverter' mode
	25 A	40 A	63 A
	25 A	25 A	40 A
	25 A	25 A	25 A
	no	no	no
	continuous monitoring of voltage and frequency	continuous monitoring of voltage and frequency	continuous monitoring of voltage and frequency
	0-10 sec (adjustable)	0-10 sec (adjustable)	0-10 sec (adjustable)
	25 A	25 A	25 A
	25 A	25 A	40 A
	n.a.	40 A	63 A
	no, system dependent	no, system dependent	no, system dependent
	27 VA	33 VA	33 VA
	<1 VA	<1 VA	<1 VA
	-5 °C to 60 °C	-5 °C to 60 °C	-5 °C to 60 °C
	-25 °C to 70 °C (may not meet the specified tolerancies)	-25 °C to 70 °C (may not meet the specified tolerancies)	-25 °C to 70 °C (may not meet the specified tolerancies)
	-60 °C to 80 °C	-60 °C to 80 °C	-60 °C to 80 °C
	max. 95%, non condensing	max. 95%, non condensing	max. 95%, non condensing
	switch on 12-22 ms / switch off 4-19 ms	switch on 12-22 ms / switch off 4-19 ms	switch on 12-22 ms / switch off 4-19 ms
	yes	yes	yes
	0.5-10 mm^2 / AWG 20-7, remote control: 0.14-2.5 mm^2 / AWG 26-13	0.5-10 mm^2 / AWG 20-7, remote control: 0.14-2.5 mm^2 / AWG 26-13	0.5-10 mm^2 / AWG 20-7, remote control: 0.14-2.5 mm^2 / AWG 26-13
	IP23	IP23	IP23

For detailed specifications, dimensional drawings, 3D files, images, certificates and manuals see ■ www.mastervolt.com/transfer-systems

A safe connection between grid power and your onboard network

You need to be careful when introducing grid power onboard, for example when a yacht is made of aluminium or steel. An incorrectly configured system can result in electrolysis, which will slowly but surely corrode the metal components. A Mastervolt isolation transformer will help preserve your valuable investment and provide you with the security of a correctly earthed 230 V system.

Select the right transformer for your system:

Lightweight Mass GI transformer

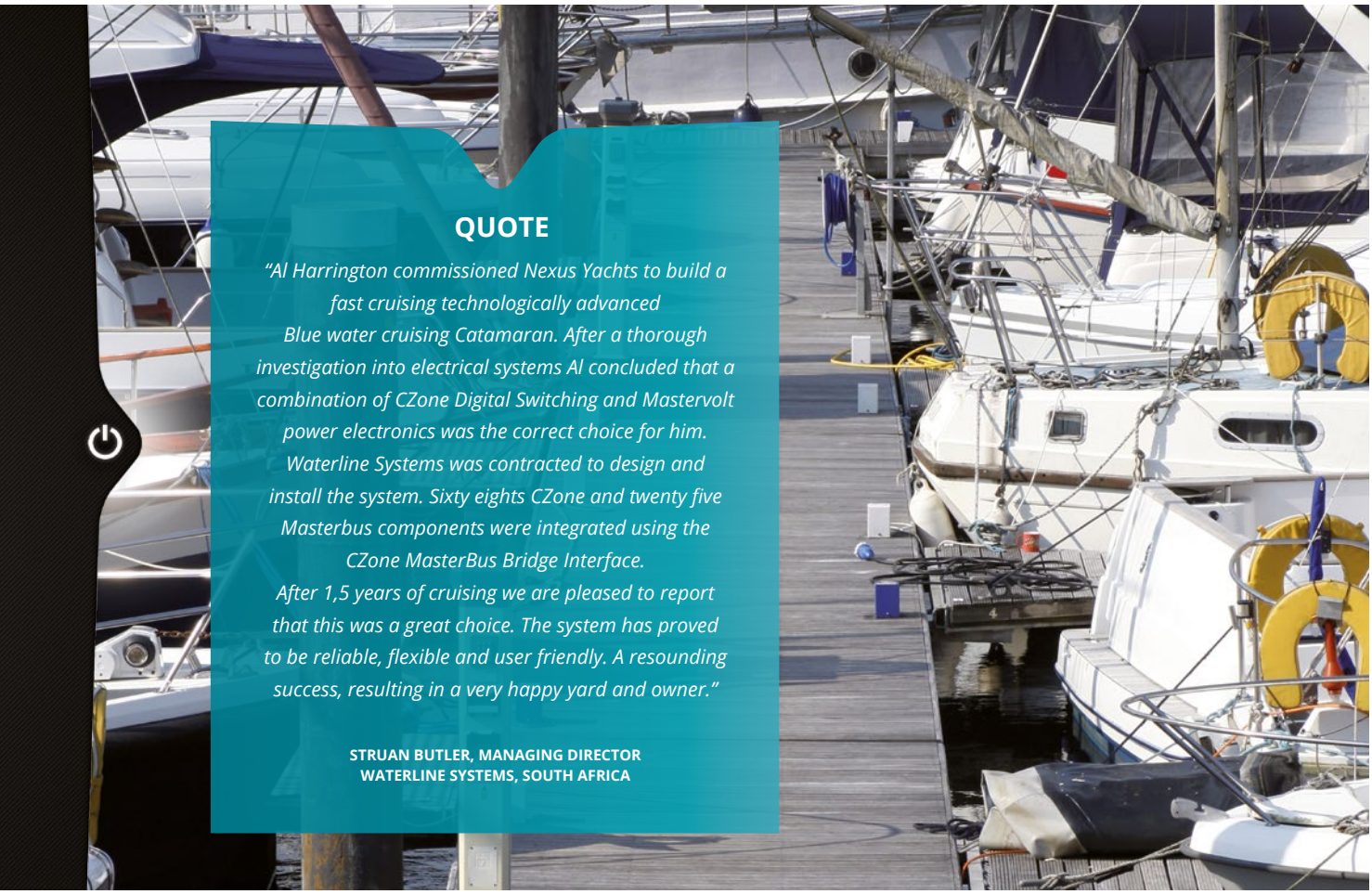
- Ultramodern high-frequency electronic switch technology.
- Lightweight and compact.
- Integrated Soft Start function.
- Connect to voltages from 90 to 255 V and from 45 to 65 Hz.
- Units can be parallel coupled for higher capacity.
- Higher efficiency, limited heat development.

IVET-D isolation transformers

- High-quality toroidal transformer in robust casing, including circuit breaker.
- Standard Soft Start for the suppression of in-rush current at AC connection.
- Multi-tap version for both 230V/50Hz and 120V/60Hz AC voltage.

IVET heavy-duty series

- High-quality isolation transformers without casing (for self installation).
- Optional Soft Start, in synthetic casing.
- Capacities of 2.5 kW to 22 kW.



QUOTE

"Al Harrington commissioned Nexus Yachts to build a fast cruising technologically advanced Blue water cruising Catamaran. After a thorough investigation into electrical systems Al concluded that a combination of CZone Digital Switching and Mastervolt power electronics was the correct choice for him. Waterline Systems was contracted to design and install the system. Sixty eights CZone and twenty five Masterbus components were integrated using the CZone MasterBus Bridge Interface. After 1,5 years of cruising we are pleased to report that this was a great choice. The system has proved to be reliable, flexible and user friendly. A resounding success, resulting in a very happy yard and owner."

STRUAN BUTLER, MANAGING DIRECTOR
WATERLINE SYSTEMS, SOUTH AFRICA

Modern transformer technology: Light, silent, reliable and easy

Mastervolt's Mass GI offers the latest high-frequency switching technology as well as Soft Start for peak loads when connecting to the grid. Weighing a mere six kilos, LED lights on the casing indicate load and overload. The transformer can be remote controlled via a panel and has the option of automatically starting the generator when there is a AC current overload.

Higher capacity via parallel switching

Parallel switching of the Mass GI units increases the AC power capacity. Two 16 A/3.5 kW units ensures 32 A/7 kW, four units give 64 A/14 kW.

Global solution

The IVET-D multi-tap is suitable for 230V/50Hz and 120V/60Hz.

Install anywhere

With its robust, aluminium casing, this isolation transformer can be fitted in any position on wall or floor. No rubber mountings are necessary because the unit does not vibrate or hum.
The Mass GI also features professional connections with strain relief cable glands.

Practical tips

- Determine AC power and onboard current: 230 V, 120 V or both.
- Determine the capacity. Maximum load with onboard power usage: Amount of amps and kW.
- Note sizes and weight; The Mass GI is 75% lighter and 60% smaller compared to low frequency transformers.

Specifications isolation transformers





	Mass GI 3.5	Mass GI 7	IVET-D 16 A 3.5 kVA multi tap	IVET 3.5*	IVET 4.5
Product code	*88000355*	*88000705*	*86060351*	*85000350*	*85000450*
INPUT					
Input voltage	90-255 V	90-255 V	220-240 V (110-120 V adjustable)	110/220/240 V	110/220/240 V
Input frequency	45-65 Hz	45-65 Hz	45-65 Hz	45-65 Hz	45-65 Hz
Nominal input current at 230 V	16 A	32 A	16 A	16 A	20 A
No load consumption	22 W	44 W	<10 W	<10 W	<10 W
Earth leakage protection	no	no	no	no	no
OUTPUT					
Output voltage	90-255 V, ± 5%	90-255 V, ± 5%	220-240 V, ± 5% (110-120 V adjustable)	120/220/240 V, ± 5%	120/220/240 V, ± 5%
Output frequency	45-65 Hz	45-65 Hz	45-65 Hz	45-65 Hz	45-65 Hz
Soft Start	yes	yes	yes	option	option
Switch off behaviour breaker	B-characteristic	B-characteristic	B-characteristic	n.a.	n.a.
Efficiency	>93%	>93%	>93%	>93%	>93%
GENERAL SPECS					
Power	3500 W (up to 4 units parallel = 14 kW)	7000 W	3500 W	3500 W	4500 W
Technology	high frequency	high frequency	torroidal	E-core	E-core
Dimensions, hxwxd	340 x 261 x 144 mm 13.4 x 10.3 x 5.7 inch	340 x 261 x 250 mm 13.4 x 10.3 x 9.8 inch	407 x 295 x 220 mm 16 x 11.6 x 8.7 inch	330 x 200 x 185 mm 13 x 7.9 x 7.3 inch	330 x 240 x 185 mm 13 x 9.4 x 7.3 inch
Weight	6 kg / 13.2 lb	10 kg / 22 lb	23 kg / 50.7 lb	30 kg / 66.1 lb	53 kg / 77.2 lb
Ambient temperature	0-40 °C, derating power > 40 °C	0-40 °C, derating power > 40 °C	0-40 °C, derating power > 40 °C	0-40 °C, derating power > 40 °C	0-40 °C, derating power > 40 °C
Switch off at	80 °C	80 °C	120 °C	n.a.	n.a.
Cooling	variofan	variofan	natural cooling, forced cooling > 80 °C	natural cooling	natural cooling
Operating humidity	max. 95%	max. 95%	max. 95%	max. 95%	max. 95%
Protection degree	IP23	IP23	IP23	IP00	IP00
MasterBus compatible	yes	yes	no	no	no

OPTIONS						
	MasterView Easy *77010305*	option	option	n.a.	n.a.	n.a.
		Touch screen panel for reading status and dimmer function settings.				
	Soft Start 13 IW *55003300*	included	included	included	option	option
		Automatic switch that suppresses the inrush current from the isolation transformer to prevent the shore power fuse from blowing.				
	Soft Start 22 kW *55003400*	included	included	included	n.a.	n.a.
		Automatic switch that suppresses the inrush current from the isolation transformer to prevent the shore power fuse from blowing.				

Specifications Transfer systems with Soft Start and automatic detection of the input voltage





	6 kVA	9 kVA	13 kVA	Soft Start 13 kVA	Soft Start 22 kVA
Product code	*55010600*	*55010900*	*55011300*	*55003300*	*55003400*
Voltage	120/230 V	120/230 V	120/230 V	230 V	230 V
Power	6 kW	9 kW	13 kW	2.5-13 kW	13-22 kW
Max. input current	60 A at 120 V 30 A at 230 V	80 A at 120 V 40 A at 230 V	130 A at 120 V 70 A at 230 V	n.a.	n.a.
Dimensions, hxwxd	400 x 300 x 210 mm 15.7 x 11.8 x 8.3 inch	400 x 300 x 210 mm 15.7 x 11.8 x 8.3 inch	400 x 300 x 210 mm 15.7 x 11.8 x 8.3 inch	200 x 180 x 115 mm 7.9 x 7.1 x 4.5 inch	200 x 180 x 115 mm 7.9 x 7.1 x 4.5 inch
Weight	12 kg / 26.5 lb	12.5 kg / 27.6 lb	13 kg / 28.7 lb	1.2 kg / 2.6 lb	1.5 kg / 3.3 lb

						
	IVET 6	**IVET 8**	**IVET 10****	**IVET 13**	**IVET 18**	**IVET 22**
	8500060	*85000800*	*85001000*	*85001300*	*85001800*	*85002200*
	110/220/240 V	110/220/240 V	110/220/240 V	110/220/240 V	110/220/240 V	110/220/240 V
	45-65 Hz	45-65 Hz	45-65 Hz	45-65 Hz	45-65 Hz	45-65 Hz
	26 A	35 A	44 A	57 A	78 A	96 A
	<10 W	<10 W	<10 W	<10 W	<10 W	<10 W
	no	no	no	no	no	no
	120/220/240 V, ± 5%	120/220/240 V, ± 5%	120/220/240 V, ± 5%	120/220/240 V, ± 5%	120/220/240 V, ± 5%	120/220/240 V, ± 5%
	45-65 Hz	45-65 Hz	45-65 Hz	45-65 Hz	45-65 Hz	45-65 Hz
	option	option	option	option	option	option
	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	>93%	>93%	>93%	>93%	>93%	>93%
	6000 W	8000 W	10 kW	13 kW	18 kW	22 kW
	E-core	E-core	E-core	E-core	E-core	E-core
	380 x 240 x 215 mm 15 x 9.5 x 8.5 inch	430 x 280 x 210 mm 16.9 x 11 x 8.3 inch	430 x 280 x 240 mm 16.9 x 11 x 9.5 inch	490 x 320 x 230 mm 19.3 x 12.6 x 9 inch	490 x 320 x 260 mm 19.3 x 12.6 x 10.2 inch	490 x 320 x 290 mm 19.3 x 12.6 x 11.4 inch
	49 kg / 108 lb	59 kg / 130 lb	75 kg / 165.4 lb	90 kg / 198.4 lb	110 kg / 242.5 lb	130 kg / 286.6 lb
	0-40 °C, derating power > 40 °C	0-40 °C, derating power > 40 °C	0-40 °C, derating power > 40 °C	0-40 °C, derating power > 40 °C	0-40 °C, derating power > 40 °C	0-40 °C, derating power > 40 °C
	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	natural cooling	natural cooling	natural cooling	natural cooling	natural cooling	natural cooling
	max. 95%	max. 95%	max. 95%	max. 95%	max. 95%	max. 95%
	IP00	IP00	IP00	IP00	IP00	IP00
	no	no	no	no	no	no
	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.
	option	option	option	option	n.a.	n.a.
	n.a.	n.a.	n.a.	option	option	option

* Also available in 2.5 kW version, product code 85000250.
** Also available in cabinet, product code 86001000.

Automatically adjust grid power to the onboard system

Mastervolt supplies three automatic switching systems for capacities of 6, 9 and 13 kW that - combined with an IVET transformer - adjust grid power to the onboard system. As a result, a 230V/50Hz system can easily function with an American or Caribbean AC connection. Do ensure that the frequency on board (50 of 60 Hz) is the same as the frequency of the incoming current.

Mastervolt batteries: The right choice for power storage

Mastervolt makes selecting the right battery easy. Whether you choose a low priced battery such as the AGM or an innovative and technologically advanced Lithium Ion battery, Mastervolt offers you the right solution for the power you expect.

To make the choice even simpler, Mastervolt has divided its entire battery range of 31 types into six series and four different battery technologies. Each series has specific benefits as well as variations in price, capacity, dimensions, volume and lifespan.

All Mastervolt batteries offer you these advantages:

- Maintenance-free.
- Safe - no degassing.
- Easy to install.
- Designed for cyclic use (charge/discharge).
- Two year warranty.

Issues to take into account:

- Determining the correct battery capacity for your new battery/batteries is very important. For support and more information see: **www.mastervolt.com/batteries**.
- Choosing the right battery charger guarantees the maximum lifespan of your batteries. For more information see **www.mastervolt.com/chargers**. Mastervolt's modern 3-step+ charge technology charges your batteries safely and quickly.
- A battery monitor is the best way to make the most of your batteries. Go to **www.mastervolt.com/batterymonitor** for more information.

Reinforced batteries

All Mastervolt batteries are equipped with shock-proof positive and negative battery plates with rubber separation, while the electrolyte is absorbed in gel or glass fibre (AGM). A high-grade lead/calcium compound guarantees you a constant capacity and minimum self-discharging. Mastervolt has the right battery for every application.

For detailed specifications, dimensional drawings, 3D files, images, certificates and manuals see ■ www.mastervolt.com/batteries

Which battery is best for your application?

	Traditional open batteries	1 MLI Lithium Ion	2 MVG gel semi-traction	3 MVSV 2V gel traction	4 AGM semi-traction
Maintenance-free	-	★★★★	★★★★	★★★★	★★★★
Gas formation during charging	★	★★★★★	★★★	★★★	★★★
Self discharge while inactive	-	★★★	★★★★	★★★★	★★★
Lifespan with complete discharge	★	★★★★★	★★★	★★★★	★★
Lifespan with limited discharge	★★	★★★★★	★★★★	★★★★	★★★
Sensitivity to excessive charge voltage	★★	★★★★★	★★★	★★★★	★★
Suitable for selection of battery bank with high capacity	★★	★★★★	★★★	★★★★	★★
Suitable for E-propulsion	★	★★★★★	★★★	★★★★	★★★★
Starting motors	★★	★★★★	★★★	★★	★★★★
Shock-resistance	★	★★★★	★★★★	★★★★	★★★★
Number of charge/discharge cycles	★	★★★★★	★★★	★★★★	★★
Temperature-resistance	★	★★★★	★★★★	★★★★	★★
Installation/angle of inclination	-	★★★★	★★★★	★★★★	★★★★
Return on investment with limited use	★	★★★	★★★	★★★★	★★★
Return on investment with intensive use	★	★★★★★	★★★	★★★★	★★
Product warranty	± 1 year	2 year	2 year	7 year	2 year
Worldwide service	★	★★★★	★★★★	★★★★	★★★★

★★★★★ excellent ★★★★ very good ★★★ good ★★ adeaquate ★ inadeaquate - poor

1 Lithium Ion batteries

Lithium ion batteries have a high energy density and are perfect for cyclic applications. They offer savings of up to 70% in volume and weight compared to traditional lead-acid batteries, with three times as many charging cycles (2000 full cycles).

Another major benefit of the Mastervolt Li-ion battery is that it is equipped with a Battery Management System (BMS), which automatically compensates for any imbalance between the cells. This guarantees you a constant high capacity and longer battery lifespan. The Lithium Ion Ultra series includes integrated battery monitoring.

2 Gel batteries

In gel batteries, the electrolyte is absorbed by a gel. This type of battery is entirely maintenance-free and has no gas formation with normal use. As no extra ventilation is required gel batteries can be installed anywhere. They are ideal as service battery and for cyclical use, and can be charged very quickly.

3 Traction batteries

This robust gel battery is designed for regular and deep discharging (>1000 full cycles), and is ideal for large systems that require intensive use and a very long lifespan.

4 AGM batteries

In AGM batteries, the electrolyte (mixture of water and sulphuric acid) is largely absorbed in glass fibre. This type of battery is entirely maintenance-free and there is no gas formation with normal use. Not requiring any ventilation, these batteries can be installed anywhere.

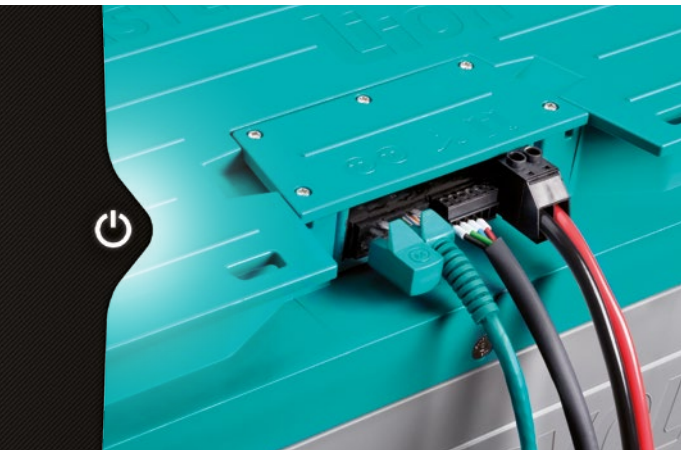
Their construction gives a very fast discharge at very high currents so AGM batteries are ideal for systems that require high currents (for instance when starting an engine). The battery poles can be unscrewed and this type of battery can be combined with every standard battery terminal.

Lithium Ion Ultra

Having perfected the legendary Lithium Ion battery in a few key areas, Mastervolt has developed an unrivalled 2500 or 5000 Wh powerhouse.

The MLI Ultra has an ultra-long lifespan that offers over 2000 cycles at 80% DOD; a potential recharge time of less than an hour; active cell balancing for efficient and safe use of the Li-ion cells; and integrated battery monitoring to further simplify your system.

What's more, the Ultra communicates directly with your Mastervolt battery charger via MasterBus to ensure the best possible recharging. Add in the fact that it takes up 70% less space and weight compared to lead acid batteries, and you'll see why this battery is the best choice.



- Highly advanced technology.
- Multifunctional battery of 2.5 kWh or 5 kWh.
- Saves up to 70% in space and weight.
- Three times the lifespan of traditional batteries (2000 cycles).
- Ultra-fast charging and discharging.
- High efficiency.
- MasterBus communication with every Mastervolt battery charger.
- Integrated Battery Management System (BMS) and monitoring.
- Series balancing technology optimizes string connection.
- Safest Lithium Ion technology available.
- Tested and certified according to UN38.3.
- Two year warranty.

Specifications Lithium Ion Ultra



	MLI Ultra 12/2500	MLI Ultra 12/5000	MLI Ultra 24/5000
Product code	*66012500*	*66015000*	*66025000*
GENERAL SPECS			
Nom. battery voltage	13.25 V	13.25 V	26.5 V
Battery capacity range	180 Ah	360 Ah	180 Ah
Nom. battery power	2500 Wh	5000 Wh	5000 Wh
Battery monitoring	integrated	integrated	integrated
Battery terminals	M8	M8	M8
MasterBus powering	yes	yes	yes
Max. outer dimensions, lxwxh (incl. terminals/grip handles)	339 x 197 x 355 mm 13.3 x 7.8 x 14 inch	622 x 197 x 355 mm 24.5 x 7.8 x 14 inch	622 x 197 x 355 mm 24.5 x 7.8 x 14 inch
Weight	31 kg / 68.3 lb	58 kg / 127.9 lb	58 kg / 127.9 lb
TECHNICAL SPECS			
Technology	LiFePO4	LiFePO4	LiFePO4
Parallel connection	yes, unlimited	yes, unlimited	yes, unlimited
Series connection	yes, up to 10 batteries (series balancing up to 2 batteries)	yes, up to 10 batteries (series balancing up to 2 batteries)	yes, up to 10 batteries (series balancing up to 2 batteries)
Switch off relay controls	integrated	integrated	integrated
Mandatory safety relay	yes, product code *79007700*	yes, product code *79007700*	yes, product code *79007702*

Large battery banks

The Lithium Ion Ultra batteries are ideal for electric and hybrid applications, and can be connected in parallel unlimited. The built-in common-rail technology offers an easy series connection of multiple batteries.

Safe operation

The Mastervolt Li-ion battery is equipped with an integrated Battery Management System with active cell balancing. Ensuring that the available energy is automatically divided between cells guarantees efficient and safe functioning of the battery.

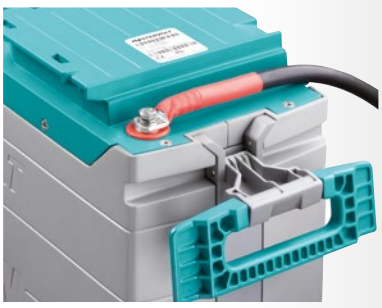
Superior performance

Mastervolt Lithium Ion batteries have a realistic lifespan of over 2000 cycles at a depth of discharge (DOD) of 80%. This is three times longer than lead acid batteries thanks to features such as battery management, the almost complete absence of self discharge and the minimal build-up of the infamous ‘memory effect’.

Weight reduction

As speed and performance are crucial aspects, a Lithium Ion battery – which takes up 70% less weight than similar lead acid batteries – offers considerable benefits. A vessel or vehicle with a capacity of 20 kWh on board, can easily save up to 500 kg and achieve a substantially better performance.

Easy installation



The elegant design of the Li-ion Ultra in the characteristic Mastervolt colours includes two integrated handles with a recess for the correct and practical installation of the cables. As the battery poles are easily accessible and completely protected, extra isolation covers are not needed.

MVG gel series

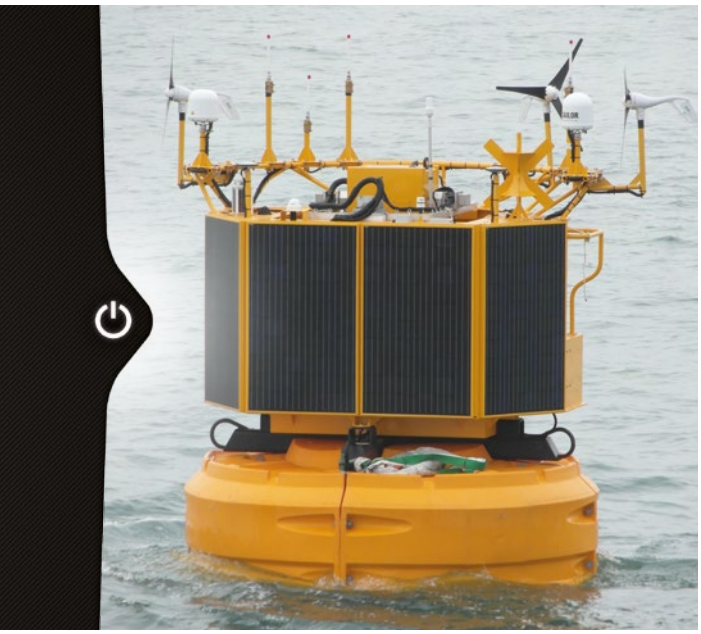
- Perfect service battery for medium and large 12 V and 24 V systems.
- Extremely long lifespan.
- No gas formation with normal use.
- Fast recharge, high charge current possible.
- For intensive cycle use with a high number of charge/discharge cycles.
- Very low self discharge.
- High return on investment.
- Two year warranty.

Specifications MVG gel series

	MVG 12/25
Product code	*64000250*
Nominal voltage	12 V
Capacity C20*	25 Ah
CCA to DIN in amps	110 A
CCA to SAE in amps	175 A
Max. outer dimensions, lxwxh (incl. terminals/grip handles)	167 x 176 x 126 mm 6.6 x 6.9 x 5 inch
Weight	9.6 kg / 21.2 lb

MVSV 2 V gel series

- Long lifespan.
- Many charging and discharging cycles.
- Charges quickly.
- Extremely sustainable battery for large installations.
- Robust build for longer lifespan.
- Deep discharging without problems.
- Can be installed horizontally or vertically.
- Seven-year warranty (pro rata).



Specifications MVSV 2 V gel series

	MVSV 280
Product code	*68000280*
Nominal voltage	2 V
Capacity C10*	280 Ah
Max. outer dimensions, lxwxh (incl. terminals/grip handles)	126 x 208 x 399 mm 5 x 8.2 x 15.7 inch
Weight	23 kg / 50.7 lb

	MVSV 1500
Product code	*68001500*
Nominal voltage	2 V
Capacity C10*	1500 Ah
Max. outer dimensions, lxwxh (incl. terminals/grip handles)	212 x 277 x 690 mm 8.3 x 10.9 x 27.2 inch
Weight	95 kg / 209 lb

* C10 = battery capacity at a discharge time of 10 hours, till 1.80 V per cell.
C20 = battery capacity at a discharge time of 20 hours, till 10.5 V per cell.

MVG 12/55

64000550

12 V
55 Ah
230 A
380 A
261 x 136 x 230 mm 10.3 x 5.4 x 9 inch
19 kg / 41.9 lb

MVG 12/85

64000850

12 V
85 Ah
270 A
450 A
330 x 171 x 236 mm 13 x 6.7 x 9.3 inch
32,6 kg / 71.9 lb

MVG 12/120

64001200

12 V
120 Ah
450 A
760 A
513 x 189 x 223 mm 20.2 x 7.4 x 8.8 inch
41 kg / 90.4 lb

MVG 12/140

64001400

12 V
140 Ah
540 A
920 A
513 x 223 x 223 mm 20.2 x 8.8 x 8.8 inch
49 kg / 108 lb

MVG 12/200

64002000

12 V
200 Ah
630 A
1100 A
518 x 274 x 238 mm 20.4 x 10.8 x 9.4 inch
70 kg / 154.3 lb

MVSV 420

68000420

2 V
420 Ah
126 x 208 x 515 mm 5 x 8.2 x 20.3 inch
30 kg / 66.1 lb

MVSV 500

68000500

2 V
500 Ah
147 x 208 x 515 mm 5.8 x 8.2 x 20.3 inch
35 kg / 77.2 lb

MVSV 580

68000580

2 V
580 Ah
168 x 208 x 515 mm 6.6 x 8.2 x 20.3 inch
39 kg / 86 lb

MVSV 750

68000750

2 V
750 Ah
147 x 208 x 690 mm 5.8 x 8.2 x 27.2 inch
49 kg / 108 lb

MVSV 1000

68001000

2 V
1000 Ah
212 x 193 x 690 mm 8.3 x 7.6 x 27.2 inch
66 kg / 146 lb

MVSV 1250

68001250

2 V
1250 Ah
212 x 235 x 690 mm 8.3 x 9.3 x 27.2 inch
80 kg / 176 lb

MVSV 1650

68001651

2 V
1650 Ah
211 x 276 x 762 mm 8.3 x 10.9 x 30 inch
115 kg / 254 lb

MVSV 2200

68002200

2 V
2200 Ah
216 x 400 x 816 mm 8.5 x 15.7 x 32.1 inch
160 kg / 353 lb

MVSV 2700

68002700

2 V
2700 Ah
214 x 489 x 816 mm 8.4 x 19.3 x 32.1 inch
198 kg / 437 lb

OPTIONS (FOR ALL MODELS)

Masterlink BTM-III
70403163

Provides an accurate indication of the current, amperage, remaining time and remaining capacity of battery bank 1, and the current and estimated capacity of battery banks 2 and 3. The built-in microprocessor calculates the remaining capacity and stores historic data.

MasterShunt
77020100

MasterBus integrated battery monitor, with detailed information on the status of your batteries for a optimised charging process, incl. voltage, current, remaining time and consumption capacity in percentage.

AGM series

- Excellent starter function.
- Perfect upgrade for wet lead acid batteries.
- Same initial power surge in an AGM 12/90 Ah as 180 Ah wet lead-acid battery.
- Glass-fibre technology ensures low internal resistance.
- Use of thicker plates extends lifespan.
- Also for medium cyclical use.
- Two-year warranty.

Specifications AGM series

	AGM 12/55 (group 24)
Product code	*62000550*
Nominal voltage	12 V
Capacity C20*	55 Ah
CCA to DIN in amps	300 A
CCA to SAE in amps	480 A
Max. outer dimensions, lxwxh (incl. terminals/grip handles)	257 x 132 x 207 mm 10.1 x 5.2 x 8.2 inch
Weight	17 kg / 37.5 lb

AGM SlimLine series

- Ideal universal battery; also for starter functions.
- Compressed AGM technology.
- Saves up to 15% in volume.
- Saves up to 15% in weight.
- Miniscule footprint; 2x 185 Ah for a 200 Ah battery footprint.
- Two-year warranty.

Specifications AGM SlimLine series

	AGM-SL 12/150
Product code	*63001500*
Nominal voltage	12 V
Capacity C20*	150 Ah
CCA to DIN in amps	610 A
CCA to SAE in amps	1020 A
Max. outer dimensions, lxwxh (incl. terminals/grip handles)	560 x 110 x 280 mm 22 x 4.3 x 11 inch
Weight	40.5 kg / 89 lb

AGM 6 Volt series

- Ideal solution for cyclic applications such as electric propulsion, wheelchairs, golf carts, etc.
- Easy configuration of 12/24/48 V battery terminals, with high capacity.
- Double pole for easy installation.
- No gas formation with normal use.
- Two-year warranty.

Specifications AGM 6 Volt series

	AGM 6/260 Ah
Product code	*61002600*
Nominal voltage	6 V
Capacity C20*	260 Ah
Max. outer dimensions, lxwxh (incl. terminals/grip handles)	295 x 180 x 298 mm 11.6 x 7.1 x 11.7 inch
Weight	35.3 kg / 77.8 lb

* C20 = battery capacity at a discharge time of 20 hours.

AGM 12/70 (group 27)	AGM 12/90 (group 31)	AGM 12/130	AGM 12/160 (group 4D)	AGM 12/225 (group 8D)	AGM 12/270 (group Super 8D)
62000700	*62000900*	*62001300*	*62001600*	*62002250*	*62002700*
12 V	12 V	12 V	12 V	12 V	12 V
70 Ah	90 Ah	130 Ah	160 Ah	225 Ah	270 Ah
385 A	535 A	585 A	630 A	815 A	1000 A
615 A	850 A	935 A	1000 A	1300 A	1600 A
348 x 167 x 183 mm 13.7 x 6.6 x 7.2 inch	330 x 173 x 237 mm 13 x 6.8 x 9.3 inch	410 x 177 x 228 mm 16.1 x 7 x 9 inch	485 x 170 x 245 mm 19.1 x 6.7 x 9.6 inch	522 x 240 x 241 20.6 x 9.4 x 9.5 inch	522 x 268 x 243 mm 20.6 x 10.6 x 9.6 inch
21 kg / 46 lb	28 kg / 62 lb	37.6 kg / 83 lb	42.3 kg / 93 lb	63.5 kg / 140 lb	73 kg / 161 lb

AGM-SL 12/185

63001850
12 V
185 Ah
750 A
1250 A
560 x 126 x 280 mm 22 x 5 x 11 inch
51.2 kg / 113 lb

AGM 6/400 Ah

61004000
6 V
400 Ah
295 x 180 x 428 mm 11.6 x 7.1 x 16.9 inch
53 kg / 116.8 lb

OPTIONS (FOR ALL MODELS)

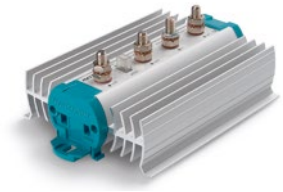
	Masterlink BTM-III *70403163*	*Provides an accurate indication of the current, amperage, remaining time and remaining capacity of battery bank 1, and the current and estimated capacity of battery banks 2 and 3. The built-in microprocessor calculates the remaining capacity and stores historic data.*
	MasterShunt *77020100*	*MasterBus integrated battery monitor, with detailed information on the status of your batteries for a optimised charging process, incl. voltage, current, remaining time and consumption capacity in percentage.*

Masterlink BTM-III

Product code	*70403163*
GENERAL SPECS	
Number of battery outlets	3 (service, starter & bowthruster)
Display/read-out	voltage, current, Amp-hours, time remaining, battery capacity in %
Dimensions, hxwxd	120 x 65 x 55 mm 4.7 x 2.6 x 2.2 inch
Dimensions shunt, hxwxd	84 x 44 x 44 mm 3.3 x 1.7 x 1.7 inch
Built-in depth incl./excl. cover box	55 / 40 mm 2.2 / 1.6 inch
Weight	0.9 kg / 2 lb
TECHNICAL SPECS	
Max. Ah capacity	9999 Ah
Supply voltage	9-35 V
Voltage measurement range	7-35 V
Current consumption (backlight off)	14 mA/12 V, 11 mA/24 V
Current consumption (backlight on)	100 mA/12 V, 50 mA/24 V
Voltage resolution	0.01 V
Voltage deviation	± 0.6% ± 1 figure
Shunt specification	500 A/50 mV (service set)
Current measurement range	0-500 A (optional 1000 A/50 mV)

Convenience, safety and comfort around your battery installation

Capacity and the right type of battery are important, but so too are ease of installation, extra comfort and sufficient safety; three aspects of your battery for which Mastervolt has numerous intelligent accessories. We will help you get the most out of your 12 V, 24 V and 48 V system, and ensure a maximum lifespan for your batteries.



Main engine with alternator as power source

To charge two or more batteries via your alternator, use an automatic battery isolator. Choose the BI type with conventional diode or the Battery Mate with electronic distribution and no loss of current.

Prevent unnecessary loss of current

A battery can be depleted even by the smallest clock or a device on standby. The most practical solution is the Mastervolt Battery Watch, which switches off all consumers via the central key switch.

Prevent unnecessary discharge

Use the battery switch to turn off the power of the onboard network or starter circuit and prevent unnecessary discharge.

Secure fuses

The MasterShunt is standard equipped with a T-fuse suitable for the high short circuit currents of the batteries. The DC Distribution standardly comes with four ANL fuses: 80, 80, 125 and 160 A, and a spare fuse of 125 A.

Strong connections

Mastervolt recommends connections with corrosion-proof links and heavy-duty screw bolts.

Maximum safety

A proper cover and isolation of the battery poles prevents sparks or short circuiting, even in the toughest conditions.

Specifications

Description	Type	Product code
BATTERY TERMINALS		
Battery terminal with nut M8 plus	B	*68060100*
Battery terminal with nut M8 min	B	*68060200*
Battery terminal plus flat	C1	*68060300*
Battery terminal min flat	C2	*68060400*
Battery terminal double plus flat	A	*68060500*
Battery terminal double min flat	A	*68060600*
Battery terminal with bolt M10 plus	D	*68060700*
Battery terminal with bolt M10 min	D	*68060800*
Battery terminal with bolt M12 plus	--	*68060900*
Battery terminal with bolt M12 min	--	*68061000*
COVERS BATTERY TERMINALS		
Cover 456N9V02 red, for product code 68060100	B	*68456902*
Cover 456N9V14 black, for product code 68060200	B	*68456914*
Cover 454R9V02 red, for product code 68060300	C1	*68454002*
Cover 453L9V14 black, for product code 68060400	C2	*68453014*
Cover 451N9V02 red, for product code 68060500	A	*68451902*
Cover 451N9V14 black, for product code 68060600	A	*68451914*
Cover 457N3V02 red, for product code 68060700 & 68060900	D	*68457302*
Cover 457N3V14 black, for product code 68060800 & 68060800	D	*68457314*
MASTERSHUNT FUSE		
T-fuse 500 A / 160 V DC, current limiting capability 50 kA		*77049000*
DC DISTRIBUTION FUSES		
20 A		*77049020*
40 A		*77049040*
50 A		*77049050*
63 A		*77049063*
80 A		*77049080*
100 A		*77049100*
125 A		*77049125*
160 A		*77049160*
175 A		*77049175*
200 A		*77049200*
250 A		*77049250*
300 A		*77049300*
355 A		*77049355*
400 A		*77049400*
425 A		*77049425*
500 A		*77049500*
EARTH LEAKAGE SWITCHES		
DPN VIGI 16 A/B/30 mA, 1P+N		*6385401610*
DPN VIGI 25 A/B/30 mA, 1P+N		*6385402510*
Shore Fix 16 A/30 mA		*124001000*

Optimal division of charge current over multiple batteries

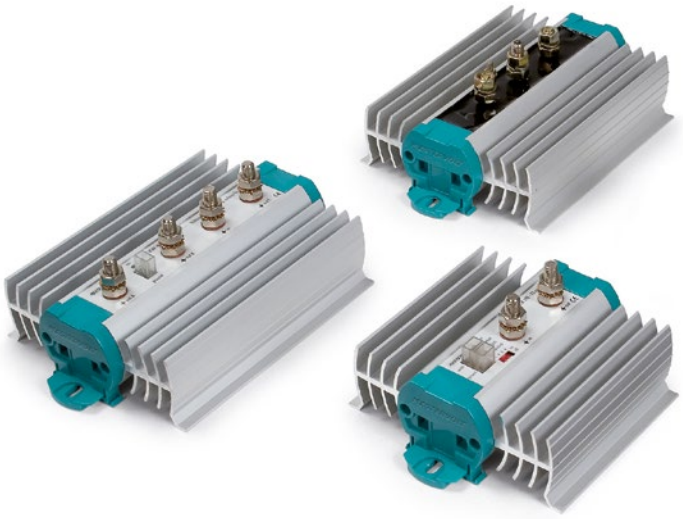
Onboard systems usually consist of two or more batteries that function independently when supplying the 12, 24 or 48 V consumers and require independent charging with reliable battery isolators and other peripheral equipment.

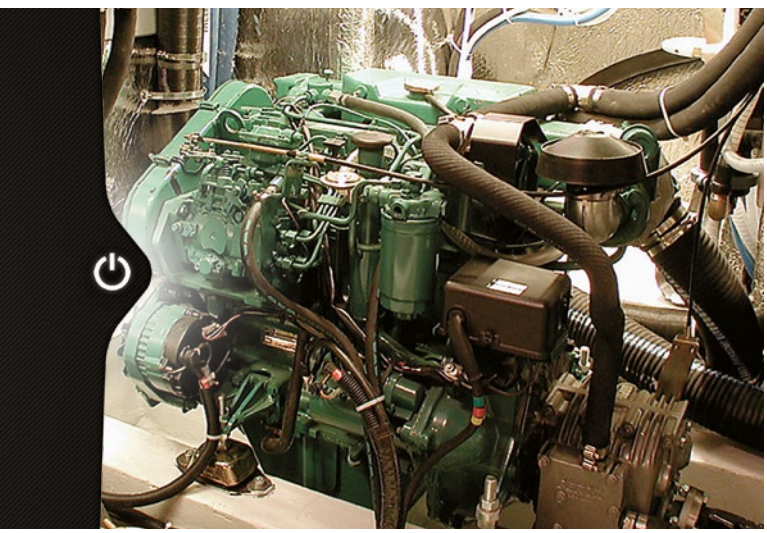
Mastervolt offers several intelligent solutions:

- Battery isolators that divide your charge current with a minimum energy loss.
- The Charge Mate for connecting and/or disconnecting two batteries.
- Robust manual switches for centrally turning off the power of the onboard network or starter circuit.
- Mastervolt Battery Watch for monitoring the condition of your batteries (also usable as main switch).

Complete range for every system

- **BI battery isolators** for conventional systems with an alternator or battery charger and two or three batteries.
- **Battery Mate** battery isolators with a negligible voltage drop; most suitable for charging multiple batteries, possibly with various brands of alternators, even if their charge voltage cannot be adjusted. Ensures high efficiency and negligible energy loss.
- **Charge Mate** for the parallel switching of two batteries while charging.
- **Battery Watch** battery switch with protection against overvoltage and depletion of the battery.
- **Battery switches** for switching on and off the consumers attached to the battery.





Charging two or three batteries at high capacity

Mastervolt's Battery Mate is ideal for alternators with a maximum charge current of 250 A. It can charge two or three batteries with a very high yield and without voltage loss.

Robust and durable

Mastervolt's completely corrosion-proof materials feature heat sinks made of aluminium alloy as well as electronic components (and, in the case of BI models, diode splitters) cast in synthetic materials.

Clear monitoring

Safety guaranteed: The Battery Mate LED display indicates whether the power input is active.

Fast installation

The composite end plates feature connection lugs and solid bolt connections with nuts and locking rings to ensure easy installation.

Compact and lightweight

The Mastervolt BI battery isolators and switches are compact and fully solid state, preventing wear. The weight of the automatic isolators (BI) varies from 560 to 1300 grams.

BI battery isolators

Mastervolt's BI battery isolators are based on conventional diode technology. The diode voltage drop (ca. 0.6 V) can be compensated for by adapting the output voltage of the connected charger or alternator. Mastervolt battery chargers and Alpha Pro MB charge regulators come as standard with automatic compensation for voltage drops.

Specifications BI battery isolators




	BI 702-S	BI 703	BI 1202-S	BI 1203-S
Product code	*83007021*	*83007030*	*83012021*	*83012031*
Max. output charger	25/50 A	25/50 A	80 A	80 A
Max. output alternator	70 A	70 A	120 A	120 A
Compensation diode	yes	no	yes	yes
Dimensions, hxwxd	157 x 140 x 80 mm 6.2 x 5.5 x 3.1 inch	207 x 140 x 80 mm 8.1 x 5.5 x 3.1 inch	207 x 140 x 80 mm 8.1 x 5.5 x 3.1 inch	207 x 140 x 80 mm 8.1 x 5.5 x 3.1 inch
Weight	0.58 kg / 1.3 lb	1.1 kg / 2.4 lb	1.2 kg / 2.6 lb	1.3 kg / 2.9 lb
Number of battery banks	2	3	2	3

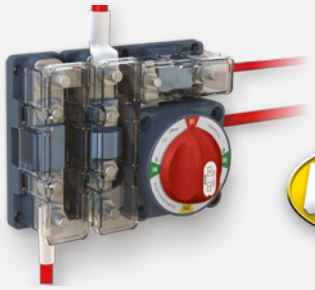
Battery Mate

While battery isolators are conventional diode splitters, the Battery Mate's technology is electronic and includes mosfets (transistors). Its components compensate for the voltage drop and ensure that charging continues at the right voltage level, even with several battery banks. The Battery Mate is compatible with any type of alternator/battery charger, in both existing and new systems. As the voltage loss between the alternator and battery is negligible, the Battery Mate performs far better than conventional battery isolators. This ensures fast and complete charging of your batteries without having to make additional adjustments to the alternator.

Specifications Battery Mate



	Battery Mate 1602 IG	Battery Mate 1603 IG	Battery Mate 2503 IG
Product code	*83116025*	*83116035*	*83125035*
Max. output charger	120 A	120 A	200 A
Max. output alternator	160 A	160 A	250 A
Dimensions, hxwxd	207 x 140 x 80 mm 8.1 x 5.5 x 3.1 inch	207 x 140 x 80 mm 8.1 x 5.5 x 3.1 inch	207 x 140 x 80 mm 8.1 x 5.5 x 3.1 inch
Weight	1 kg / 2.2 lb	1 kg / 2.2 lb	1 kg / 2.2 lb
Number of battery banks	2	3	3



Mastervolt offers a comprehensive range of battery switches and bus bars for safe and reliable operation, the Pro Installer series.

We would like to refer to our global product catalog where we offer the most extended product portfolio globally under the Marinco brand.

www.marinco.com

MARINCO

Charge Mate

A secondary battery is increasingly more common. As a second battery can prevent the main battery from depleting and being unable to start, this seems like a safe and reliable solution. The second battery, however, also has to be charged regularly. Mastervolt has the solution: The Charge Mate connects both batteries with a relay while charging, and keeps them isolated when discharging. The Charge Mate is especially practical for small systems.

Specifications Charge Mate

	Charge Mate 1202	Charge Mate 2505
Product code	*83301202*	*83302502*
GENERAL SPECS		
Battery voltage	12/24 V	12/24 V
Continuous power	120 A	500 A
Number of modes	n.a.	on, off, auto, start assist
Dimensions, hxwxd	76 x 46 x 46 mm 3 x 1.8 x 1.8 inch	90 x 80 x 85 mm 3.5 x 3.1 x 3.3 inch
Weight	0.125 kg / 0.3 lb	0.65 kg / 1.4 lb
TECHNICAL SPECS		
Power consumption	switch open: < 1 mA at 12/24 V DC	switch open: < 1 mA at 12/24 V DC
Inrush current (250ms)	2000 A	2000 A
Switch on voltage	13 - 15 V (12 V) 26 - 30 V (24 V)	13 - 15 V (12 V) 26 - 30 V (24 V)
Switch on delay	5 sec	30 sec
Switch off voltage	< 12.75 V (12 V) < 25.5 V (24 V)	< 12.25... > 15 V (12 V) < 25.5...> 30 V (24 V)
Switch off delay	no	3 minutes
Ambient temperature	-40 to 65 °C	-40 to 60 °C
Protection degree	IP21	IP21

Battery Watch

The Battery Watch is an essential element of any well-equipped battery system, offering you a 600-gram electronic watchdog that ensures a much longer lifespan for your batteries. The unit monitors the optimum condition of your batteries and can also be used as a main battery isolation switch. LED lights provide a clear read out and the undervoltage can be set using DIP switches.

Specifications Battery Watch

	Battery Watch
Product code	*83200150*
Input voltage	8-32 V DC
Max. load	150 A
Switch off under voltage 12 V	9-12 V DC
Switch off under voltage 24 V	18-24 V DC
Dimensions, hxwxd	157 x 140 x 80 mm 6.2 x 5.5 x 3.2 inch
Weight	0.6 kg / 1.3 lb

For detailed specifications, dimensional drawings, 3D files, images, certificates and manuals see ■ www.mastervolt.com/battery-isolators

Electric propulsion by Mastervolt

Electric sailing is becoming ever more popular. Perhaps it is the peace and comfort that comes from saying goodbye to engine vibrations and noise. Our desire to be eco-friendly is certainly playing a key role.

And then there is also the fact that many of the world's 'green zones' can only be accessed with silent and emission-free e-propulsion.

Choosing your electric or hybrid solution

Having developed our e-propulsion products in partnership with the experts in this field, Mastervolt offers complete electric systems up to 20 kW or customised solutions with higher capacities (up to 40 kW). In addition to propulsion, some systems can also supply power to the batteries, battery chargers and battery monitoring devices. And we have a range of intelligent, integrated solutions for hybrid sailing.

Total package

Mastervolt delivers all its electric motors with a controller, cables, display, contact key, main switch and main fuse. Due to the wide variety in designs, materials and shapes, throttle handles are not included as standard.

Sailing hours

The number of sailing hours depends on your battery kit combined with the generated capacity. For six to eight hours sailing, you require 4.6 x kW capacity in kWh.

- ***Example: 4.6 x 3.5 kW = 16.1 kWh; this is the capacity required for six to eight hours sailing.***

A battery monitor that always provides the latest information is very beneficial when electric sailing.

Two-year warranty and global service

All Mastervolt systems for electric sailing come with a two-year warranty as well as global service.

Practical information:

Permanent Magnet (PM) motors are very compact and silent; Asynchronous motors are exceptionally quiet and have a very high torque.

To find out which batteries are most suitable for you, visit ■ ***www.mastervolt.com/batteries***

A proper battery charger is essential for the maintenance and lifespan of your batteries. See ■ ***www.mastervolt.com/chargers*** for assistance with your selection.

A reliable battery monitor is a must. See ■ ***www.mastervolt.com/batterymonitor***

Choose your propulsion kit:

DriveMaster

The DriveMaster propeller systems are ideal when size and space are limited, and remain very much a solution for today. The special and compact permanent magnet motor offers a high constant torque with a low rpm, directly transferred to the propeller without transmission.

Motor type:

DriveMaster

DriveMaster Ultra

DriveMaster Ultra asynchronous systems are specially designed for applications where capacity and reliability are crucial in all conditions. The modern brushless asynchronous electro-motors are watertight (IP65), air-cooled, entirely maintenance-free and incredibly quiet. The asynchronous technology enables a considerably higher temporary capacity. Thanks to the fully automated Powerboost function (+20%), fast manoeuvring and short bursts of speed are even easier to attain.

Motor type:

DriveMaster Ultra

Specifications
DriveMaster / DriveMaster Ultra

Type	Supplied capacity	Motor technology	Voltage regulator	Max. RPM	Required battery capacity for 3-4 hours sailing	Required battery capacity for 6-8 hours sailing	Product code
DriveMaster 2.5	2.5 kW	PM	24 V	1100	7 kWh	11.5 kWh	*140100250*
DriveMaster 3.6	3.6 kW	PM	48 V	1600	10 kWh	16.5 kWh	*140100360*
DriveMaster Ultra 3.5*	3.5 kW	asynchronous	48 V	1450	9.8 kWh	16 kWh	*140300350*
DriveMaster Ultra 7.5*	7.5 kW	asynchronous	48 V	1450	21 kWh	34.5 kWh	*140300750*
DriveMaster Ultra 10*	10 kW	asynchronous	48 V	1450	28 kWh	46 kWh	*140301000*
DriveMaster Ultra 20*	20 kW	asynchronous	96 V	1450	56 kWh	92 kWh	*140302000*

* With Boost function for easy manoeuvring.

PodMaster

Mastervolt's ideal solution for motor or sailyachts is installed under the hull to save space and minimise sound and vibrations. Sailing with the PodMaster is the quietest possible solution for electric sailing.

The PodMaster is made of seawater-proof aluminium and given six layers of epoxy coating for extra protection. Depending on the model, the bulb contains an ultra-modern, sensor-free, 3-phase permanent magnet synchronised motor or a highly efficient permanent magnet DC motor.
The motor, bearings and plugs were designed for professional use and guarantee years of sailing enjoyment and minimum maintenance. Its high capacity and exceptional efficiency ensure that virtually the entire capacity is transferred to the propeller.

PodMaster

PodMaster Steerable

Specifications PodMaster

Type	Supplied capacity	Motor technology	Voltage regulator	Max. RPM	Required battery capacity for 3-4 hours sailing	Required battery capacity for 6-8 hours sailing	Product code
PodMaster 2*	2 kW	PM	24 V	1800	5.6 kWh	9.2 kWh	*140600200*
PodMaster 4.2	4.2 kW	synchronous	48 V	1500	11.8 kWh	19.3 kWh	*140600420*
PodMaster 10	10 kW	synchronous	48 V	1800	28 kWh	46 kWh	*140601000*
PodMaster 2 Steerable	2 kW	PM	24 V	1800	5.6 kWh	9.2 kWh	*140700200*
PodMaster 4.2 Steerable	4.2 kW	synchronous	48 V	1500	11.8 kWh	19.3 kWh	*140700420*
PodMaster 10 Steerable	10 kW	synchronous	48 V	1800	28 kWh	46 kWh	*140701000*
PodMaster 2 Sterndrive	2 kW	PM	24 V	1800	5.6 kWh	9.2 kWh	*140800200*
PodMaster 4.2 Sterndrive	4.2 kW	synchronous	48 V	1500	11.8 kWh	19.3 kWh	*140800420*
PodMaster 10 Sterndrive	10 kW	synchronous	48 V	1800	28 kWh	46 kWh	*140801000*

* Delivered with fixed propeller, also available with folding propeller.

PodMaster Professional

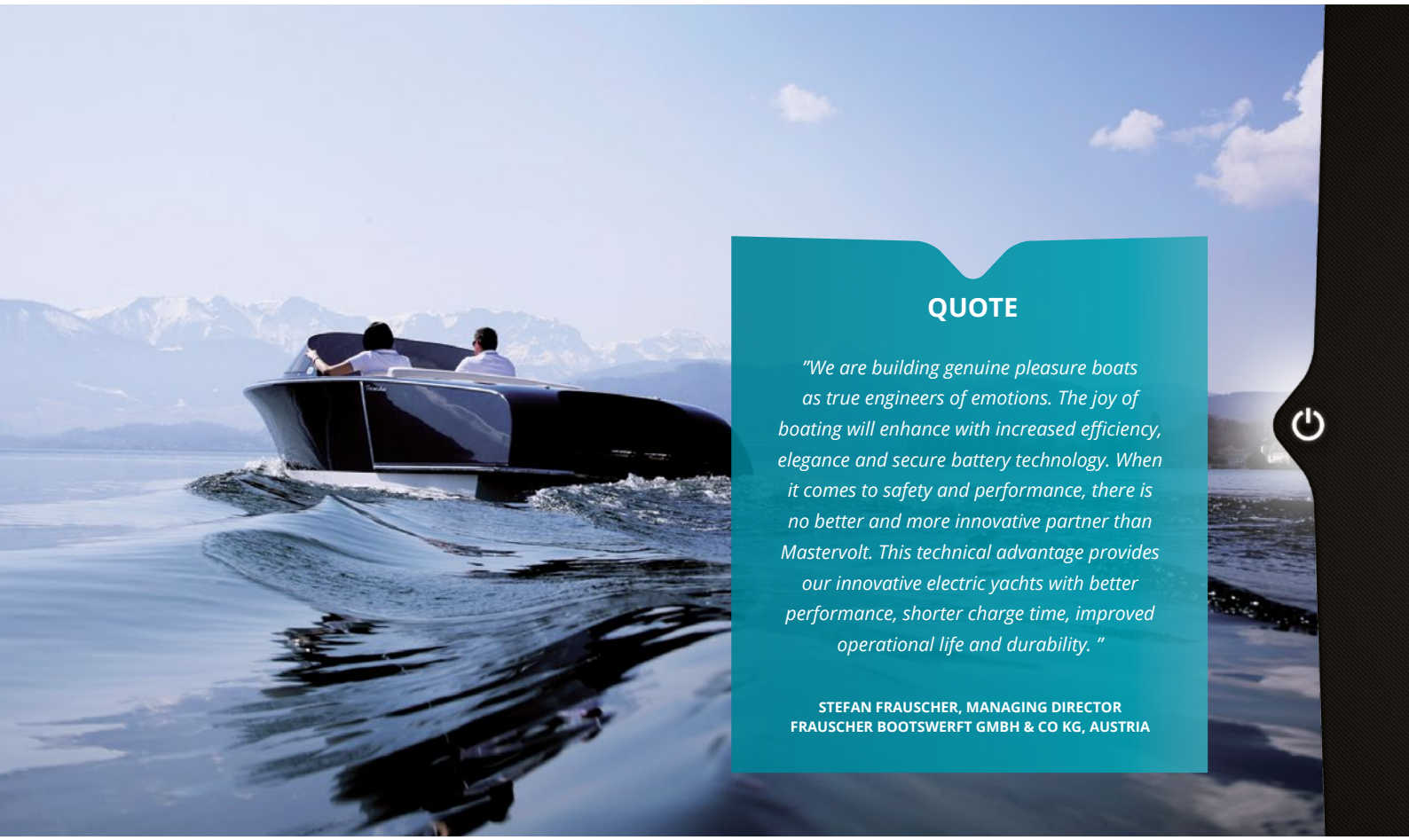
The PodMaster Professional is the professional low rpm model of our PodMaster series and fully seawater-proof thanks to its stainless steel construction. The bulb contains an ultra-modern, sensor-free permanent magnet 3-stage synchronous motor that was specifically developed to provide a high torque output. As a result, the PodMaster Professional can be used with a large diameter propeller for extra efficient propulsion.

PodMaster Professional

Specifications PodMaster Professional

Type	Supplied capacity	Motor technology	Voltage regulator	Max. RPM	Required battery capacity for 3-4 hours sailing	Required battery capacity for 6-8 hours sailing	Product code
PodMaster 6.5 Professional*	6.5 kW	synchronous	48 V	950	18.2 kWh	30 kWh	*141300650*
PodMaster 10 Professional*	10 kW	synchronous	48 V	1050	28 kWh	46 kWh	*141301000*

* Supplied without propeller.



QUOTE

"We are building genuine pleasure boats as true engineers of emotions. The joy of boating will enhance with increased efficiency, elegance and secure battery technology. When it comes to safety and performance, there is no better and more innovative partner than Mastervolt. This technical advantage provides our innovative electric yachts with better performance, shorter charge time, improved operational life and durability. "

**STEFAN FRAUSCHER, MANAGING DIRECTOR
FRAUSCHER BOOTSWERFT GMBH & CO KG, AUSTRIA**

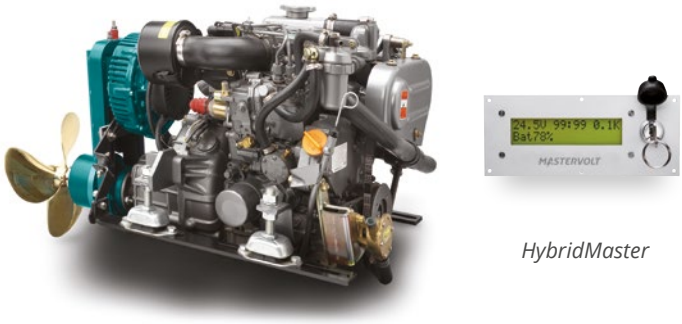
Hybrid sailing:
Best of both worlds

The HybridMaster is Mastervolt's solution for hybrid propulsion: combining the advantages of electric propulsion with the sailing radius of a diesel engine.

The HybridMaster series has an electric power rating ranging from 3.5 to 10 kW, allowing them to be combined with diesel engines of up to 150 hp. When sailing electrically, the HybridMaster gets its energy from the batteries. When sailing on the motor, the batteries are recharged up to a maximum of 150 A. With the Mastervolt HybridMaster you can enjoy the best of both worlds.

HybridMaster

The HybridMaster is universally applicable and can be installed parallel to the propeller shaft. The gear ratio between the rpm of the electric motor and the propeller shaft can be adapted, which is crucial as it ensures that the electric propulsion is optimally adjusted to the existing propeller and motor.



HybridMaster

HybridMaster Ultra

The HybridMaster Ultra is the top end of the line, using completely silent and maintenance-free brushless asynchronous motor technology.

Specifications
HybridMaster / HybridMaster Ultra

Type	Capacity	Motor technology	Voltage regulator	Product code
HybridMaster 4.8	4.8 kW	PM	48 V	*140103000*
HybridMaster 3.5 Ultra	3.5 kW	asynchronous	48 V	*140320350*
HybridMaster 7.5 Ultra	7.5 kW	asynchronous	48 V	*140320750*
HybridMaster 10 Ultra	10 kW	asynchronous	48 V	*140321000*

For detailed specifications, dimensional drawings, 3D files, images, certificates and manuals see ■ www.mastervolt.com/e-propulsion

Choose your throttle control

The Mastervolt ControlMaster throttle controls were specifically designed for electric sailing and ensure that the speed of your vessel can be subtly and carefully controlled. Another important issue is an easily selectable neutral gear. Your choice of throttle control will depend on your preference in design, shape and materials. All our throttle controls were developed using corrosion-proof materials and are easily installed. The kits can be equipped with all available throttle handles.

	Model	Applicable for	Assembly	Product code
1 **ControlMaster Casual**	single version	all propulsions	side assembly	*141500010*
2 **ControlMaster Sport**	single version	all propulsions	side assembly	*141500030*
3 **ControlMaster Sport TD**	double version	all propulsions	top assembly	*141500220*

Choose your system

The overview below provides several system recommendations based on weight and application. Heavier vessels from around 55 ft for motor and sailyachts, and from around 60 ft for catamarans always require a bespoke solution. These recommendations are intended as guidelines only; always consult your Mastervolt specialist for the best configuration.

Required capacity (guideline)

	Motoryacht		Sailyacht		Catamaran	
Weight	length	power	length	power	length	power
1000 kg	≤ 5 mtr	2.5 kW	≤ 6 mtr	2.0 kW	≤ 6 mtr	2x 1.0 kW
2000 kg	≤ 7 mtr	5.0 kW	≤ 9 mtr	4.0 kW	≤ 9 mtr	2x 2.0 kW
3000 kg	≤ 9 mtr	7.5 kW	≤ 11 mtr	6.0 kW	≤ 11 mtr	2x 3.0 kW
4000 kg	≤ 11 mtr	10.0 kW	≤ 12 mtr	8.0 kW	≤ 12 mtr	2x 4.0 kW
5000 kg	≤ 12 mtr	12.5 kW	≤ 13 mtr	10.0 kW	≤ 13 mtr	2x 5.0 kW
6000 kg	≤ 13 mtr	15.0 kW	≤ 14 mtr	12.0 kW	≤ 14 mtr	2x 6.0 kW
8000 kg	≤ 14 mtr	20.0 kW	≤ 15 mtr	15.0 kW	≤ 15 mtr	2x 7.5 kW

Electrical cables & adapters: your life line to the grid

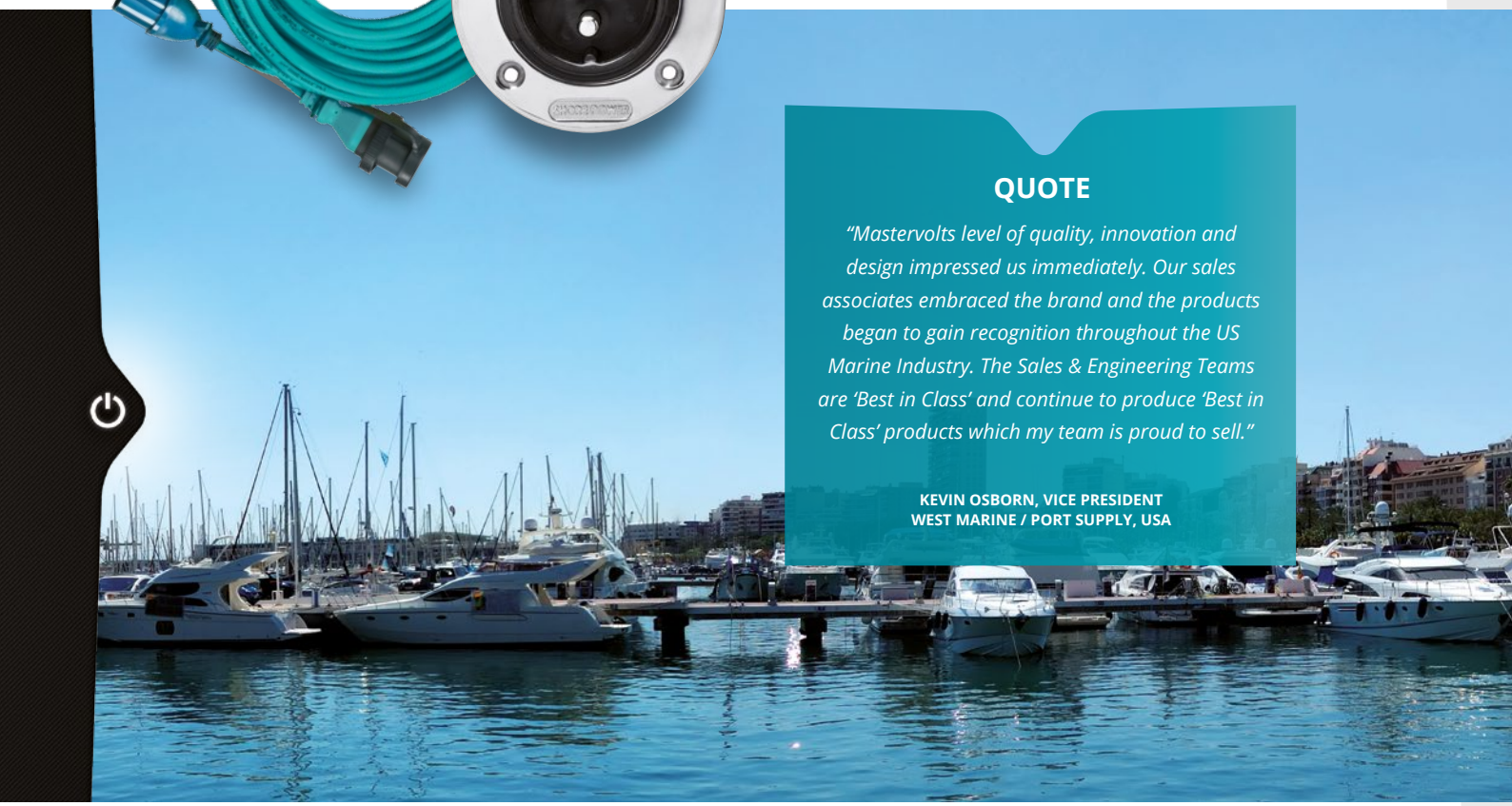
A safe and carefree power connection is your ticket to a comfortable and smooth onboard experience during your stay. The 230 V grid is the source to run your appliances and charge the batteries. Mastervolt offers you everything you need for a high quality grid connection, with safety, security and performance given the highest priority.

Practical tips

- Based on the maximum load for onboard power consumption, choose either a 16 A or a 32 A connection.
- For high loads choose multiple parallel connections to the grid.
- Choose the appropriate connection: Standard is an earthed two-pole plug or the more familiar blue CEE three-pole plug.

You need:

- Cable between the grid and application: Industrial, electric triple-core cable with European colour coding (brown, blue, yellow/green) with a thick synthetic sheath.
- An onboard connection: Perfectly protected easy lock system for grid power plug.
- Required safety measures.
- Shore Fix fuse/earth leakage circuit breaker; basic fuse between AC plug and onboard system.
- High or low frequent isolation transformer: The safest solution for complete isolation of your network and the grid; prevents corrosion via electrolysis.



QUOTE

"Mastervolts level of quality, innovation and design impressed us immediately. Our sales associates embraced the brand and the products began to gain recognition throughout the US Marine Industry. The Sales & Engineering Teams are 'Best in Class' and continue to produce 'Best in Class' products which my team is proud to sell."

KEVIN OSBORN, VICE PRESIDENT
WEST MARINE / PORT SUPPLY, USA

16A

Power cable

Product code 15 m	*121160150*
Product code 25 m	*121160250*

- Wear-proof
- UV-proof
- Moulded plugs
- Integrated LED power indicator
- 2.5 mm²

Extension cord

Product code 15 m	*121160151*
Product code 25 m	*121160251*

- Wear-proof
- UV-proof
- Moulded plugs
- Integrated LED power indicator
- 2.5 mm²

RVS power inlet

Product code 15 m	*121160000*

- 16 A
- 230 V

Adapter CEE 7/7 - CE

Product code	*121160900*

- From CEE-7/7 to CE plug
- Wear-proof
- UV-proof
- Integrated LED power indicator

Adapter CE - CEE 7/7

Product code	*12116091 0*

- From CE to CEE-7/7 plug
- Wear-proof
- UV-proof

Splitter for CE plug

Product code	*121160920*

- Wear-proof
- UV-proof
- Integrated LED power indicator

32A

Power cable

Product code 25 m	*121320250*

- Wear-proof
- UV-proof
- Moulded plugs
- Integrated LED power indicator
- 25 metres
- 4 mm²

RVS power inlet

Product code 15 m	*121320000*

- 32 A
- 230 V

In addition to the Mastervolt power connections, we also supply the complete Marinco product range, including the new EEL ShorePower series.

We would like to refer to our global product catalog where we offer the most extended product portfolio globally under the Marinco brand.

MARINCO

It’s easy and in one box: The Comfort System

Knowing that trawling through catalogues collecting part numbers for various components and designing a system can be time consuming, Mastervolt has created the ultimate kit.

Normally, the 7 components needed would all require their own product code, however, now just one product code, and one box, covers them all. The Comfort System consists of a charger/ inverter combination, shore connection, battery monitoring, monitored main fuses and one touch screen panel.

Product code
77712505

For yet more convenience, the individual instruction manuals have been condensed into just one, easily understood reference guide, sub-divided into an installation sheet and an user’s sheet. Better still, the savings made in the simplified packaging and logistics, amounting to some 10% of the retail price, have been passed on to the customer.

To simplify matters even further a configuration file is available. After uploading, the system will include a handy favourite page, product names and configuration.

The system approach of the Comfort System also means that customers can upgrade and expand this straightforward installation with further plug & play Mastervolt components in the future.

User’s profile

The Comfort System is particularly suitable for 30-50 ft yachts and luxury mobile homes, with sufficient power for onboard electric consumers like a coffee maker and microwave.

Complete overview of the Comfort System

Mass Combi
12/2500

MasterShunt
500

DC Distribution
500

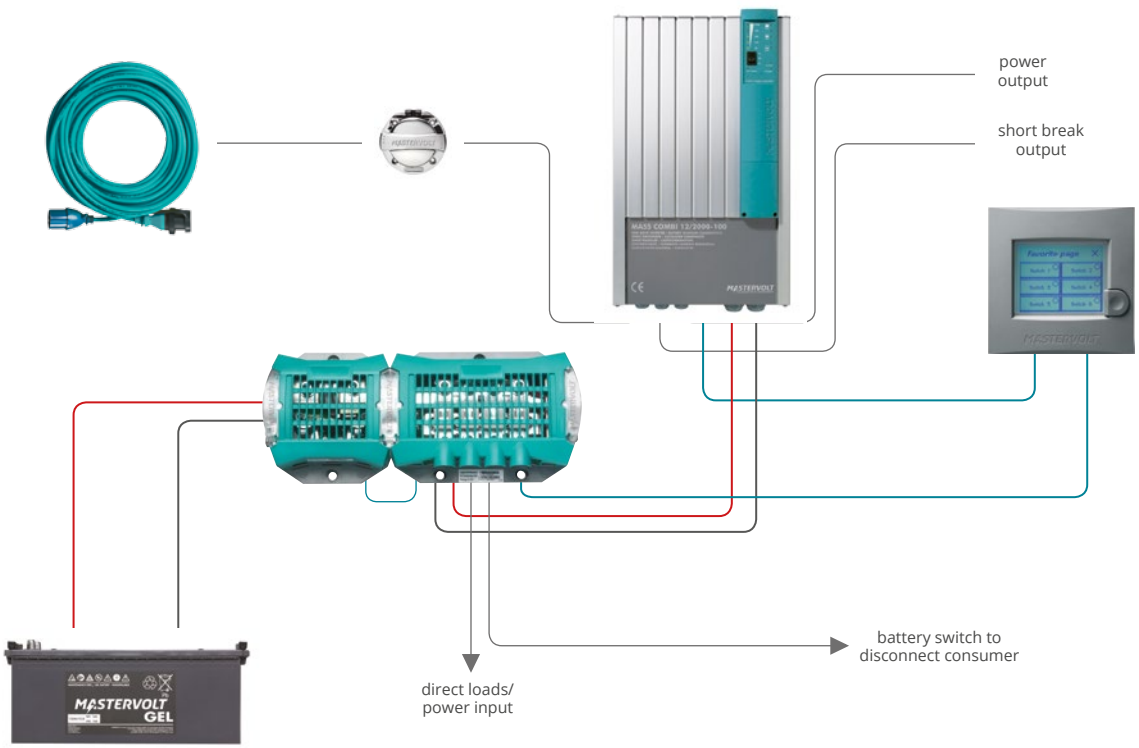
MasterView
Easy

Shore power cable
16 A / 25 mtr /
3x2.5 mm²

Shore power inlet
(European layout/
pin & sleeve)

ANL fuse 250 A;
Combi fuse that can
be mounted in
DC Distribution

System drawing



Your guide to a Mastervolt system

Whatever your application, Mastervolt offers a system-wide solution. We don't just send you a box of components and expect you to sort it all out, even though you will find the Mastervolt systems remarkably intuitive. Instead, you will have our full technical support throughout your project, from purchase to installation.

Better still, the system will be technologically bullet proof – every component is perfectly geared to link seamlessly into the network, with advanced software in place for accurate monitoring and control. This uniform approach drastically reduces the amount of wiring and power consumption required, and creates a custom-made system with unprecedented flexibility for your needs.

QUOTE

'Orga is continually improving the product technology by working in close collaboration with customers to develop systems specifically adapted to their requirements. Use of innovative technology and the expert knowledge of its dedicated staff and reliable suppliers like e.g. Mastervolt are crucial to Orga's success.'

MARTIJN VAN DE KAMP, BUSINESS ANALYST ORGA OFFSHORE, THE NETHERLANDS

Factors to consider

- **Space:**
  Is there enough room for system components?
- **Desired 230 V devices and 12 or 24 V consumers:**
  What kind of equipment will be used and for how long?
- **Required capacity:**
  What is the total power consumption in Watts?
- **Peak load:**
  Does everything have to be able to function simultaneously? Do you use equipment that requires a power surge when starting up, like a refrigerator or airconditioning?
- **Required voltage:**
  12, 24 or 48 V DC and/ or 230 V AC?
  Or perhaps 120 V/60 Hz?
- **Availability of grid power:**
  Is there a frequent opportunity to plug in the system or not? Do you have equipment that requires an uninterrupted power supply?

Whether or not a generator?

A generator usually seems the easiest solution to be sure of an independent power supply wherever you may go. There may, however, be a more efficient answer to reach this goal and the comfort you deserve. How about a combination of batteries connected to an inverter that converts 24 Volt power to 230 Volt? Or a solar power system for charging the battery? While these solutions are more quiet as a generator, they are considerably less harmful to the environment as there is no need for a diesel engine to be constantly running. However, if a generator must be used, Mastervolt systems are compatible with all mainstream generators.

A complete system saves time and money

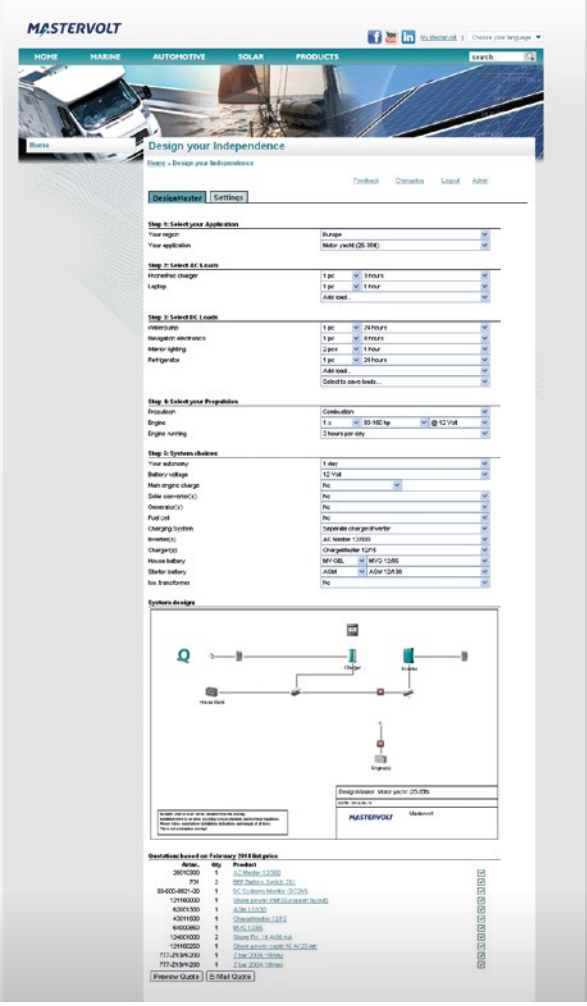
The purchase of a complete system also provides an economic advantage. Builders, installers and end users will agree. Component selection, purchase, installation and documentation take considerably less time. And because everything is perfectly aligned, you opt for optimum reliability.

DesignMaster: System design made easy!

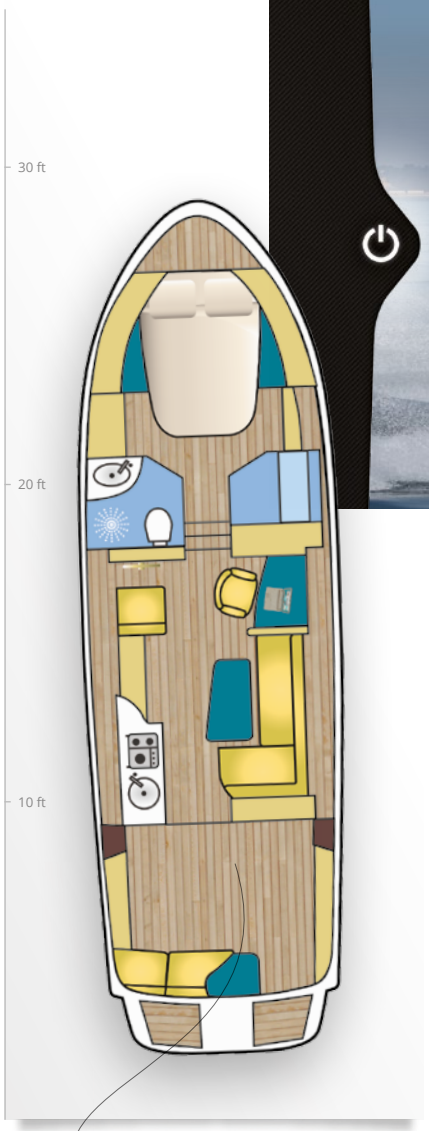
To help you determine which system is right for you, Mastervolt has created the DesignMaster, an online calculation module (see *www.mastervolt.com/designmaster*). Simply enter your options, wishes and requirements, and the DesignMaster will specify the most suitable system.

You are given an overview of the necessary components and their specifications, such as the battery capacity, the weight of the battery charger or converter, the need for a generator, the wiring, and so on. All Mastervolt dealers have access to this tool and are able to design the perfect system for you.

On the next pages you will find some system examples and suggestions, to give you an idea of the endless possibilities.



A Mastervolt system for carefree sailing pleasure



Application

Motor yacht between 25 and 35 ft

Use

Generally day trips, at nights in a harbour

Details

Normal onboard facilities

Sailing profile

The Mastervolt system described below assumes a frequently occurring situation. You cruise out of the marina in the morning and plan to spend the day with two to four people, enjoying time on the water onboard your motoryacht. In the evening you either cruise back to your home port or hop from one marina to the next where you have access to shore power. The usual appliances are always onboard and you also want to use equipment that you brought with you such as a laptop.

Energy consumption

DESCRIPTION	POWER	TOTAL X CAPACITY X HOUR	DAILY CONSUMPTION
Daily AC consumers (on inverter)			
Phone/tablet charger	20 W	1 x 20 Watt x 3 hours	= 0.060 kWh
Laptop	30 W	1 x 30 Watt x 3 hours	= 0.030 kWh
Daily DC consumers			
Water pump	30 W	1 x 3 Watt x 24 hours	= 0.072 kWh
Navigation electronics	20 W	1 x 20 Watt x 8 hours	= 0.160 kWh
Interior lighting	20 W	2 x 20 Watt x 1 hour	= 0.040 kWh
Refrigerator	50 W	1 x 10 Watt* x 24 hours	= 0.240 kWh
Total AC and DC consumers:			**= 0.602 kWh**

* *The refrigerator runs for 1/5 of the time, resulting in an average of 10 Watt.*

The Basics

- The maximum AC capacity is 50 Watt for the laptop and telephone/tablet charger.
- Your navigation station has, for example, a GPS, speedometer and depth gauge.
- Complete convenience: With an onboard inverter you and your guests will be able to use the standard phone and laptop adapters.

System choice

A system with separate charger and inverter provides the highest flexibility and reliability. The charger will always provide the optimum charge even when the available shore power is limited, fluctuating or unreliable. The inverter will provide a perfect true sine wave output to your sensitive onboard electronics. Power is available when you need it.

Service battery: MVG 12/120

The total of AC and DC consumers requires around 0.6 kWh. Totally discharging the batteries is not advisable so opt for a maximum of 50% discharge = 1.2 kWh. Taking into account ease of installation and the amount of standard equipment (such as lighting) we selected a 12 V system. The required battery capacity is 1.2 kWh/12 V = 100 Ah.

Battery charger: ChargeMaster 12/25-3

In normal conditions we assume 25% of the battery capacity when selecting a battery charger: 25% of 120 Ah requires a 30 A battery charger. In this case the ChargeMaster 12/25-3 is an excellent choice. It is even able to charge up to three battery banks. In this case you use two of the three outputs: One for the service battery and one for the starter battery of the engine. This gives you the flexibility should you want to add another battery later. Furthermore, you can use this third output as a second starter battery if you have two engines, or for a bowthruster battery.

Inverter: AC Master 12/300

The AC Master 12/300 is sized to power all the loads at the same time.

Monitoring: DC Systems Monitor (DCSM)

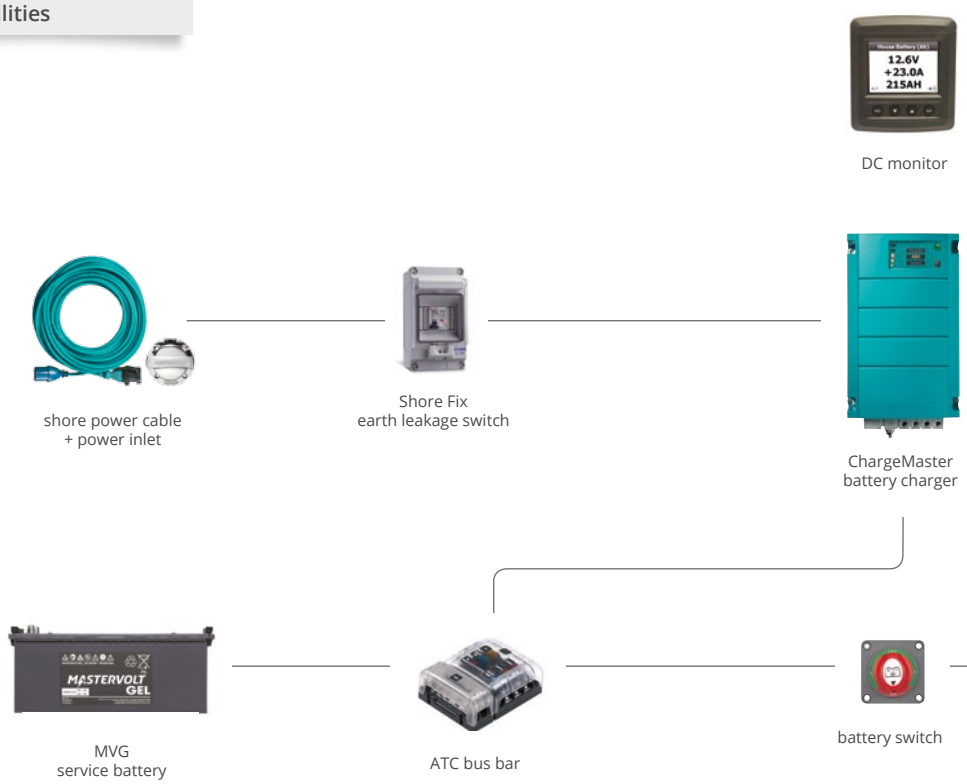
Configure the DCSM to show the data in analogue, digital and graphic form. Monitors the charge and discharge amps for two banks, capacity remaining in Ah and %, battery condition, tank fluid level and status of important circuits (on/off).

Other system components

- 1 x AGM 12/130 starter battery.
- 1 x Shore Fix, 16A/30mA earth leakage switch.
- 1 x shore power cable 16 A, 25 mtr.
- 1 x shore power inlet 2+PE, 16A/230V.
- 1 x Z-bar 200 A 18-way.
- 1 x ATC bus bar.
- 2 x battery switches for switching on and off the consumers attached to the battery.

System drawing

Application
Motor yacht between 25 and 35 ft
Use
Generally day trips, at nights in a harbour
Details
Normal onboard facilities



Products used	
1 x DC Systems Monitor (DCSM)	1 x MVG 12/120 service battery
1 x shore power cable, 16 A	1 x ATC bus bar
1 x shore power inlet, 16 A	2 x battery switch
1 x Shore Fix earth leakage switch	1 x Z-bar 200 A
1 x ChargeMaster 12/25-3 battery charger	1 x AGM 12/130 starter battery
1 x AC Master 12/300 inverter	

A Mastervolt system for carefree sailing pleasure

AC Master
inverter

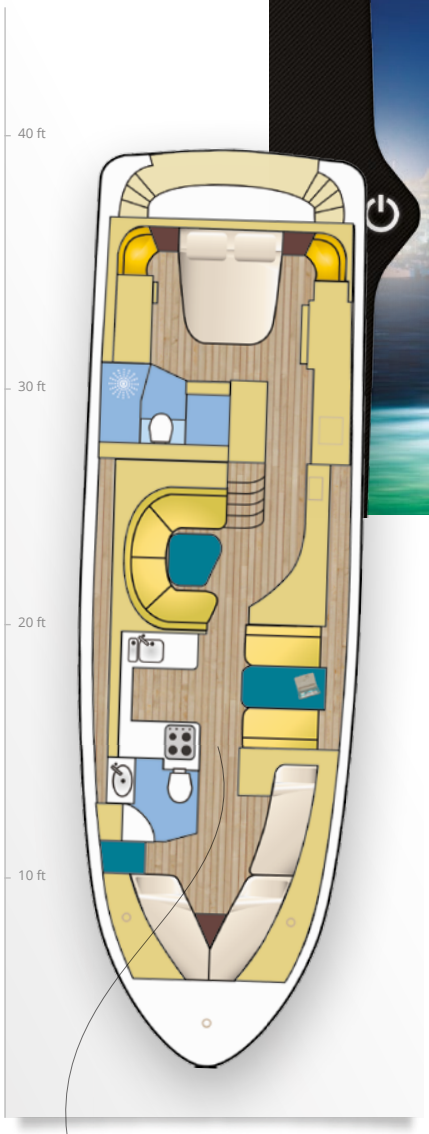
Z-bar
18-way

standard
alternator

battery
switch

AGM
starter battery

Complete comfort on the water



Application

35-40 ft motor yacht

Use

Longer weekend trips

Details

Comfortable onboard facilities

Sailing profile

Generally sailing for a weekend or midweek, sometimes anchored without access to shore power so you need enough power to cruise for two days. You also desire a range of comforts onboard, including a large refrigerator, microwave/oven combination and high-end coffee/espresso machine. Internet and email facilities are on your wish list as is (partial) navigation using your laptop, a good sound system and occasionally watching your favourite TV show.

Energy consumption

DESCRIPTION	POWER	TOTAL X CAPACITY X HOUR	DAILY CONSUMPTION
Daily AC consumers (on inverter)			
Coffee machine	1000 W	1 x 1000 Watt x 15 minutes	= 0.250 kWh
LED television	80 W	1 x 80 Watt x 1 hour	= 0.080 kWh
Laptop	30 W	1 x 30 Watt x 1 hour	= 0.030 kWh
Phone/tablet charger	20 W	1 x 20 Watt x 3 hours	= 0.060 kWh
Daily DC consumers			
Interior lighting	20 W	4 x 20 Watt x 3 hours	= 0.240 kWh
Refrigerator	50 W	1 x 10 Watt* x 24 hours	= 0.240 kWh
Navigation electronics	20 W	1 x 20 Watt x 8 hours	= 0.160 kWh
Total AC and DC consumers:			**= 1.060 kWh**

* *The refrigerator runs for 1/5 of the time, resulting in an average of 10 Watt.*

The Basics

- Your navigation station includes a GPS, plotter, speedometer and depth gauge.
- Your yacht has several pumps for water, shower, toilet and bilges.
- You require optimum ease of operation; not only centrally located but also next to your bed or in the engine room.

System choice

One of the advantages of using a Mass Combi is the ability to power loads even when mains supply is limited by using energy from your batteries. For example, a 10 A load can be powered from a 4 A shore connection. In addition, the design of the Mass Combi is both unique and characteristic of Mastervolt. Rather than installing heavy transformers, our lightweight, high-frequency technology offers major benefits regarding size, weight and sound (no hum!). The technology also ensures an exceptionally high efficiency with a minimal conversion loss and a low no-load consumption. The included battery temperature sensor will make sure the batteries receive the best possible charge. The Mass Combi meets all your requirements and more!

Batteries: 2 x MVG 12/140 Ah

The total of AC and DC consumers requires around 1 kWh per day (2 kWh in total). Totally discharging the batteries is not advisable so opt for a maximum of 50% discharge = 4 kWh. Taking into account the various appliances and required peak loads we suggest a 12 V system.
The required battery capacity is 4 kWh/12 V = ± 330 Ah.

Charger/inverter: Mass Combi 12/1200-60

280 Ah needs at least 25% of the battery capacity for charging power, so in this case we chose for a 60 A charging power via the Mass Combi. The Mass Combi has a battery charger that allows you to safely, quickly and completely charge two battery banks; starter and service batteries can be separately charged. Additionally the Mass Combi can be used to convert the power for your AC applications, using everything simultaneously is also possible.

Monitoring: MasterView Easy

This touchscreen control panel is easy to read and operate. The grey button turns the display on or off or locks it, while all other functions can be controlled using the touchscreen.

Digital distribution

The products in this system communicate with each other via MasterBus. This brilliantly simple platform for communication and connections ensures that all components 'speak' the same language. One communication protocol with high-speed CANbus technology.

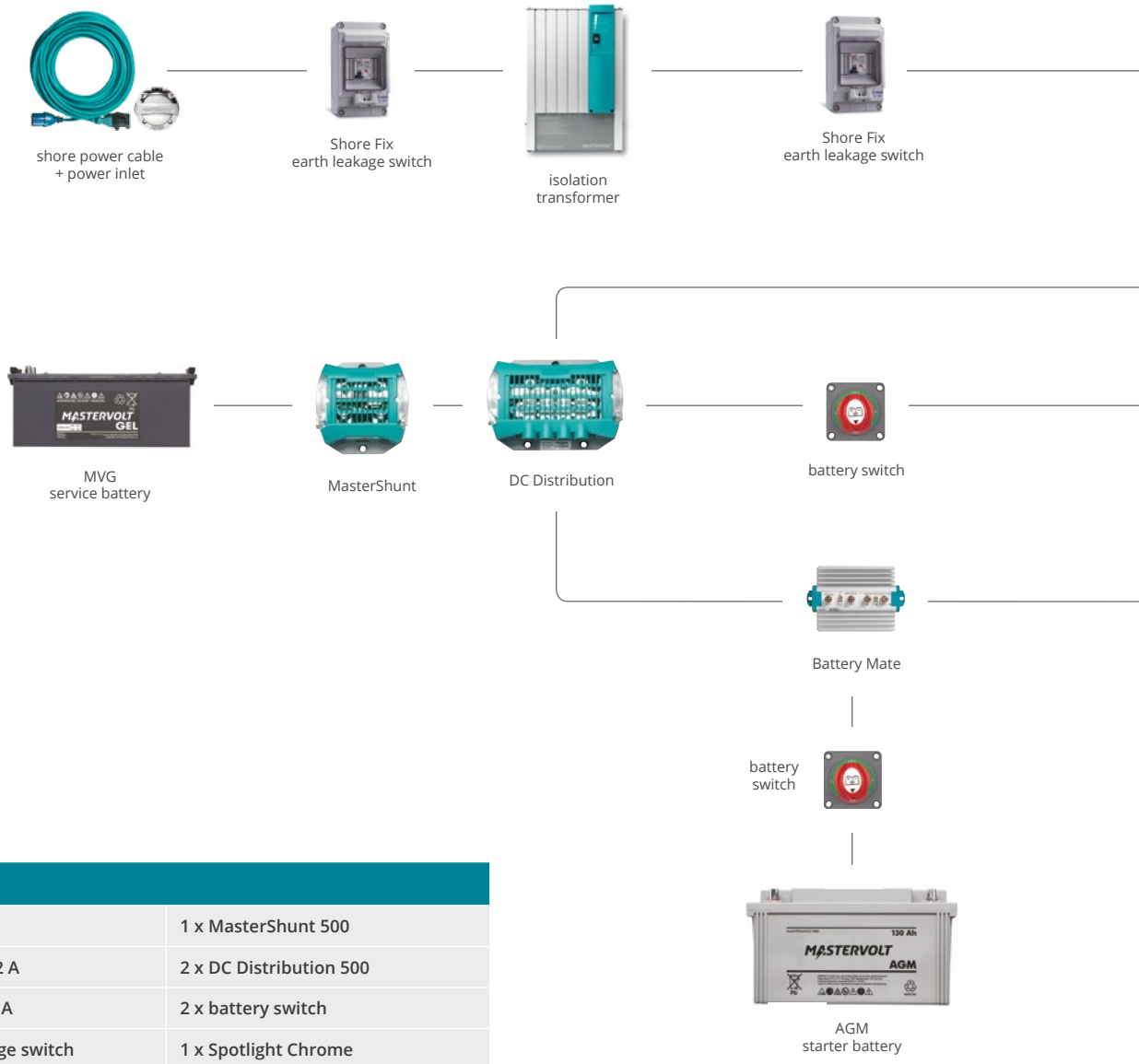
- 1 x MasterShunt 500
  MasterBus integrated battery monitor, with detailed information on the status of your batteries for an optimised charging process, incl. voltage, current, time remaining and consumption capacity in percentage.
- 2 x DC Distribution 500 with 4 fuses
  This distribution model connects up to four DC devices to the DC groups, such as a battery charger, inverter, alternators and solar panels.

Other system components

- 1 x AGM 12/130 starter battery.
- 1x Mass GI 3.5 kVA/16 A; lightweight isolation transformer for safely using shore power, vital for steel or aluminium vessels to avoid electrolysis and corrosion.
- 1 x Battery Mate 1602 IG; the ultimate solution for charging several batteries simultaneously, compatible with any type of alternator/charger.
- 3 x Shore Fix, 16A/30mA earth leakage switches.
- 1 x shore power cable 16 A, 25 mtr.
- 1 x shore power inlet 2+PE, 16A/230V.
- 2 x battery switches for switching on and off the consumers attached to the battery.
- 1 x Spotlight Chrome; the most versatile, durable, consistent and easy-to-use spotlight on the market.

System drawing

Application
35-40 ft motor yacht
Use
Longer weekend trips
Details
Comfortable onboard facilities



Products used	
1 x MasterView Easy	1 x MasterShunt 500
1 x shore power cable, 32 A	2 x DC Distribution 500
1 x shore power inlet, 32 A	2 x battery switch
3 x Shore Fix earth leakage switch	1 x Spotlight Chrome
1 x Mass GI 3.5 isolation transformer	1 Battery Mate 1602 IG
1 x Mass Combi 12/1200-60	1 x AGM 12/130 starter battery
2 x MVG 12/140 service battery	

Complete comfort on the water

MasterView Easy

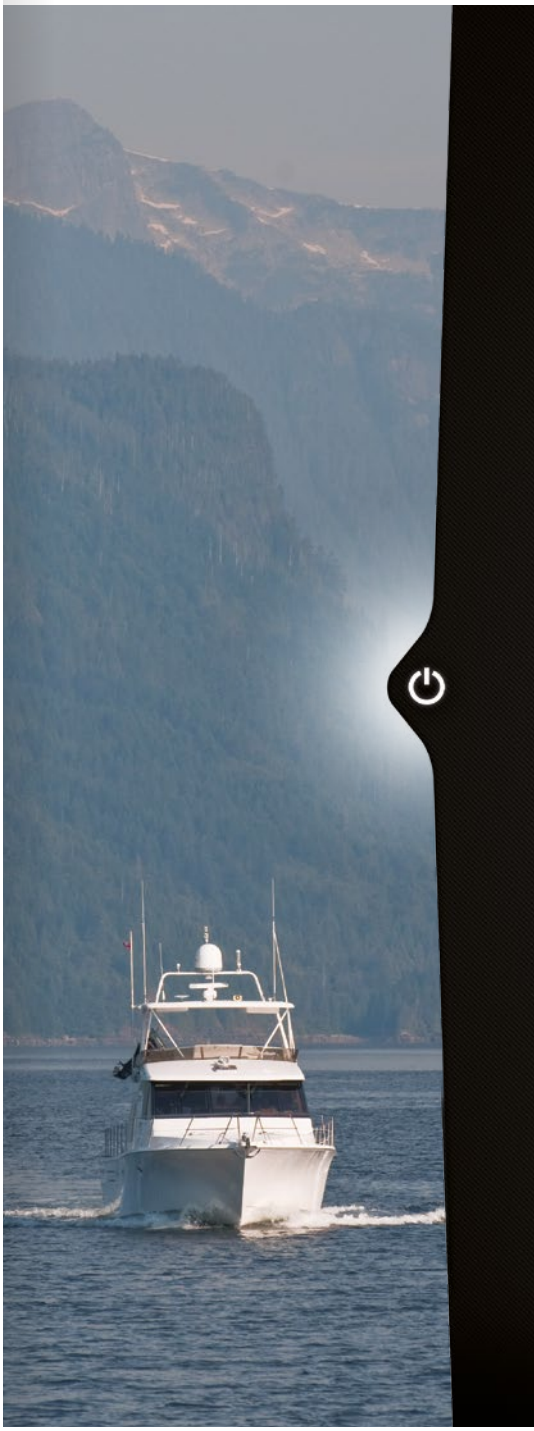
Mass Combi

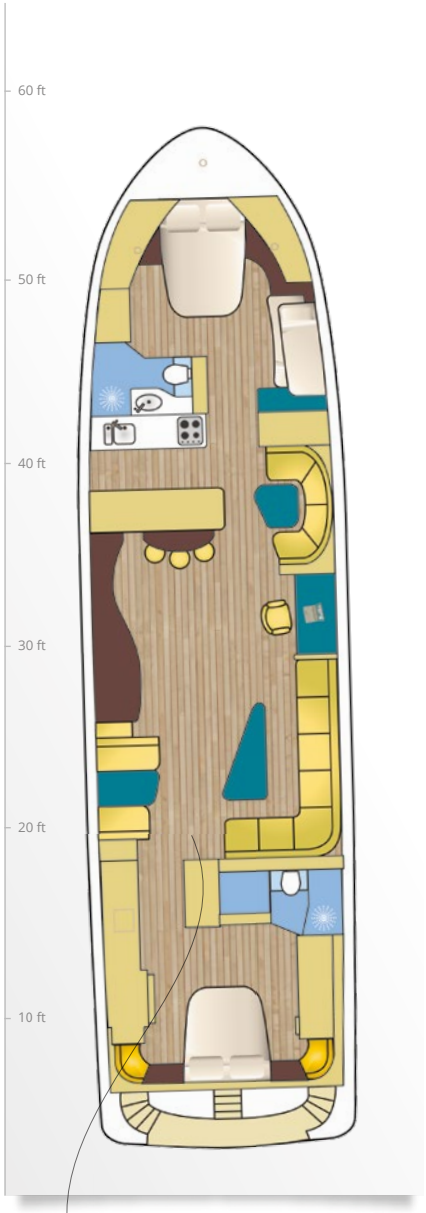
Shore Fix
earth leakage switch

Spotlight

DC Distribution

alternator





Five-star luxury on the water

Sailing profile

You often make long trips and despite the luxury onboard facilities, you do not want to depend on shore power constantly. Ease and comfort are important and you like to have the same conveniences as you do at home, while also being able to use a winch when moored in the harbour. Your comprehensive navigation system is spread across various indoors and outdoors screens, and you have a hydraulic, remote controlled passerelle. You also expect the components of the electric system to be seamlessly compatible with each other and provide a carefree system performance. Wherever you are, you also need complete security of service should there be a malfunction.

Energy consumption

DESCRIPTION	POWER	TOTAL X CAPACITY X HOUR	DAILY CONSUMPTION
Daily AC consumers (on generator)			
Air-conditioning (> 6 kBTU) *incl. pumps and fan coils*	3000 W	2 x 1500 Watt x 8 hours	= 24 kWh
Daily AC consumers (on inverter)			
Microwave	1500 W	1 x 1500 Watt x 30 minutes	= 0.750 kWh
Coffee machine	1000 W	1 x 1000 Watt x 30 minutes	= 0.500 kWh
Hair dryer	1500 W	2 x 1500 Watt x 30 minutes	= 1.500 kWh
LED television	80 W	3 x 80 Watt x 3 hours	= 0.720 kWh
Icemaker	2000 W	1 x 200* Watt x 24 hours	= 4.800 kWh
Laptop	30 W	1 x 30 Watt x 8 hours	= 0.240 kWh
Phone/tablet charger	20 W	3 x 20 Watt x 8 hours	= 0.480 kWh
Daily DC consumers			
Wipers	40 W	2 x 8 Watt x 1 hour	= 0.016 kWh
Spotlight	100 W	1 x 100 Watt x 15 minutes	= 0.025 kWh
Hifi installation	50 W	1 x 50 Watt x 8 hours	= 0.400 kWh
Refrigerator	50 W	2 x 10 Watt** x 24 hours	= 0.480 kWh
Navigation deck lights	20 W	5 x 20 Watt x 8 hours	= 0.800 kWh
Navigation electronics	20 W	5 x 20 Watt x 24 hours	= 2.400 kWh
Navigation displays	40 W	4 x 40 Watt x 24 hours	= 3.840 kWh
Interior lighting	20 W	5 x 20 Watt x 8 hours	= 0.800 kWh
Total AC and DC consumers:			**= 41.751 kWh**

* *The icemaker runs for 1/10 of the time, resulting in an average of 200 Watt.*
** *The refrigerator runs for 1/5 of the time, resulting in an average of 10 Watt.*

Application

50-60 ft motor yacht with all comforts

Use

Longer trips and extended periods without shore power

Details

Luxurious onboard facilities

The Basics

- You charge your batteries with heavy alternators on the main engine while sailing, so seldom need shore power.
- You use the generator for recharging while you are moored or anchored without having shore power available.
- Your navigation station includes GPS, plotters, speedometer and depth gauge, and there is an onboard marine telephone.
- Your ship has several pumps for water, shower, toilet and bilges.
- You require optimum ease of operation; not only centrally located but also next to your bed or in the engine room.

System choice

The lifespan for 2 Volt traction gel cells is around 10 to 15 years and the maximum number of full cycles is 900 to 1000. These batteries are therefore highly suitable for larger systems that require intensive use and a very long lifespan.

Batteries: 12 x MVSV 1000

The total of AC and DC consumers requires around 42 kWh. The batteries recharge while running the engine; in this example we assume two engines each with a 24V/110A alternator. After three hours of sailing, these supply 16 kWh power.

- A 24 V battery voltage is selected to be able to use smaller cable sizes.
- Twelve 2 Volt cell batteries ensure you 25 kWh onboard.

Generator, battery charger, inverter and alternators

- 25 kW generator 230V/50Hz, 1500 rpm.
- The Mass Systemswitch intelligently links all AC sources to the different consumer groups. Limited sources and priorities between the consumers are taken into consideration.
- The Mass Sine 24/5000 inverter supplies 230 V from the battery for the major consumers, independent of generator and shore power.
- 3 x ChargeMaster 24/100 battery charger for charging the main set.
- 2 x Alpha 24/110 alternators to improve charge from the main engine.

Monitoring: MasterView Easy

This touchscreen control panel is easy to read and operate. The grey button turns the display on or off or locks it, while all other functions can be controlled using the touchscreen.

Digital distribution

The products in this system communicate with each other via MasterBus. This brilliantly simple platform for communication and connections ensures that all components 'speak' the same language. One communication protocol with high-speed CANbus technology.

- 1 x MasterShunt 500
  MasterBus integrated battery monitor, with detailed information on the status of your batteries for an optimised charging process, incl. voltage, current, time remaining and consumption capacity in percentage.

- 3 x DC Distribution 500 with 4 fuses
  This distribution model connects up to four DC devices to the DC groups, such as a battery charger, inverter, alternators and solar panels.

- 1 x MasterBus USB Interface
  The MasterBus USB Interface enables you to read and configure the MasterBus network via your PC.

Other system components

- 4 x AGM 12/225 starter battery.
- 1x Mass GI 7kVA/32A;
  lightweight isolation transformer for safely using shore power, vital to avoid electrolysis and corrosion.
- 1 x Solar ChargeMaster;
  provides a pure charge current in all conditions while the 3-step charging method ensures a safe charging process and a longer lifespan for your batteries.
- 1 x 24V/12V DC-DC converter.
  Each system has its own voltage, this microprocessor controlled unit converts 24 V into 12 V DC so you are able to use both voltages.
- 1 x shore power cable 32 A, 25 mtr.
- 1 x shore power inlet 2+PE, 32A/230V.
- 3 x battery switches for switching on and off the consumers attached to the battery.
- 1 x Spotlight Chrome; the most versatile, durable, consistent and easy-to-use spotlight on the market.

System drawing

Application
50-60 ft motor yacht with all the comforts
Use
Longer trips and extended periods without shore power
Details
Luxurious onboard facilities

generator

earth leakage switch

shore power cable + power inlet

earth leakage switch

isolation transformer

earth leakage switch

ChargeMaster battery charger

MasterBus USB Interface

MVSV 2 V gel service battery

MasterShunt

DC Distribution

DC Distribution

Solar ChargeMaster

Products used	
1 x 25 kW generator	12 x MVSV 1000, 2 Volt gel battery
3 x earth leakage switch	1 x MasterShunt 500
1 x MasterView Easy	3 x DC Distribution 500
1 x Mass Sine 24/5000 inverter	3 x battery switch
1 x Mass Systemswitch	1 x DC/DC converter, 24V/12V
3 x ChargeMaster 24/100 battery charger	1 x Spotlight Chrome
1 x Mass GI 7 isolation transformer	2 x Alpha 24/110 alternator
1 x shore power cable, 32 A	1 x Solar ChargeMaster
1 x shore power inlet, 32 A	4 x AGM 12/225 starter battery
1 x MasterBus USB Interface	

Five-star luxury on the water

MasterView Easy

Systemswitch

Mass Sine inverter

Spotlight

battery switch

DC Distribution

DC Master

Alpha alternator

Alpha alternator

standard alternator

battery switch

AGM starter battery

standard alternator

battery switch

AGM starter battery

A weekend with wind in your sails

Sailing profile

You like to leave harbour on a Friday afternoon for a fantastic weekend of sailing. There is a good wind so the sails are quickly filled and the weather stays great for the entire weekend. Onboard, your Mastervolt system ensures that you do not have to worry about a thing.

Application

30-40 ft sailing yacht

Use

Weekends sailing; shore power not always available

Details

Average onboard facilities

Energy consumption

DESCRIPTION	POWER	TOTAL X CAPACITY X HOUR	DAILY CONSUMPTION
Daily AC consumers (on inverter)			
Phone/tablet charger	20 W	1 x 20 Watt x 1 hour	= 0.020 kWh
Laptop	30 W	1 x 30 Watt x 15 minutes	= 0.007 kWh
LED television	80 W	1 x 80 Watt x 1 hour	= 0.080 kWh
Daily DC consumers			
Autopilot	30 W	1 x 30 Watt x 3 hours	= 0.090 kWh
Hifi installation	50 W	1 x 50 Watt x 1 hour	= 0.050 kWh
Water pump	30 W	1 x 3 Watt x 24 hours	= 0.072 kWh
Interior lighting	20 W	3 x 20 Watt x 1 hour	= 0.060 kWh
Navigation electronics	20 W	4 x 20 Watt x 8 hours	= 0.640 kWh
Navigation deck lights	20 W	1 x 20 Watt x 8 hours	= 0.160 kWh
Total AC and DC consumers:			**= 1.179 kWh**

The Basics

- Your navigation station includes GPS, plotter, wind meter, speedometer and depth gauge.
- You prefer optimum ease of operation; centrally located.
- Due to short cable lenghts 12 Volt has been selected.

System choice

A system with separate charger and inverter provides the highest flexibility and reliability. The charger will always provide the optimum charge even when the available shore power is limited, fluctuating or unreliable. The inverter will provide a perfect true sine wave output to your sensitive onboard electronics. Power is available when you need it.

Service battery: MVG 12/200

The total of AC and DC consumers requires around 1.2 kWh. Totally discharging the batteries is not advisable so opt for a maximum of 50% discharge = 2.4 kWh. Taking into account ease of installation and the amount of standard equipment (such as lighting) we selected a 12 V system.
The required battery capacity is therefore 2.4 kWh/12 V = 200 Ah.

Battery charger: ChargeMaster 12/50-3

In normal conditions we assume 25% of the battery capacity when selecting a battery charger: 25% of 200 Ah requires a 50 A battery charger. In this case the ChargeMaster 12/50-3 is an excellent choice. It is even able to charge up to three battery banks. In this case you only use two outputs: One for the service battery and one for the starter battery of the engine. This gives you the flexibility should you want to add another battery later. Furthermore, you can use this third output as a second starter battery if you have two engines, or for a bowthruster battery.

Inverter: AC Master 12/300

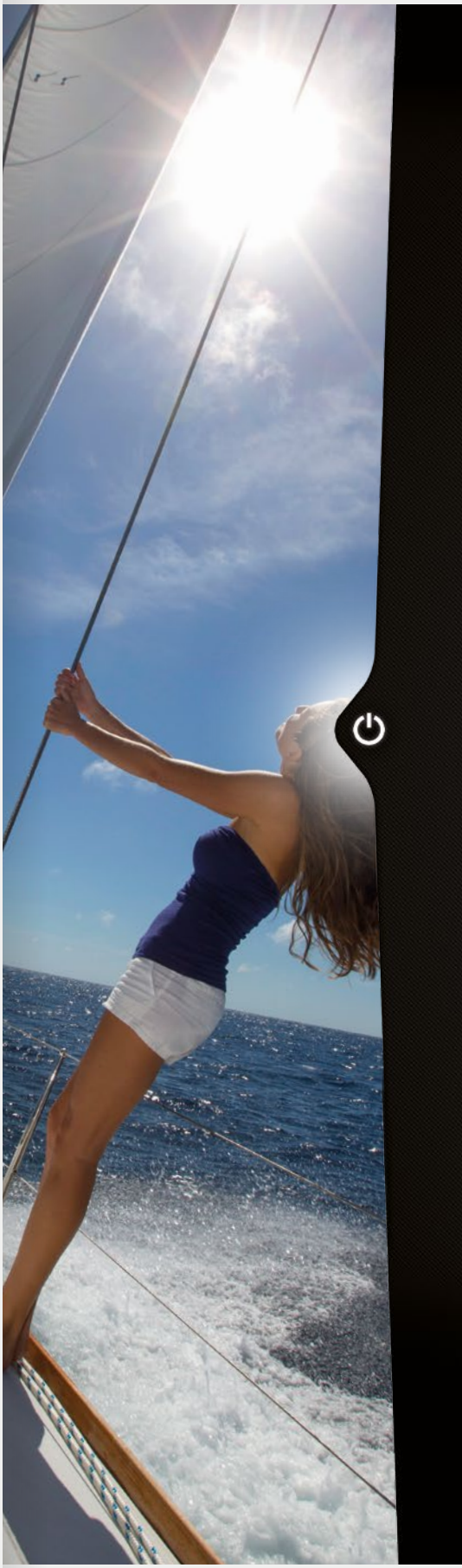
The AC Master 12/300 is sized to power all the loads at the same time.

Monitoring: Masterlink BTM-III

The Masterlink BTM-III battery monitor provides an accurate indication of the current, amperage, time remaining and remaining capacity of battery bank 1, and the current and estimated capacity of battery banks 2 and 3. The built-in microprocessor calculates the remaining capacity and stores historic data.

Other system components

- 1 x AGM 12/70 starter battery.
- 1 x Battery Mate 1602 IG; the ultimate solution for charging several batteries simultaneously, compatible with any type of alternator/charger.
- 1 x Shore Fix, 16A/30mA earth leakage switch.
- 1 x shore power cable 16 A, 25 mtr.
- 1 x shore power inlet 2+PE, 16A/230V.
- 1 x Z-bar 200 A 18-way.
- 1 x Z-bar 200 A 10-way.
- 2 x battery switches for switching on and off the consumers attached to the battery.



System drawing

Application
30-40 ft sailing yacht
Use
Weekends sailing; shore power not always available
Details
Average onboard facilities

Masterlink BTM-III
battery monitor

shore power cable
+ power inlet

Shore Fix
earth leakage switch

ChargeMaster
battery charger

MVG
service battery

Z-bar
10-way

battery switch

Battery Mate

battery
switch

AGM
starter battery

Products used	
1 x Masterlink BTM-III	12 x MVG 12/200 gel battery
1 x shore power cable, 16 A	1 x Z-bar 200 A, 10-way
1 x shore power inlet, 16 A	2 x battery switch
1 x Shore Fix earth leakage switch	1 x Z-bar 200 A, 18-way
1 x ChargeMaster 12/50-3 battery charger	1 x Battery Mate 1602 IG
1 x AC Master 12/300 inverter	1 x AGM 12/70 starter battery

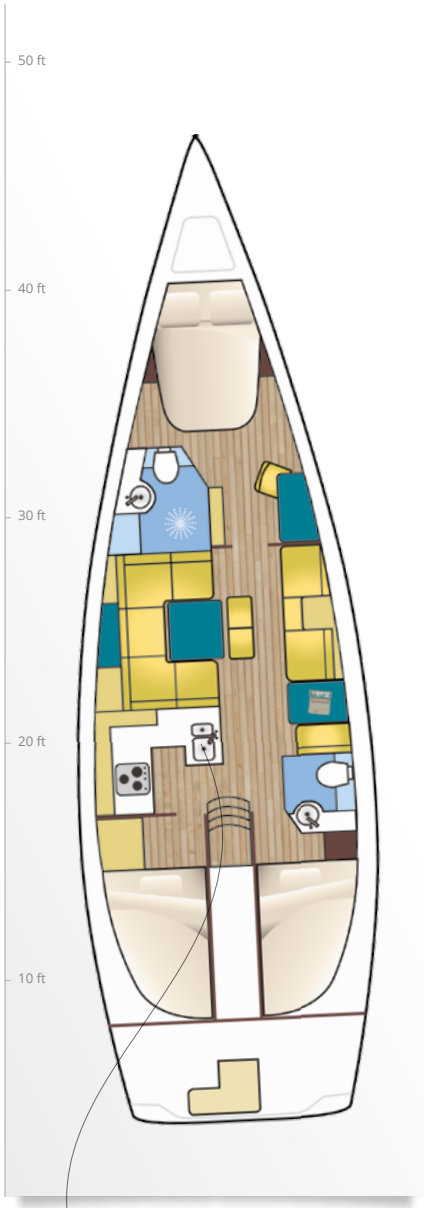
A weekend with wind in your sails

AC Master
inverter

Z-bar
18-way

alternator

The wind in your sails for the day



Application

40-50 ft sailing yacht

Use

Extensive trips

Details

Normal onboard facilities

Sailing profile

What can be better than a nice day's sailing on the water? Relaxed after so much fresh air you head back to the harbour at the end of the day. Onboard you have the basic facilities, with the option to watch TV, listen to music, chill the white wine and charge your laptop or mobile phone.

Energy consumption

DESCRIPTION	POWER	TOTAL X CAPACITY X HOUR	DAILY CONSUMPTION
Daily AC consumers (on inverter)			
Coffee machine	1000 W	1 x 1000 Watt x 15 minutes	= 0.250 kWh
Laptop	30 W	1 x 30 Watt x 1 hour	= 0.030 kWh
Phone/tablet charger	20 W	2 x 20 Watt x 3 hours	= 0.120 kWh
Hair dryer	1500 W	1 x 1500 Watt x 15 minutes	= 1.375 kWh
Daily DC consumers			
Hifi installation	50 W	1 x 50 Watt x 3 hours	= 0.150 kWh
Interior lighting	20 W	4 x 20 Watt x 3 hours	= 0.240 kWh
Navigation electronics	20 W	4 x 20 Watt x 24 hours	= 1.920 kWh
Navigation deck lights	20 W	2 x 20 Watt x 8 hours	= 0.320 kWh
Refrigerator	50 W	1 x 10 Watt* x 24 hours	= 0.240 kWh
Navigation displays	40 W	1 x 40 Watt x 8 hours	= 0.320 kWh
Total AC and DC consumers:			**= 3.965 kWh**

** The refrigerator runs for 1/5 of the time, resulting in an average of 10 Watt.*

The Basics

- As compact and lightweight is important, a combined inverter/charger has been selected.
- Simple operation via touch screen control panel.

System choice

The new Mass Combi Ultra fits perfectly into a Mastervolt system. All components are easily connected via MasterBus and installation can be controlled and monitored intuitively, even with just one MasterView Easy touchscreen. This will provide and manage all information about the Combi, the batteries and other sources such as the generator, grid or solar panels. The system is also suitable for Digital Switching, Mastervolt's decentralised digital switching system.

- A 24 V battery voltage is selected for this system to be able to use smaller cable sizes.

Batteries: 3 x MLI Ultra 24/5000

The total of AC and DC consumers requires around 4 kWh. The additional alternator can charge 1 kWh in half an hour. After four days, the batteries are discharged 12 kWh (4x 4-1). Totally discharging the batteries is not advisable so opt for a maximum of 80% discharge = 15 kWh. Taking into account the various appliances and required peak loads we suggest a 24 V system.
The required battery capacity is 15 kWh.

Charger/inverter: Mass Combi Ultra 24/3500-100

432 Ah (3x 80% x 180 Ah) needs at least 25% of the battery capacity for charging power, so in this case we chose for a 100 A charging power via the Mass Combi Ultra. The Mass Combi Ultra has a battery charger that allows you to safely, quickly and completely charge two battery banks; starter and service batteries can be separately charged. Additionally the Mass Combi Ultra can be used to convert the power for your AC applications, using everything simultaneously is also possible.

Monitoring: MasterView Easy

This touchscreen control panel is easy to read and operate. The grey button turns the display on or off or locks it, while all other functions can be controlled using the touchscreen.

Digital distribution

The products in this system communicate with each other via MasterBus. This brilliantly simple platform for communication and connections ensures that all components 'speak' the same language. One communication protocol with high-speed CANbus technology.

- 1 x MasterShunt 500

MasterBus integrated battery monitor, with detailed information on the status of your batteries for an optimised charging process, incl. voltage, current, time remaining and consumption capacity in percentage.

- 2 x DC Distribution 500

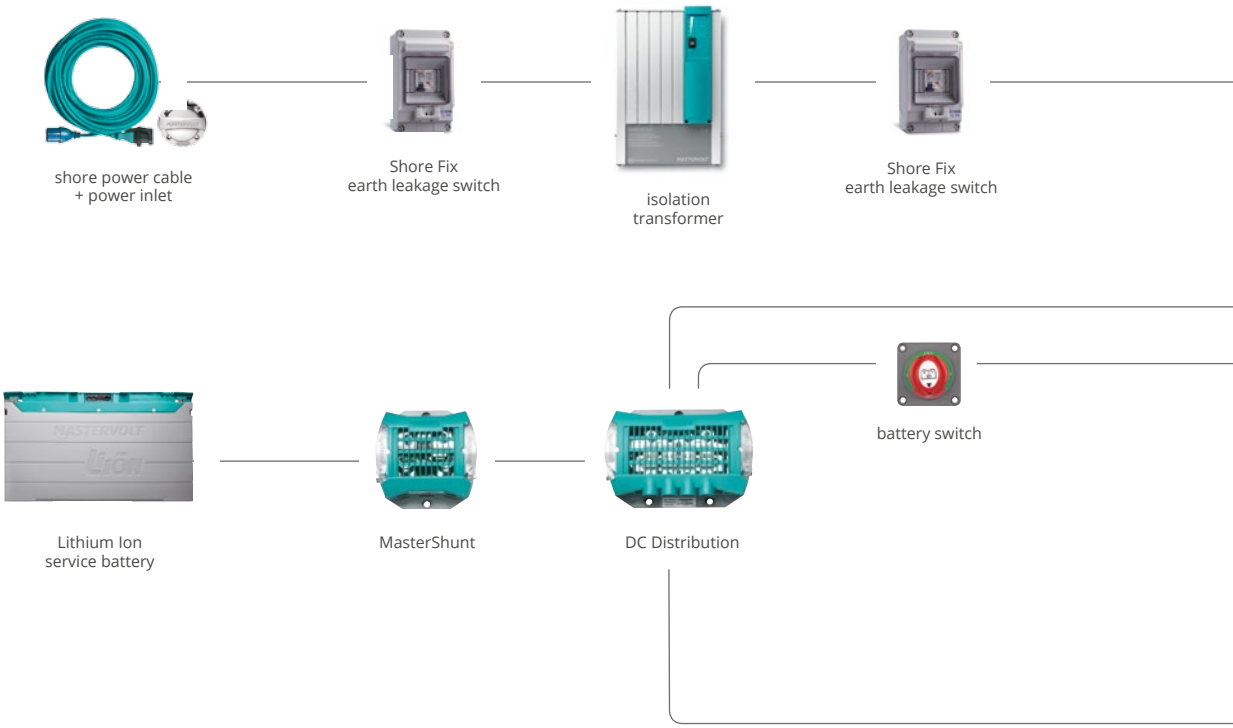
This distribution model connects up to four DC devices to the DC groups, such as a battery charger, inverter, alternators and solar panels.

Other system components

- 2 x AGM 12/90 starter battery.
- 1x Mass GI 3.5kVA/16A; lightweight isolation transformer for safely using shore power, vital for steel or aluminium vessels to avoid electrolysis and corrosion.
- 1 x Alpha 24/75 additional alternator.
- 1 x 24V/12V DC-DC converter. Each system has its own voltage, this microprocessor controlled unit converts 24 V into 12 V DC so you are able to use both voltages.
- 3 x Shore Fix, 16A/30mA earth leakage switches.
- 1 x shore power cable 16 A, 25 mtr.
- 1 x shore power inlet 2+PE, 16A/230V.
- 2 x battery switches for switching on and off the consumers attached to the battery.
- 1 x Spotlight Chrome; the most versatile, durable, consistent and easy-to-use spotlight on the market.

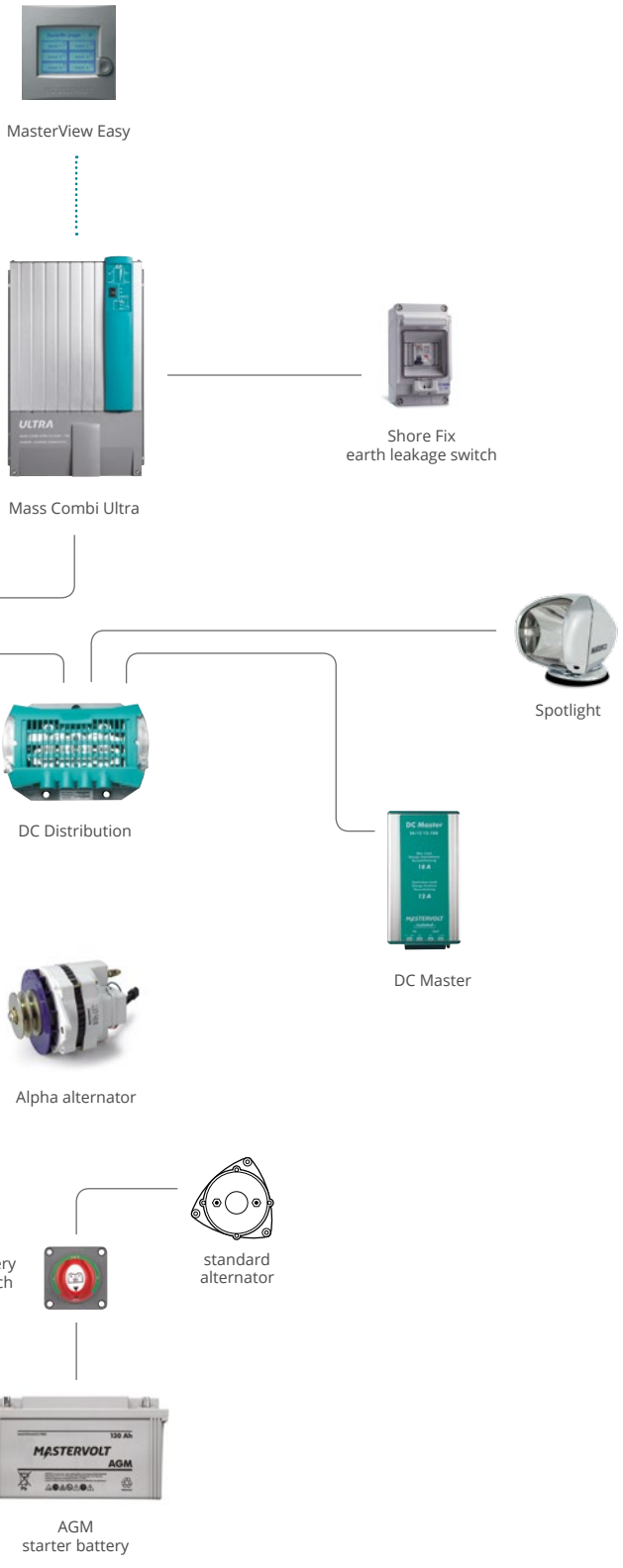
System drawing

Application
40-50 ft sailing yacht
Use
Extensive trips
Details
Normal onboard facilities

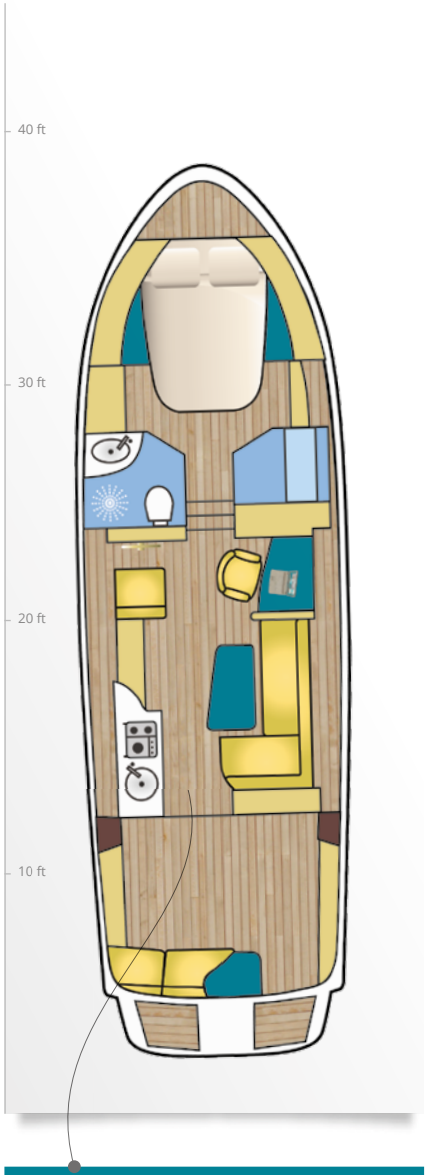


Products used	
1 x shore power cable, 16 A	1 x MasterShunt 500
1 x shore power inlet, 16 A	2 x DC Distribution 500
3 x Shore Fix earth leakage switch	2 x battery switch
1 x Mass GI 3.5 isolation transformer	1 x Spotlight Chrome
1 x Mass Combi Ultra 24/3500-100	1 x DC/DC converter, 24V/12V
1 x MasterView Easy	1 x Alpha 24/75 alternator
3 x MLI Ultra 24/5000 Lithium Ion battery	2 x AGM 12/90 starter battery

The wind in your sails for the day



All the comforts of electric sailing



Application

30-40 ft electrically powered yacht

Use

Longer weekend trips, at nights usually in a harbour

Details

Comfortable onboard facilities

Sailing profile

Generally sailing for a day, sometimes anchored without access to shore power so you need enough power to cruise for a full day. For the electric propulsion/engine capacity we have assumed a Mastervolt DriveMaster Ultra 10 (10kW/48V). This recommended system enables you to cruise at cruising speed for four hours.

Energy consumption

DESCRIPTION	POWER	TOTAL X CAPACITY X HOUR	DAILY CONSUMPTION
Daily DC consumers			
Navigation deck lights	20 W	1 x 20 Watt x 3 hours	= 0.060 kWh
Navigation electronics	20 W	1 x 20 Watt x 8 hours	= 0.160 kWh
Navigation lights	20 W	1 x 20 Watt x 8 hours	= 0.160 kWh
E-Propulsion consumption			
E-Propulsion consumption		30% power x 10 kW x 4 hours	= 12.000 kWh
Total DC and E-Propulsion consumption:			**= 12.380 kWh**

The Basics

- Your navigation station includes a GPS, plotter, speedometer and depth gauge.
- Your yacht has several pumps for water, shower, toilet and bilges.
- You require optimum ease of operation; not only centrally located but also next to your bed or in the engine room.
- Maintenance free system: Oil changes and cleaning the diesel filter are things of the past.

System choice

Lithium Ion batteries have a high energy density and are perfect for cyclic applications. They offer savings of up to 70% in volume and weight compared to traditional lead-acid batteries, with three times as many charging cycles (2000 full cycles). Another major benefit of the Mastervolt Li-ion battery is that it is equipped with a Battery Management System (BMS), which automatically compensates for any imbalance between the cells. This guarantees you a constant high capacity and longer battery lifespan. The Lithium Ion Ultra series includes integrated battery monitoring.

Electric propulsion: DriveMaster Ultra 10

As your boat weighs around 4000 kg, we advise one Mastervolt DriveMaster Ultra 10 (10kW/48V).

The DriveMaster Ultra asynchronous system is specially designed for applications where capacity and reliability are crucial in all conditions. The modern brushless asynchronous electro motors are watertight (IP65), air-cooled, entirely maintenance-free and incredibly quiet – small wonder that this type of motor has such an excellent reputation. High torques and low rpms enable the use of large propellers, benefitting both the efficiency and thrust. The asynchronous technology enables a considerably higher temporary capacity. Thanks to the fully automated Powerboost function (+20%), fast manoeuvring and short bursts of speed are even easier to attain.

Batteries: 4 x MLI Ultra 24/5000

The total of AC and DC consumers requires around 12.3 kWh. Totally discharging the batteries is not advisable so opt for a maximum of 80% discharge, i.e. at least 15 kWh. Li-ion batteries can be 100% discharged.

- A 24 V battery voltage is selected to be able to use smaller cable sizes.
- The required battery capacity is around 330 Ah at 48 Volt.
- Four Lithium Ion batteries ensure you 360 Ah onboard.
- 1 x latching relay 24V/500A; mandatory relais.

Battery charger: Mass 48/50

The maximum charging capacity on a single 26 A shore power supply is 50 A on 48 Volt. We selected the Mass 48/50 which gives a charging duration of 6,5 hours.

Monitoring: MasterView Easy

This touchscreen control panel is easy to read and operate. The grey button turns the display on or off or locks it, while all other functions can be controlled using the touchscreen.

Digital distribution

The products in this system communicate with each other via MasterBus. This brilliantly simple platform for communication and connections ensures that all components 'speak' the same language. One communication protocol with high-speed CANbus technology.

- 2 x DC Distribution 500

This distribution model connects up to four DC devices to the DC groups, such as a battery charger, inverter, alternators and solar panels.

- 1 x MasterBus USB Interface

The MasterBus USB Interface enables you to read and configure the MasterBus network via your PC.

Other system components

- 1 x ControlMaster Casual.

This throttle control is specifically designed for electric sailing and ensures that the speed of your vessel can be subtly and carefully controlled. Another important issue is an easily selectable neutral gear.

- 1 x 48V/12V DC-DC converter.

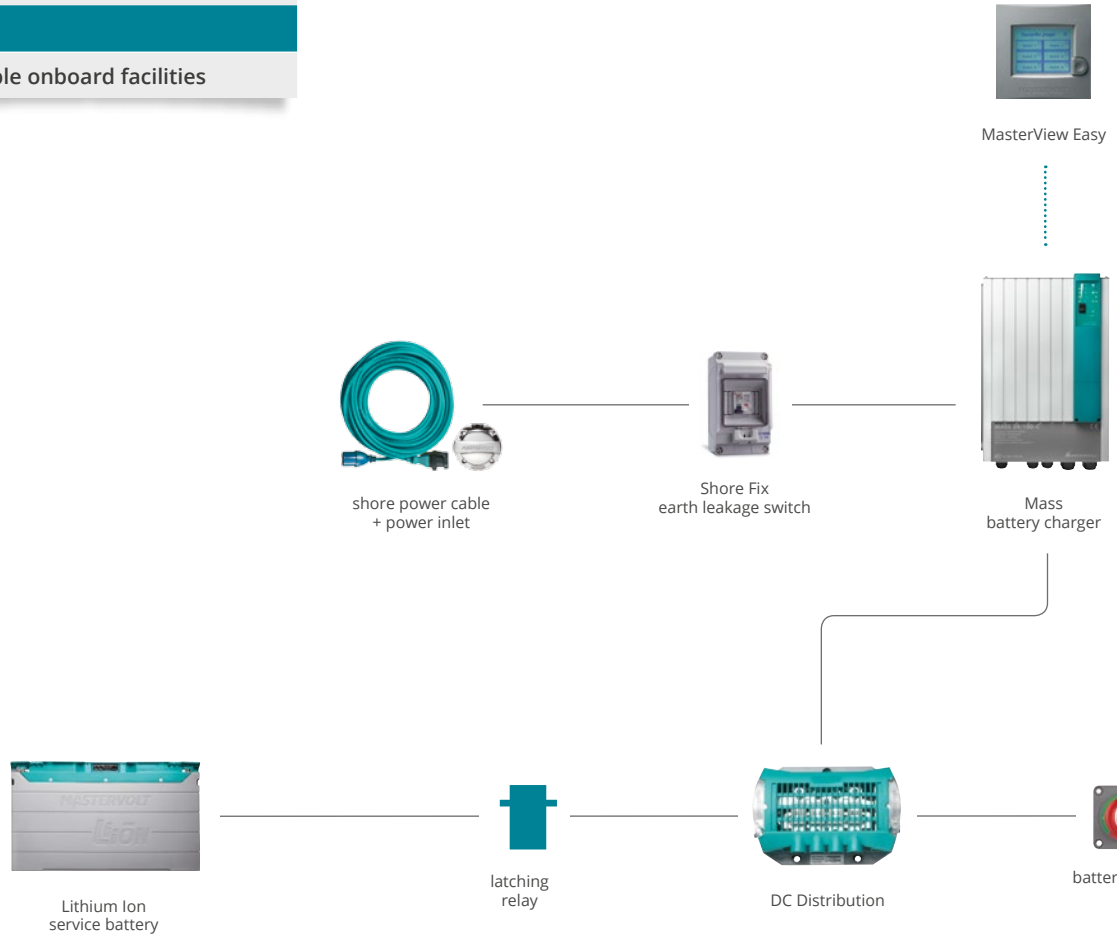
Each system has its own voltage, this microprocessor controlled unit converts 48 V into 12 V DC, so you are able to use both voltages.

- 1 x Shore Fix, 16A/30mA earth leakage switch.
- 1 x shore power cable 16 A, 25 mtr.
- 1 x shore power inlet 2+PE, 16A/230V.
- 1 x battery switch for switching on and off the consumers attached to the battery.
- 1 x Spotlight Chrome;

the most versatile, durable, consistent and easy-to-use spotlight on the market.

System drawing

Application
30-40 ft electrically powered yacht
Use
Longer weekend trips, at nights usually in a harbour
Details
Comfortable onboard facilities



Products used	
1 x MasterView Easy	2 x DC Distribution 500
1 x MasterBus USB Interface	1 x battery switch
1 x shore power cable, 16 A	1 x Spotlight Chrome
1 x shore power inlet, 16 A	1 x DC/DC converter, 48V/12V
1 x Shore Fix earth leakage switch	1 x DriveMaster Ultra 10
1 x Mass 48/50 battery charger	1 x ControlMaster Casual
4 x MLI Ultra 24/5000 Lithium Ion battery	

All the comforts of electric sailing

MasterBus
USB Interface

Spotlight

DC Distribution

DC Master

DriveMaster Ultra 10

ControlMaster
Casual

The full boating experience at the touch of a finger

Imagine with one touch you have full control of your onboard circuits, the ability to customize your experience, and improve safety by making all of the right decisions at the right time. One touch to go boating, one touch to shut down, one touch for evening cruising, and anything else your heart desires. With CZone technology by Mastervolt, all of this is possible. Whether you use a key fob or your tablet, the ability to monitor and control is at your fingertips.

The Basics

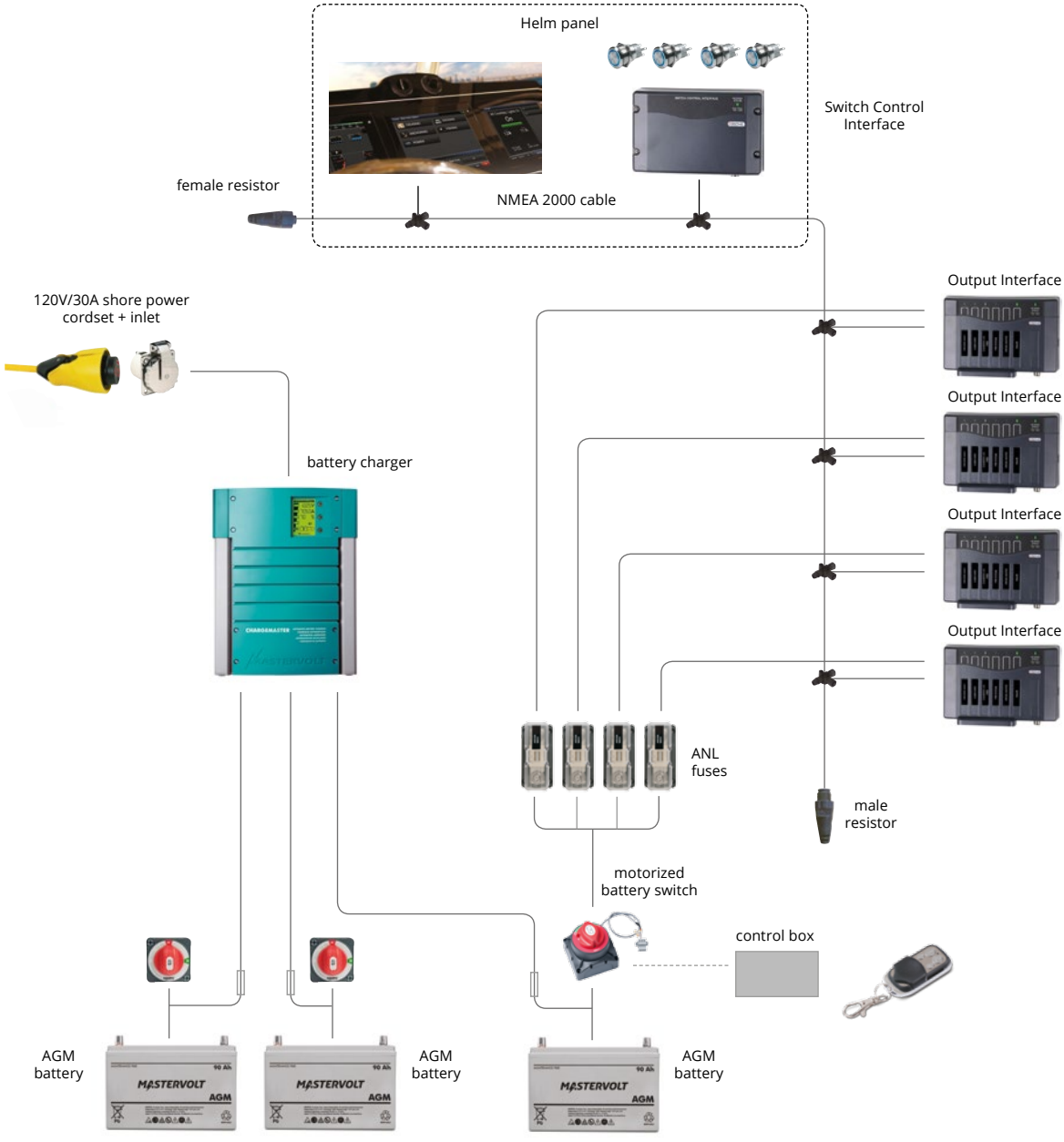
- Onboard circuits controlled with CZone™ digital switching technology.
- Ability to customize modes, bundling circuits together for easy of operation and control.
- Ability to monitor and control the system via tablet, key fob or integrated with major electronics brands including Simrad, B&G, Garmin* at the helm.
- Mastervolt integrated power system with battery charger and AGM batteries.
- Monitoring of the power system.
- 12 V DC, 120 V AC system.

** Please check the Mastervolt site for the latest developments on integration partners.*

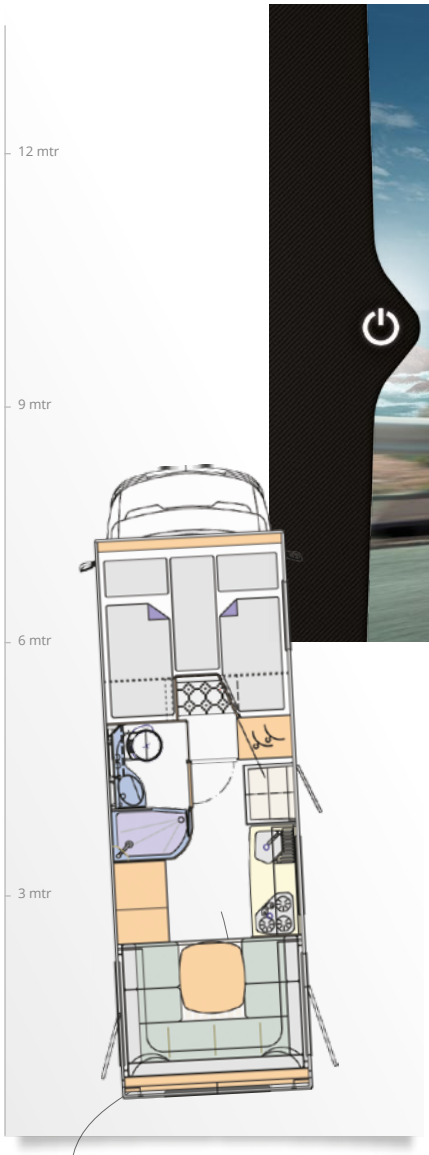
System choice

- System integration with the Garmin 8000 SMAP series
- NMEA 2000 cable, tee connectors and resistors
- 6 x push button, illuminated switches
- 1 x CZone Switch Control Interface
- 1 x 120V/30A EEL shore power cord set
- 1 x 120V/30A inlet
- 1 x ChargeMaster 12/70-3 battery charger
- 4 x CZone Output Interface
- 4 x Pro Installer ANL fuses & fuse holders
- 2 x Pro Installer EZ-Mount battery switch
- 1 x motorized battery switch
- 1 x key fob & control box
- 3 x AGM 12/90 battery

System drawing



A Mastervolt system for carefree camping



Application

6-8 metre motor home

Use

Generally day trips or weekend trips, at night connected to the grid

Details

Basic appliances

System description

This system is designed for mobile homes, recreational vehicles and commercial vehicles with limited electrical demands or equipment. The system satisfies basic power needs for 12 V lighting, radio/TV/DVD, a satellite dish and a few 230 V devices, such as a laptop, electrical toothbrush and your mobile telephone charger. The heart of the system consists of a sturdy and maintenance free gel battery. Used normally, the battery will deliver enough power for a full day, independently of the engine alternator or grid voltage. This is especially pratical considering the number of locations with no mains hook-up.

Energy consumption

DESCRIPTION	POWER	TOTAL X CAPACITY X HOUR	DAILY CONSUMPTION
Daily AC consumers (on inverter)			
LED television	80 W	1 x 80 Watt x 1 hour	= 0.080 kWh
Phone/tablet charger	20 W	1 x 20 Watt x 3 hours	= 0.060 kWh
Laptop	30 W	1 x 30 Watt x 3 hours	= 0.030 kWh
Daily DC consumers			
Interior lighting	20 W	3 x 20 Watt x 3 hours	= 0.180 kWh
Total AC and DC consumers:			**= 0.350 kWh**

The Basics

- Battery monitoring for full information on state of charge and time remaining of your batteries.
- The maximum AC capacity is 80 Watt for the laptop and telephone/tablet charger.
- Simple operation via touch screen control panel.
- Complete convenience: With an onboard inverter you and your guests will be able to use the standard phone and laptop adapters.

System choice

A system with separate charger and inverter provides the highest flexibility and reliability. The charger will always provide the optimum charge even when the available grid power is limited, fluctuating or unreliable. The inverter will provide a perfect true sine wave output to your sensitive onboard electronics. Power is available when you need it.

Service battery: MVG 12/85

The total of AC and DC consumers requires around 0.35 kWh. Totally discharging the batteries is not advisable so opt for a maximum of 50% discharge = 0.7 kWh. Taking into account ease of installation and the amount of standard equipment (such as lighting) we selected a 12 V system.
The required battery capacity is 0.7 kWh/12 V = 60 Ah.
This makes the MVG 12/85 gel battery the best choice.

Battery charger: ChargeMaster 12/15-2

In normal conditions we assume 20-25% of the battery capacity when selecting a battery charger: 20-25% of 85 Ah requires a 15 A battery charger. In this case the ChargeMaster 12/15-2 is an excellent choice.

You can use two outputs:
One for the service battery and one for the starter battery of the engine.

Inverter: AC Master 12/300

The AC Master 12/300 is sized to power all the loads at the same time.

Monitoring: Masterlink BTM-III

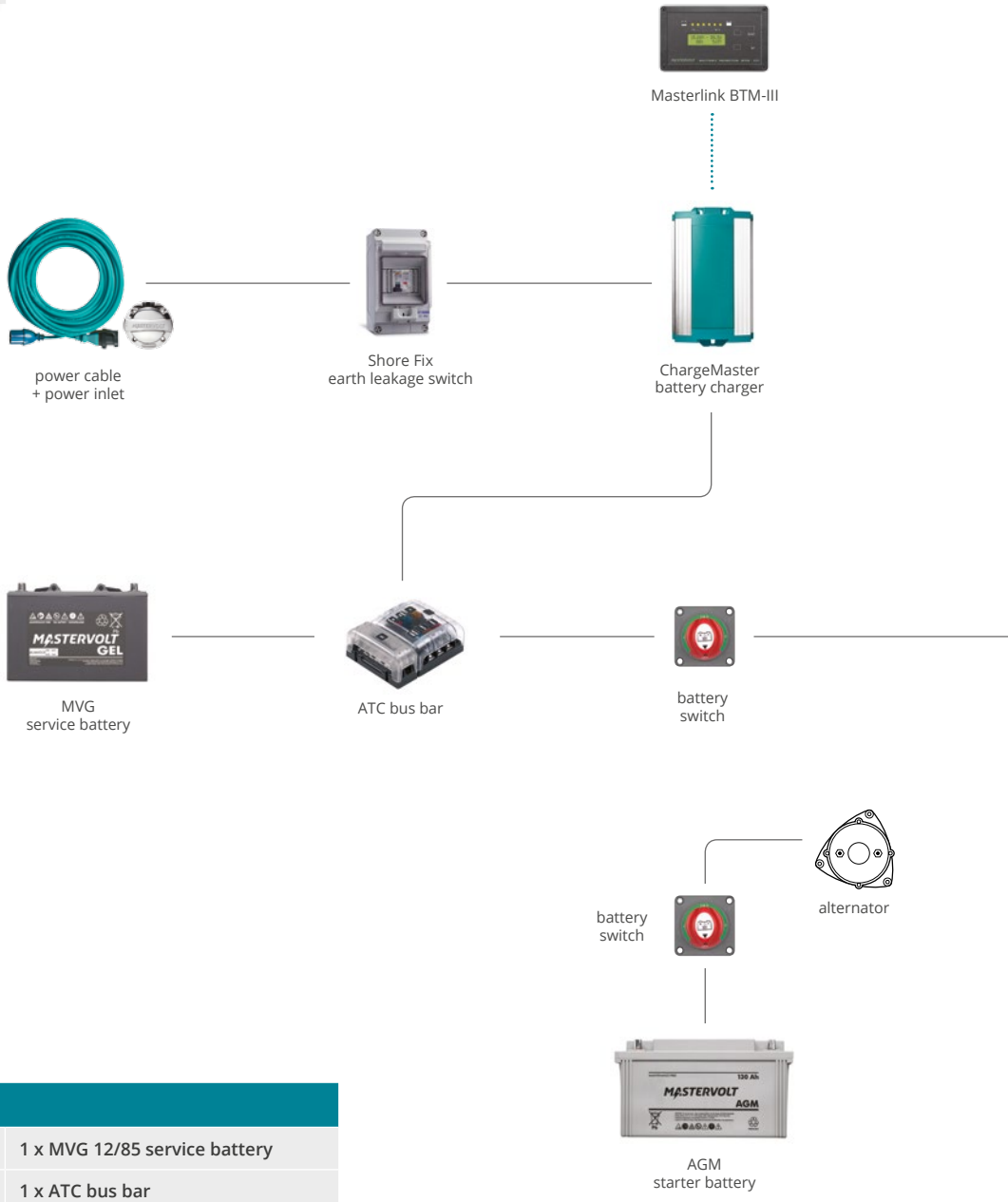
This battery monitor provides an accurate indication of the current, amperage, time remaining and estimated capacity of the battery. The built-in microprocessor calculates the remaining capacity and stores historic data.

Other system components

- 1 x AGM 12/70 starter battery.
- 1 x Shore Fix, 16A/30mA earth leakage switch.
- 1 x power cable 16 A, 25 mtr.
- 1 x power inlet 2+PE, 16A/230V.
- 1 x ATC bus bar.
- 1 x Z-bar 200 A 10-way.
- 2 x battery switches for switching on and off the consumers attached to the battery.

System drawing

Application
6-8 metre motor home
Use
Generally day trips or weekend trips, at night connected to the grid
Details
Basic appliances



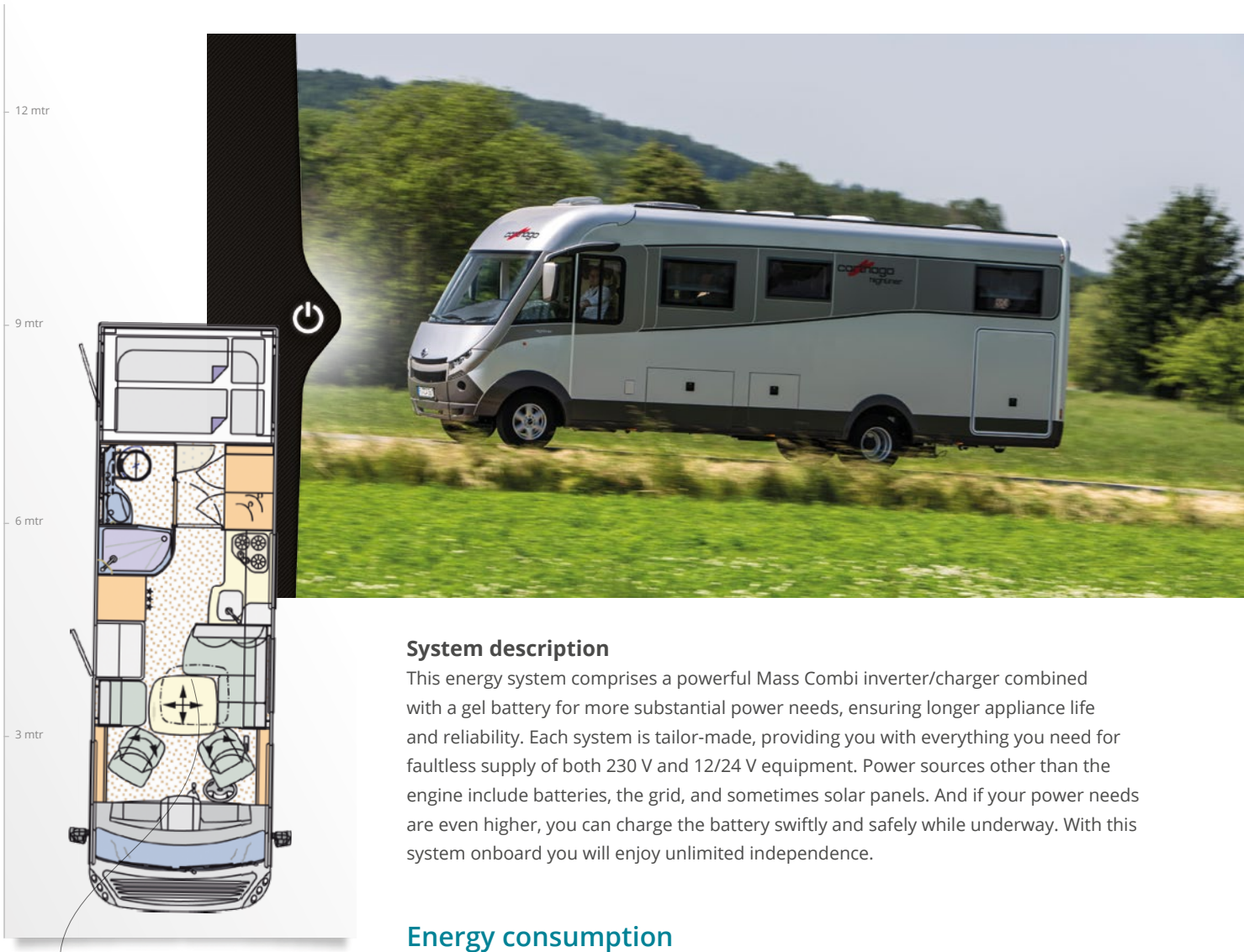
Products used	
1 x Masterlink BTM-III	1 x MVG 12/85 service battery
1 x shore power cable, 16 A	1 x ATC bus bar
1 x shore power inlet, 16 A	2 x battery switch
1 x Shore Fix earth leakage switch	1 x Z-bar 200 A, 10-way
1 x ChargeMaster 12/15-2 battery charger	1 x AGM 12/70 starter battery
1 x AC Master 12/300 inverter	

A Mastervolt system for carefree driving

AC Master
inverter

Z-bar
10-way

Complete comfort on the road



Application

7-9 metre motor home

Use

Longer weekend trips, two days independent from the grid

Details

Comfortable onboard facilities

System description

This energy system comprises a powerful Mass Combi inverter/charger combined with a gel battery for more substantial power needs, ensuring longer appliance life and reliability. Each system is tailor-made, providing you with everything you need for faultless supply of both 230 V and 12/24 V equipment. Power sources other than the engine include batteries, the grid, and sometimes solar panels. And if your power needs are even higher, you can charge the battery swiftly and safely while underway. With this system onboard you will enjoy unlimited independence.

Energy consumption

DESCRIPTION	POWER	TOTAL X CAPACITY X HOUR	DAILY CONSUMPTION
Daily AC consumers (on inverter)			
Hair dryer	1500 W	1 x 1500 Watt x 15 minutes	= 0.375 kWh
Coffee machine	1000 W	1 x 1000 Watt x 15 minutes	= 0.250 kWh
Microwave	1500 W	1 x 1500 Watt x 15 minutes	= 0.375 kWh
LED television	80 W	1 x 80 Watt x 3 hours	= 0.240 kWh
Laptop	30 W	1 x 30 Watt x 3 hours	= 0.090 kWh
Phone/tablet charger	20 W	1 x 20 Watt x 3 hours	= 0.060 kWh
Daily DC consumers			
Interior lighting	20 W	5 x 20 Watt x 3 hours	= 0.300 kWh
Waterpump	30 W	1 x 3 Watt x 24 hours	= 0.072 kWh
Total AC and DC consumers:			**= 1.762 kWh**

** The waterpump runs for 1/10 of the time, resulting in an average of 3 Watt.*

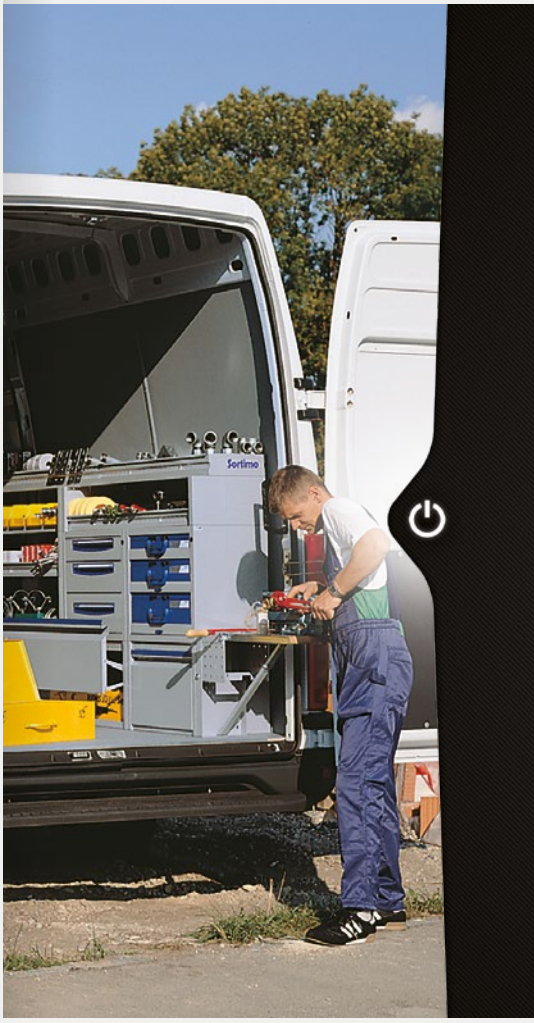
The Basics

- As compact and lightweight is important, a combined inverter/charger has been selected
- Recharge the batteries using the energy from the sun.

System choice

One of the advantages of using a Mass Combi is the ability to power loads even when mains supply is limited by using energy from your batteries. For example, a 10 A load can be powered from a 4 A grid connection. In addition, the design of the Mass Combi is both unique and characteristic of Mastervolt.

Rather than installing heavy transformers, our lightweight, high-frequency technology offers major benefits regarding size, weight and sound (no hum!). The technology also ensures an exceptionally high efficiency with a minimal conversion loss and a low no-load consumption. The included battery temperature sensor will make sure the batteries receive the best possible charge. The Mass Combi meets all your requirements and more!



Batteries: 3 x MVG 12/200 Ah

The total of AC and DC consumers requires around 3.6 kWh (1.8 kWh for one day). Totally discharging the batteries is not advisable so opt for a maximum of 50% discharge = 7.2 kWh. Taking into account the various appliances and required peak loads we suggest a 12 V system.
The required battery capacity is 7.2 kWh/12 V = ± 600 Ah.

Charger/inverter: Mass Combi 12/2500-100

600 Ah needs approx. 25% of the battery capacity for charging power, so in this case we chose for a 100 A charging power via the Mass Combi. The Mass Combi has a battery charger that allows you to safely, quickly and completely charge two battery banks; starter and service batteries can be separately charged. Additionally the Mass Combi can be used to convert the power for your AC applications, using everything simultaneously is also possible.

Monitoring: MasterView Easy

This touchscreen control panel is easy to read and operate. The grey button turns the display on or off or locks it, while all other functions can be controlled using the touchscreen.

Digital distribution:

The products in this system communicate with each other via MasterBus. This brilliantly simple platform for communication and connections ensures that all components 'speak' the same language. One communication protocol with high-speed CANbus technology.

- **1 x MasterShunt 500**

MasterBus integrated battery monitor, with detailed information on the status of your batteries for an optimised charging process, incl. voltage, current, time remaining and consumption capacity in percentage.

- **2 x DC Distribution 500**

This distribution model connects up to four DC devices to the DC groups, such as a battery charger, inverter, alternators and solar panels.

- **1 x MasterBus USB Interface**

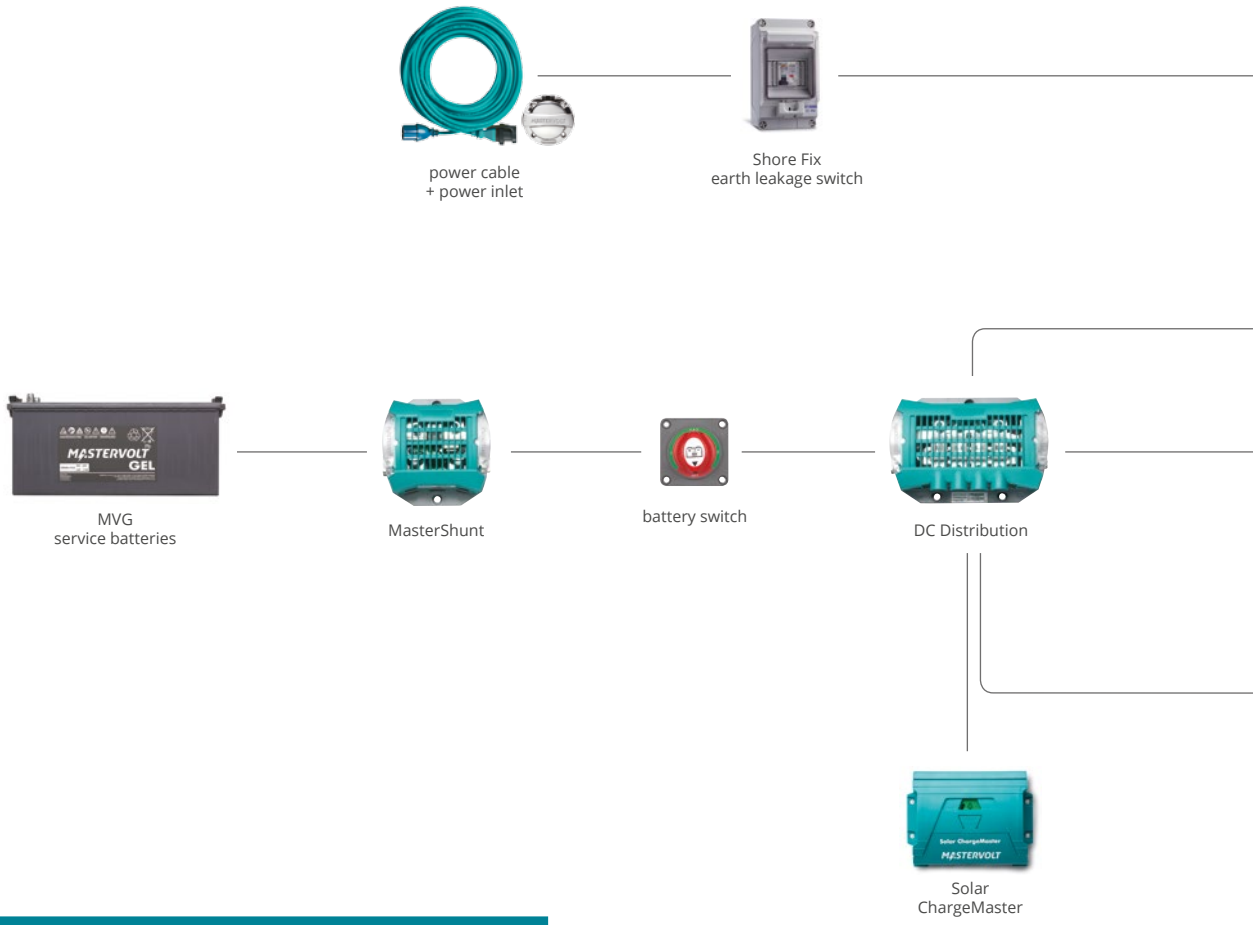
The MasterBus USB Interface enables you to read and configure the MasterBus network via your PC.

Other system components

- 1 x AGM 12/90 starter battery.
- 1 x ChargeMate 2502; battery combiner, charges two batteries while driving.
- 1 x Solar ChargeMaster; provides a pure charge current in all conditions while the 3-step charging method ensures a safe charging process and a longer lifespan for your batteries.
- 2 x Shore Fix, 16A/30mA earth leakage switches.
- 1 x power cable 16 A, 25 mtr.
- 1 x power inlet 2+PE, 16A/230V.
- 2 x battery switches for switching on and off the consumers attached to the battery.

System drawing

Application
7-9 metre motor home
Use
Longer weekend trips, two days independent from the grid
Details
Comfortable onboard facilities



Products used	
1 x MasterView Easy	1 x MasterShunt 500
1 x MasterBus USB Interface	2 x battery switch
1 x shore power cable, 16 A	2 x DC Distribution 500
1 x shore power inlet, 16 A	1 x ChargeMate 2502
2 x Shore Fix earth leakage switch	1 x Solar ChargeMaster
1 x Mass Combi 12/2500-100	1 x AGM 12/90 starter battery
3 x MVG 12/200 Ah service battery	

Complete comfort on the road

MasterView Easy

MasterBus
USB Interface

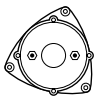
Mass Combi

Shore Fix
earth leakage switch

battery switch

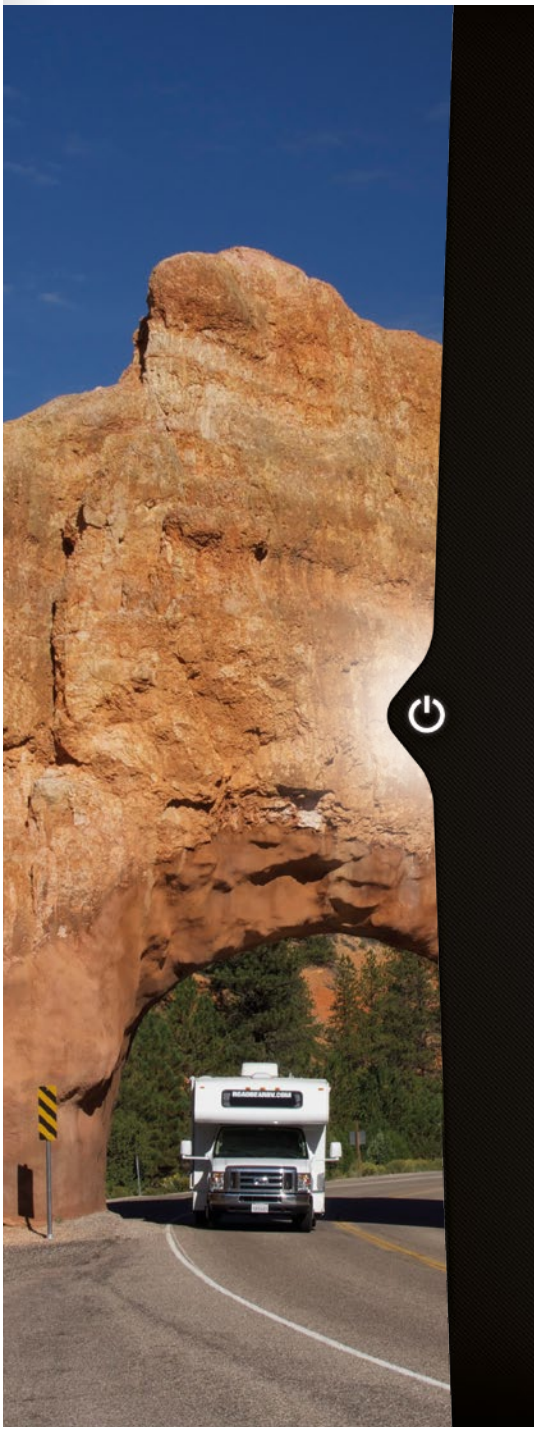
DC Distribution

ChargeMate



alternator

AGM
starter battery



Five-star luxury on the road

Application

Large motor home with all comforts

Use

Longer trips and extended periods without grid power

Details

Luxurious onboard facilities

System description

As you explore the world for weeks or even months at a time, a reliable source of electricity is essential for mobile independence. A made-to-measure power system provides you with a complete system to achieve this, with the Lithium Ion batteries as its heart, that can easily supply all AC consumers.Even when you use a lot of electricity, or require an aircon, sensitive electronic equipment or the internet... The choice is yours!

Energy consumption

DESCRIPTION	POWER	TOTAL X CAPACITY X HOUR	DAILY CONSUMPTION
Daily AC consumers (on inverter)			
Air conditioning (> 6 kBTU)	1500 W	1 x 750 Watt x 3 hours	= 2.250 kWh
Hair dryer	1500 W	2 x 1500 Watt x 15 minutes	= 0.750 kWh
Coffee machine	1000 W	1 x 1000 Watt x 30 minutes	= 0.500 kWh
Microwave	1500 W	1 x 1500 Watt x 15 minutes	= 0.375 kWh
LED television	80 W	2 x 80 Watt x 3 hours	= 0.480 kWh
Laptop	30 W	1 x 30 Watt x 8 hours	= 0.240 kWh
Phone/tablet charger	20 W	2 x 20 Watt x 8 hours	= 0.320 kWh
Daily DC consumers			
Hifi installation	50 W	1 x 50 Watt x 8 hours	= 0.400 kWh
Refrigerator	50 W	1 x 10 Watt* x 24 hours	= 0.240 kWh
Interior lighting	20 W	10 x 20 Watt x 3 hours	= 0.600 kWh
Total AC and DC consumers:			**= 6.155 kWh**

** The refrigerator runs for 1/5 of the time, resulting in an average of 10 Watt.*

The Basics

- The goal is to have all luxury and comfort for as long as possible.
- You charge your batteries with heavy alternators on the main engine while driving, so seldom need grid power.

System choice

The additional Alpha 24/75 alternator will charge the batteries while driving/running your engine. This 24 Volt 75 Amps alternator is designed to provide maximum output, even at low engine speed (rpm). You will be able to charge roughly 24 x 75 = 1.8 kWh every hour the engine is running. This alternator gives you full independency!

Alternator: Alpha 24/75

Batteries: 3 x MLI Ultra 24/5000

Lithium Ion batteries have a high energy density and are perfect for cyclic applications. They offer savings of up to 70% in volume and weight, with three times as many charging cycles (2000 full cycles). The Lithium Ion Ultra series includes integrated battery monitoring.
The total of AC and DC consumers requires around 6 kWh. For two days of independency without running the enige you need 12 kWh. Totally discharging the batteries is not advisable so opt for a maximum of 90% discharge for Lithium Ion batteries, i.e. at least 13.3 kWh. Li-ion batteries can be 100% discharged.

- A 24 V battery voltage is selected to be able to use smaller cable sizes.
- The required battery capacity is around 600 Ah.
- Three Lithium Ion batteries ensure you 625 Ah onboard.
- 3 x latching relay 500 A; mandatory safety relais.
- 3 x T-fuse holder plus 3 x T-fuse 225 A.

Charger/inverter: Mass Combi Ultra 24/3500-100

In this case, 625 Ah needs 15% of the battery capacity for charging power, so we chose for 100 A charging power via the Mass Combi Ultra. The Combi Ultra has a battery charger that allows you to safely, quickly and completely charge two battery banks; starter and service batteries can be separately charged. Additionally the Mass Combi Ultra can be used to convert the power for your AC applications, using everything simultaneously is also possible.

Monitoring: MasterView Easy

This touchscreen control panel is easy to read and operate. The grey button turns the display on or off or locks it, while all other functions can be controlled using the touchscreen.

Digital distribution

The products in this system communicate with each other via MasterBus.
This brilliantly simple platform for communication and connections ensures that all components 'speak' the same language. One communication protocol with high-speed CANbus technology.

2 x DC Distribution 500

This distribution model connects up to four DC devices to the DC groups, such as a Combi, inverter, alternator and solar panels.

1 x MasterBus USB Interface

The MasterBus USB Interface enables you to read and configure the MasterBus network via your PC.

Other system components

- 1 x AGM 12/130 starter battery.
- 1 x Solar ChargeMaster; provides a pure charge current in all conditions while the 3-step charging method ensures a safe charging process and a longer lifespan for your batteries.
- 2 x Shore Fix, 16A/30mA earth leakage switches.
- 1 x power cable 16 A, 25 mtr.
- 1 x power inlet 2+PE, 16A/230V.
- 2 x battery switches for switching on and off the consumers attached to the battery.

System drawing

Application
Large motor home with all comforts
Use
Longer trips and extended periods without grid power
Details
Luxurious onboard facilities

power cable
+ power inlet

Shore Fix
earth leakage switch

Lithium Ion
service battery

T-fuseholder
with fuses

latching
relay

DC Distribution

Solar
ChargeMaster

Products used	
1 x MasterView Easy	3 x T-fuse holder + 3 x T-fuse 225 A
1 x MasterBus USB Interface	3 x latching relay 500 A
1 x shore power cable, 16 A	2 x DC Distribution 500
1 x shore power inlet, 16 A	2 x battery switch
2 x Shore Fix earth leakage switch	1 x Alpha 24/75 alternator
1 x Mass Combi Ultra 24/3500-100	1 x Solar ChargeMaster
3 x MLI Ultra 24/5000 Lithium Ion battery	1 x AGM 12/130 starter battery

Five-star luxury on the road

MasterView Easy

MasterBus
USB Interface

Mass Combi

Shore Fix
earth leakage switch

battery
switch

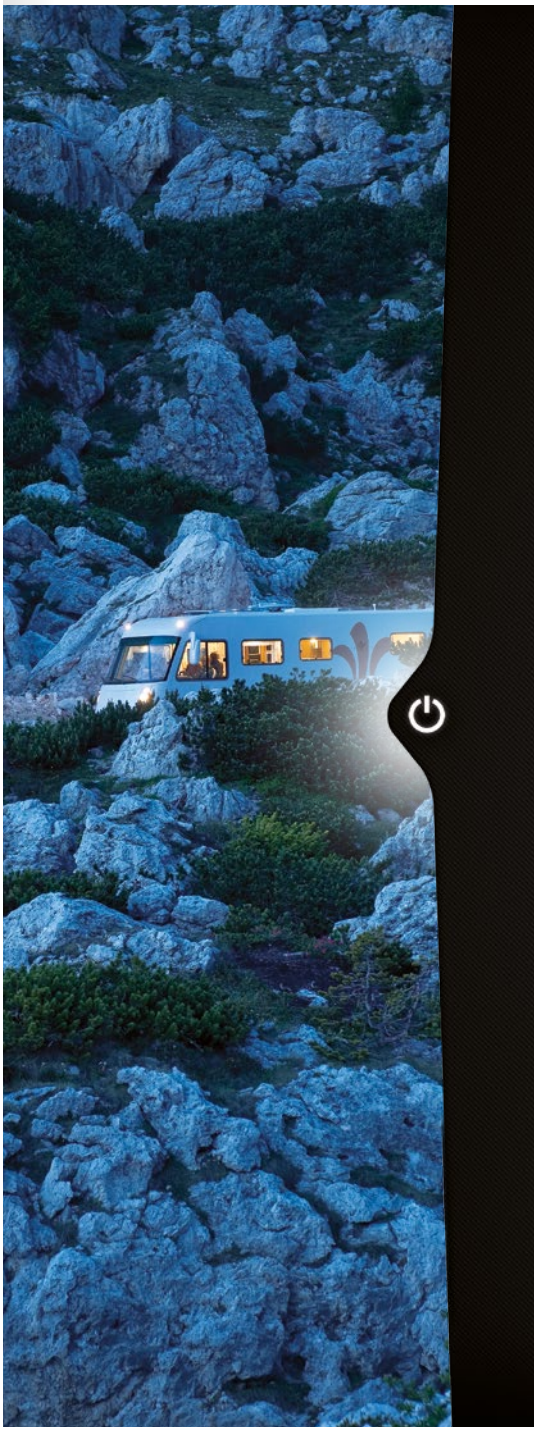
DC Distribution

Alpha alternator

alternator

battery
switch

AGM
starter battery



Providing global options and rich features for the trucking industry

A North American trucking company specialised in global vehicles, chooses Mastervolt for global power options. The integrated electrical system with tank monitoring provides added power and functionality, and a reduction in wiring.

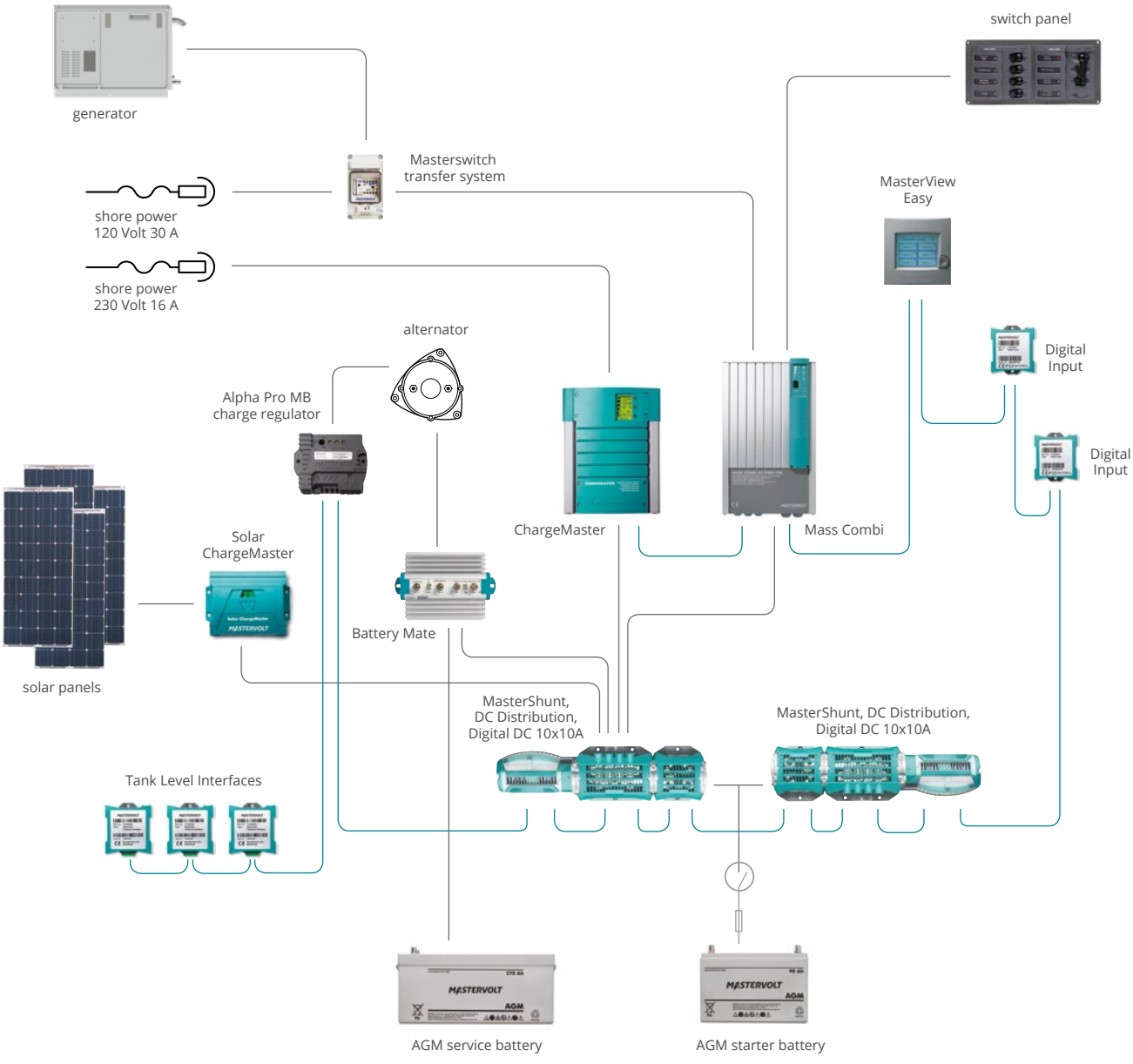
The Basics

- Global shore power option.
- The alternator powers the inverter and runs the air conditioning when driving.
- Limits generator use.
- The Mass Combi inverter/charger provides 60 Hz at all times.
- The second battery charger manages 50 Hz power.
- The Digital DC 10x10A reduces wiring and adds functionality.
- Dimmers are eliminated
- 12 V, 120 V AC system.

System choice

- 1 x 120V/30A EEL shore power cordset
- 1 x 120V/30A inlet
- 1 x 230V/16A inlet
- 1 x MasterSwitch 7 kW
- 1 x MasterView Easy
- 1 x Alpha Pro MB charge regulator
- 1 x ChargeMaster 12/100-3
- 1 x Mass Combi 12/2500-100
- 2 x Digital Input
- 1 x Solar ChargeMaster 40 A
- 1 x Battery Mate, 250 A voltage drop free battery isolator
- 3 x Tank Level Interface
- 2 x MasterShunt 500, digital battery monitor
- 2 x DC Distribution 500
- 2 x Digital DC 10x10A
- 3 x AGM 12/90 starter battery
- 4 x AGM 12/270 service battery

System drawing



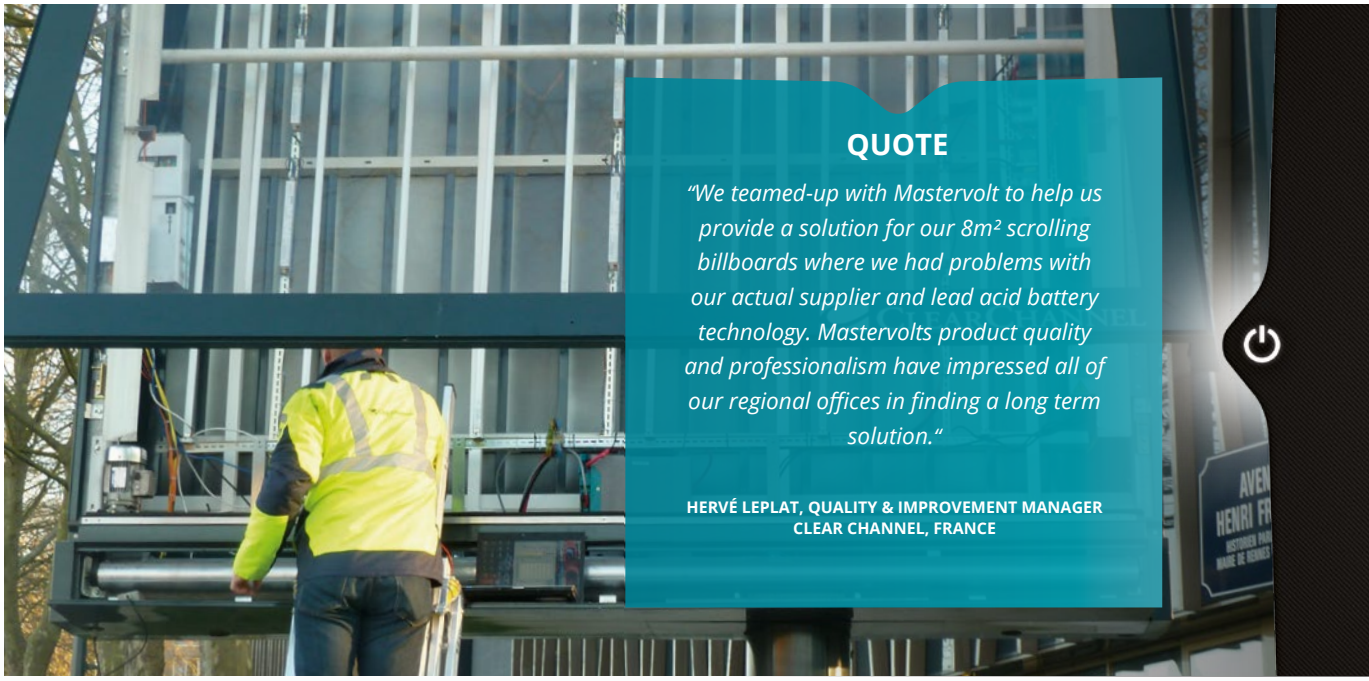
Reducing the costs of a billboard system

Advertising companies in France use road-side 8 m² motorised billboards, that need electrical power for lighting and motors that change the picture every 5 seconds. For the electrical needs of these panels, in some cases a contract is put in place with the grid operator and an electrical meter is needed. This can be very expensive, so an option of a system running off batteries, and recharged at night by street lighting is used. These panels could be single or double sided operation.

The problem we were faced with, was that the systems used had to be installed inside the panel, hence the operating temperature in the summer meant that the performance of the chargers and batteries used was not optimal and the batteries had to be changed very often, so costly. Due to new ecological law the street lighting was going to be turned off at certain times during the night, so normal 3-step charging with long absorption times was not ideal, but necessary because of the use of lead acid batteries.
The solution was to change to Lithium Ion batteries. Quick charge and a very long lifespan meant a reliable system that will work independently for years.

Energy consumption

DESCRIPTION	NUMBER	AVG. POWER	HOURS/DAY	DAILY CONSUMPTION
AC consumers				
Electric motor for roller	1 or 2	100-200 W	17	= 1.7 / 3.4 kWh
Sources				
Grid / street lighting at night	1	1000 W	6-17	= 6 - 17 kWh



QUOTE

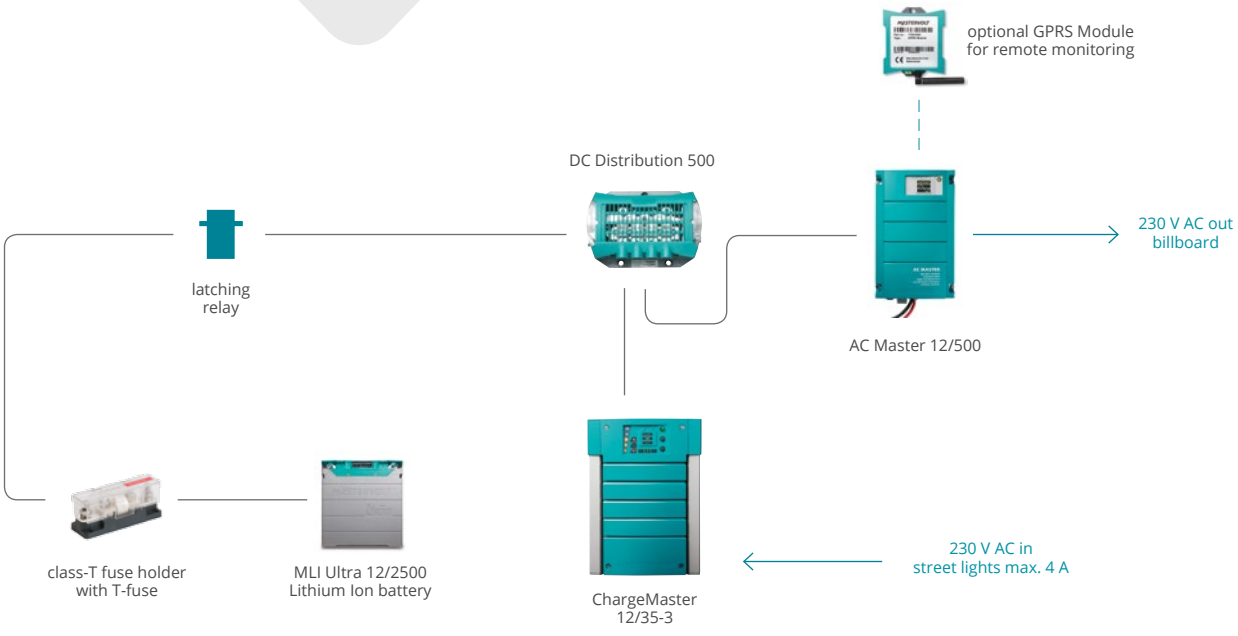
"We teamed-up with Mastervolt to help us provide a solution for our 8m² scrolling billboards where we had problems with our actual supplier and lead acid battery technology. Mastervolts product quality and professionalism have impressed all of our regional offices in finding a long term solution."

HERVÉ LEPLAT, QUALITY & IMPROVEMENT MANAGER CLEAR CHANNEL, FRANCE

System choice

- 1 x MLI Ultra 12/2500
- 1 x ChargeMaster 12/35-3
- 1 x AC Master 12/500
- 1 x Pro Installer fuse holder
- 1 x T-fuse
- 1 x DC Distribution 500
- 1 x GPRS Module (optional)

System drawing



‘Riederhütte’ powered by DOMA, Austria

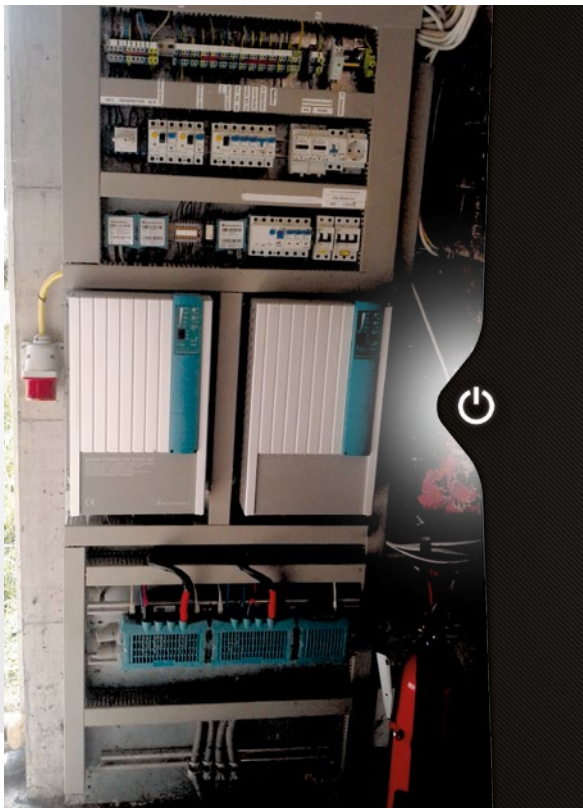
The ‘Riederhütte’ is a shelter in the Austrian mountains that is completely autonomically supplied by an off grid package (PV panels, MPPT charge regulators, batteries, generator, inverters) as there is no grid available in the mountains. Besides the solar panels and the batteries, a backup generator is needed if battery capacity is depleted or when the weather is bad (no sunshine).

Energy consumption

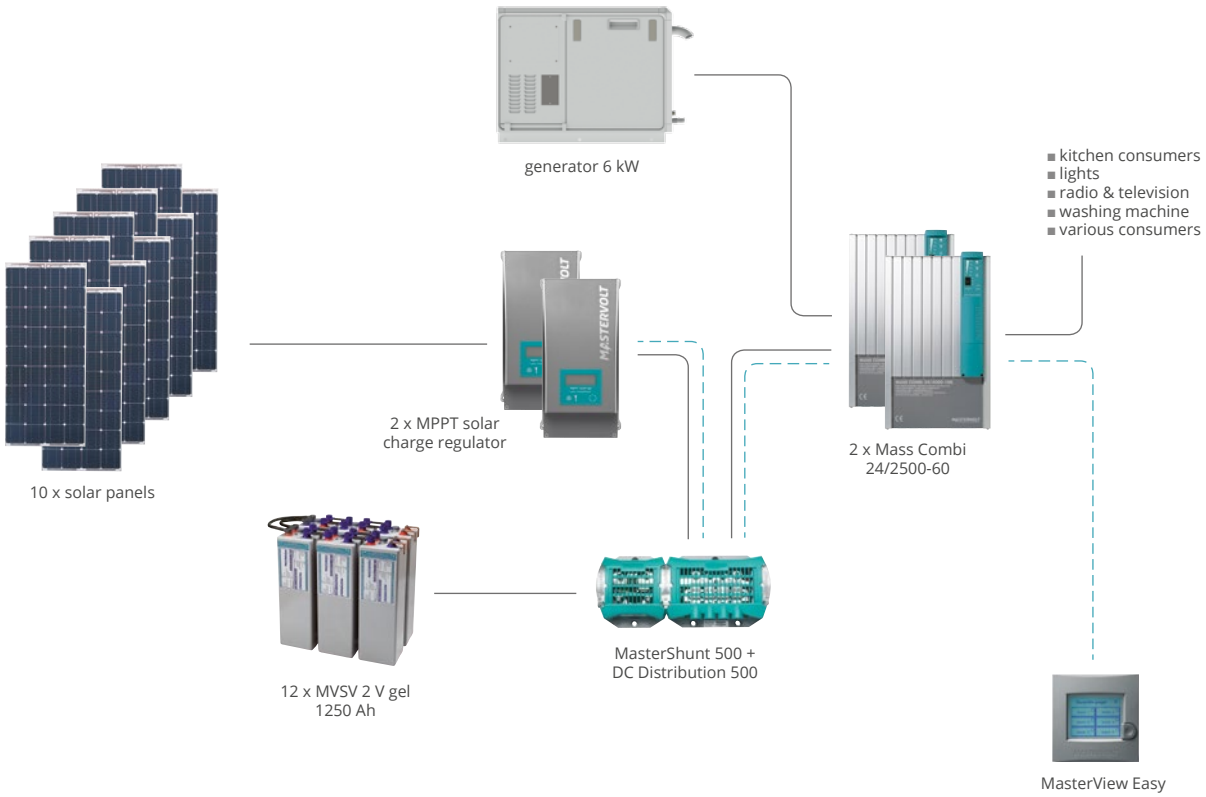
DESCRIPTION	NUMBER	AVG. POWER	HOURS/DAY	DAILY CONSUMPTION
AC consumers				
Kitchen consumers	2	1500 W	2	= 6 kWh
Lights	15	20 W	8	= 2.4 kWh
LED television	2	300 W	3	= 1.8 kWh
Various consumers (UV disinfection; defecator, etc.)	5	500 W	2	= 5 kWh
Washing machine	1	2200 W	2	= 1.1 kWh
Total AC consumers:				**= 16.3 kWh**
Sources				
Generator	1	5700 W	1	= 5.7 kWh
Solar panels	10	217 W	6	= 13 kWh
Total sources:				**= 18.7 kWh**

System choice

- 1 x generator 6 kW
- 2 x MPPT solar charge regulator
- 2 x Mass Combi 24/2500-60
- 12 x MVSV 2 V gel battery 1250 Ah
- 1 x Mastershunt 500
- 1 x DC Distribution 500
- 1 x MasterView Easy



System drawing



Independent from the grid by the Sun Factory, the Netherlands

Having the ability to store energy in your house allows you to be more independent from the electrical grid, both financially and for reasons of security and/or comfort.

In national park 'de Oude Venen' various remote cottages are provided with an off grid system. The generated solar energy is stored in two Lithium Ion batteries via a MPPT solar charge regulator. The 5 kW Mastervolt inverter delivers a pure 230 V sine wave, enabling you to use all appliances like you would at home. The entire off grid system can be monitored remotely by means of a WiFi module.

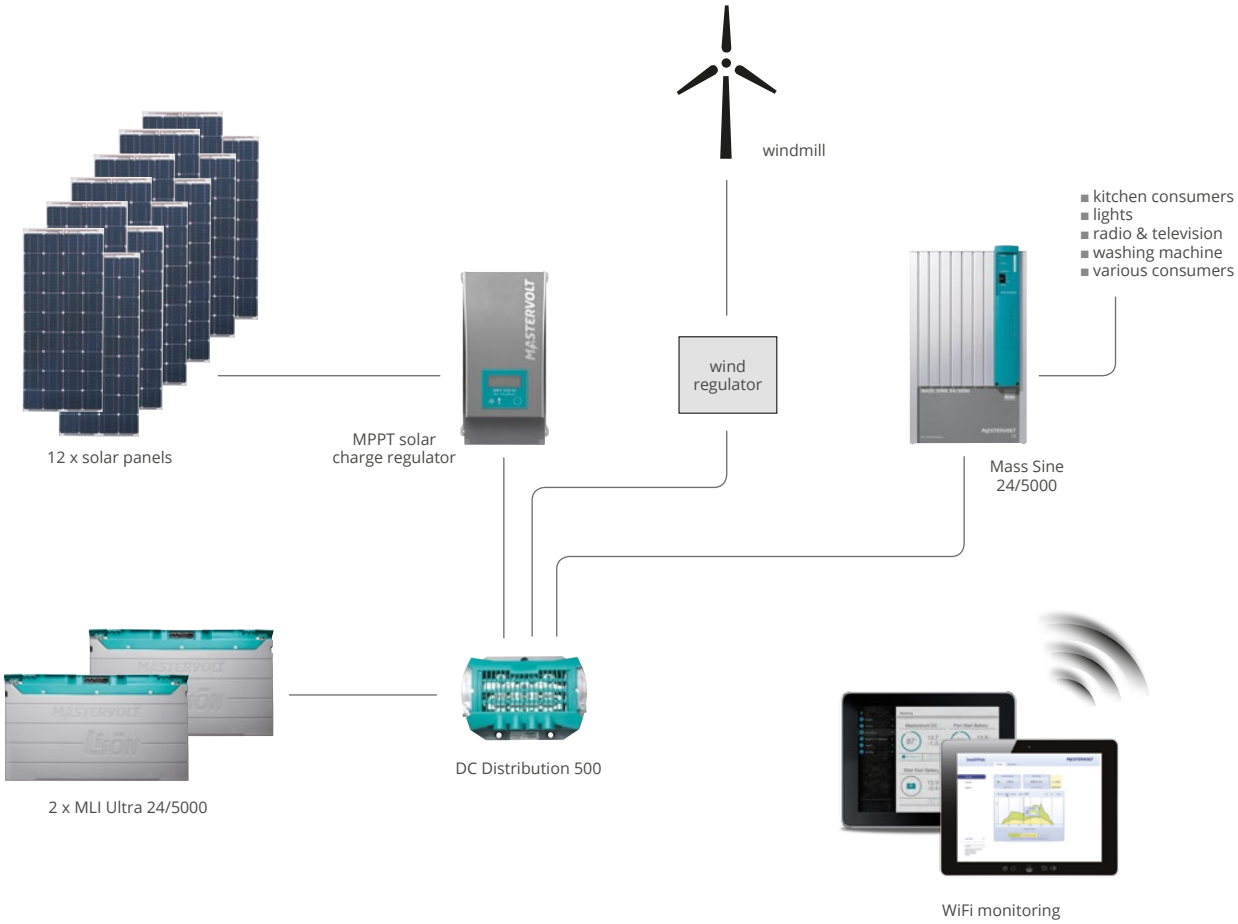
Energy consumption

DESCRIPTION	NUMBER	AVG. POWER	HOURS/DAY	DAILY CONSUMPTION
AC consumers				
Kitchen consumers	2	1200 W	1	= 2.400 kWh
LED television	1	80 W	4	= 0.320 kWh
Laptop	1	20 W	6	= 0.120 kWh
Refrigerator	1	80 W	12	= 0.960 kWh
Washing machine	1	1800 W	1	= 1.800 kWh
Interior lighting	8	7 W	6	= 0.360 kWh
Total AC consumers:				**= 5.96 kWh**
Sources				
Solar panels	12	2200 Wp	6	= 7.900 kWh
Wind energy	1	750 Wp	1.5	= 1.100 kWh
Total sources:				**= 9 kWh**

System choice

- 1 x MPPT solar charge regulator
- 1 x Mass Sine 24/5000 inverter
- 2 x MLI Ultra 24/5000 Lithium Ion batteries
- 1 x DC Distribution 500
- 1 x WiFi monitoring

System drawing



Industrial 3-phase solution

In these modern green minded times, more environment friendly solutions for industrial applications are becoming a necessity. A hybrid generator solution is such an application that will offer 'best of both worlds'. The generator works perfectly together with Mastervolt's Mass Combi Ultra charger/inverter and the MLI Ultra Lithium Ion battery. This solution will offer fuel savings, a flexible system and higher reliability.

In more detail, the advantages are ranging from being able to run silently when an operator chooses to, having the comfort of a backup power system and in saving fuel by limiting generator running hours. The system is managed through Mastervolt's MasterBus system intelligence and when the battery pack reaches a minimum state of charge, the generator will start to run. It will both power the system and charge the MLI Ultra batteries op to 100%, to be ready for its next cycle. The MLI Ultra in combination with the Mass Combi Ultra is an ideal solution for managing power with a minimal amount of components. System solutions range from 3 kWh single phase up to 30 kWh 3-phase.

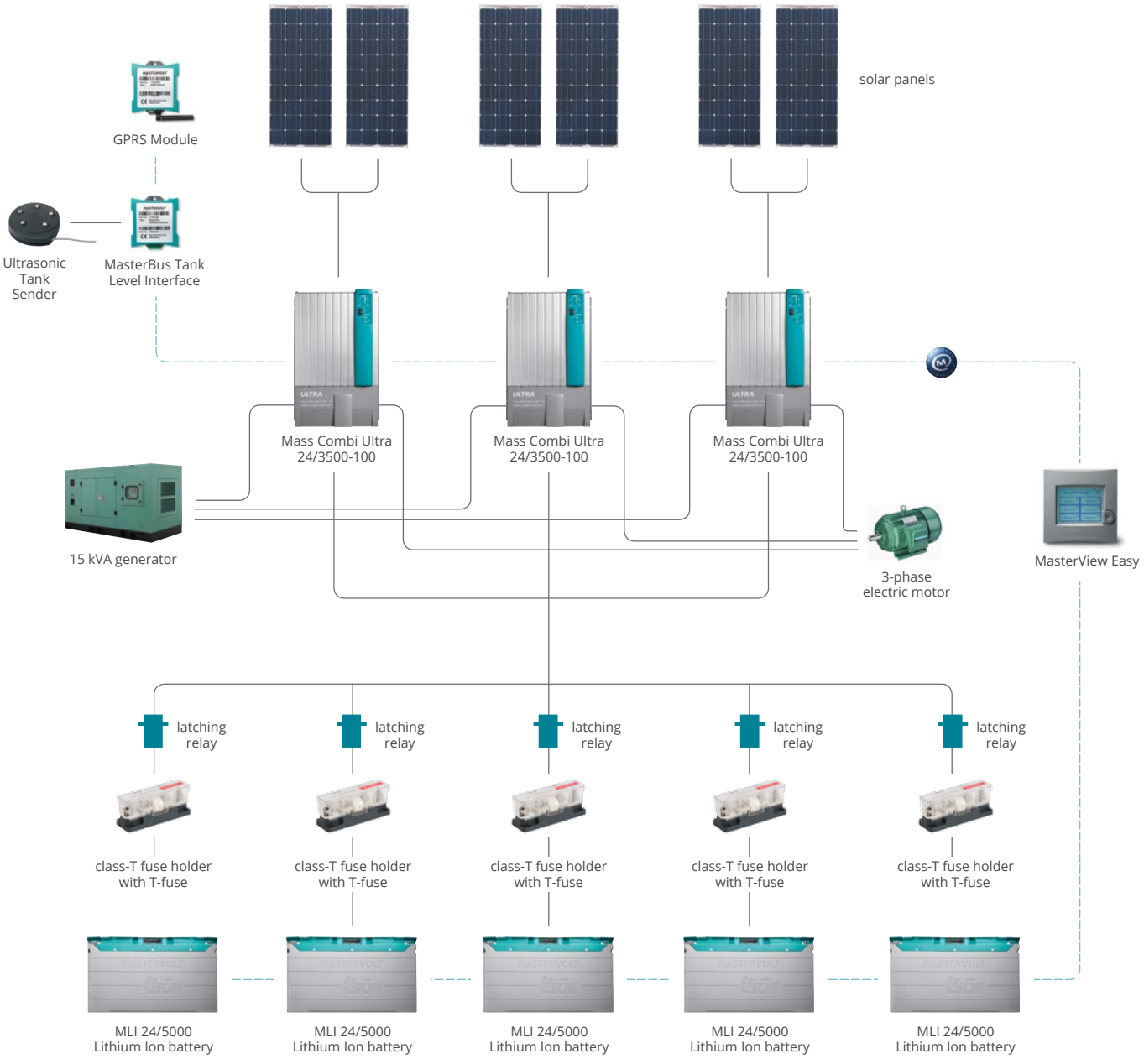
Energy consumption

DESCRIPTION	NUMBER	AVG. POWER	HOURS/DAY	DAILY CONSUMPTION
AC consumers				
3-Phase motor	1	3000 W	24	= 72 kWh
				= 72 kWh
Sources				
Generator	1	14000 W	3 x 2	= 84 kWh
Solar panels	6	250 W	± 5	= 7.5 kWh
Total sources:				= 91.5 kWh

System choice

- 3 x Mass Combi Ultra 24/3500-100
- 5 x MLI Ultra 24/5000
- 5 x Pro Installer T-fuse holder
- 5 x T-fuses
- 1 x MasterView Easy
- 1 x MasterBus USB Interface
- 1 x MasterBus Tank Level Interface
- 1 x Ultrasonic Tank Sender
- 1 x GPRS module

System drawing

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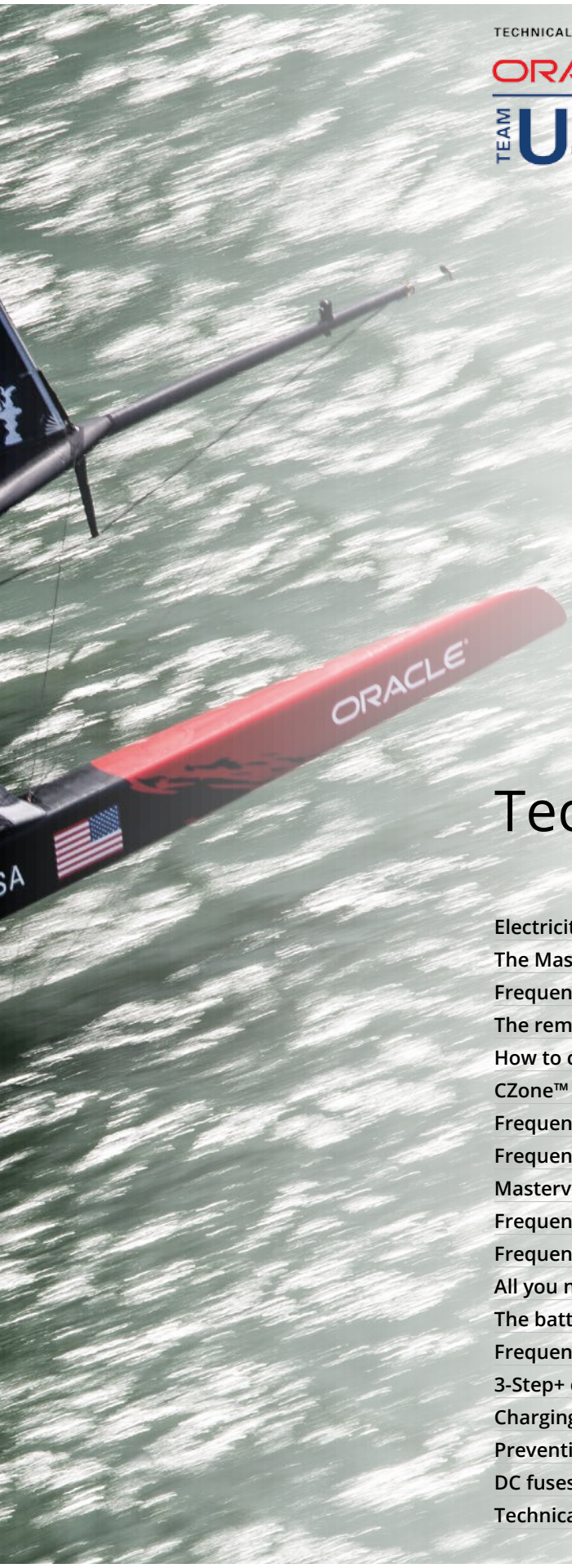


Technical Background

Electricity: How does it work?

As electricity cannot be seen, smelled or heard (when all is well), it is a technology that can be more difficult to grasp than, say, mechanical engineering or architecture. Nevertheless, over the past century we have come to increasingly rely on electrical energy. It only takes a power cut for us to all realise how much we depend on electricity for our luxury, safety and comfort.

The luxury, safety and comfort we take for granted at home and at work is also appreciated onboard a yacht or in a camper. The same goes when working in locations with no connection to a power plant, including on tugboats, Rhine barges or during road works.

For more than 20 years, Mastervolt has specialised in supplying reliable electrical power in places without utility facilities. To offer a better understanding of our products, let us first give a short explanation of the main terms.

Voltage and current provide power

The main activity of Mastervolt is power conversion. And the main variable that can be converted in the field of electricity is voltage. The electrical voltage is the potential difference between two points in an electrical circuit.

We distinguish two types of voltage: Alternating Current (AC) and Direct Current (DC). Voltage is expressed in Volt (V), and AC frequency is expressed as Hertz (Hz), the rate at which voltage alternates.

■ ***Alternating Current*** (voltage) is the electricity that comes out of home sockets and is used for most appliances. In Europe this is 230 V 50 Hz, in the USA 120 V or 240 V 60 Hz.

■ ***Direct Current*** is supplied by a battery or solar panels. Batteries are vital because they offer a practical possibility to store electrical energy. Battery voltages are commonly 12 V or 24 V. Another possibility is 48 V, which is usually exclusive to electric propulsion.

While direct current is stored in batteries, we actually need alternating current to power our household appliances. This requires conversion from DC voltage to AC voltage.

Another term we use is ■ ***current (I)***, measured in ■ ***amps (A)***.
Current 'flows' through the onboard wiring when there are electric appliances in use. The amount of current that flows through the wiring can vary greatly (depending on the connected load and used voltage). This is why the correct cable thickness is so important – overheating electric wires can have serious consequences.

A river in which water is flowing, a wire that conducts electrical current, or a cyclist biking against the wind…
All experience resistance.

In the field of electricity, this ■ ***resistance (R)*** is indicated in ■ ***Ohm (Ω)***.
Resistance is important because it causes losses in the form of heat, that we need to take into account. Voltage loss takes place in wires and if not dealt with, there will be insufficient voltage at the end of the wire to power the appliance we want to use.

The mentioned variables all provide ■ ***power (P),*** which is expressed in ■ ***Watt (W).*** Every electric device refers to its output in Watt; microwaves of 900 W, light bulbs of 60 W, generators of 4000 W and washing machines of 2500 W.

To keep the terminology and discussion simple, we refer to kilowatts (kW), in which 1000 W equals 1 kW. To link consumption to a consumption period, we use a time unit in which electrical power is generated or consumed, namely one hour. Together they make kilowatt hours (kWh).

Formulas

The relationship between these units is expressed in formulas that represent the 'laws' of electricity.

V = potential difference expressed in voltage (V)
I = current in units of amps (A)
R = resistance in units of Ohm (Ω)
P = power in units of Watt (W)

Ohm's Law is the most important formula. V = I x R
Voltage [V] = current [I] x resistance [R]

Because we often use the term power, the formula below is frequently used to determine power: **P = V x I**
Power [P] = voltage [V] x current [I]

The right wiring

Having the right wiring is crucial for safety and efficiency. Incorrect diameters can lead to overheated cables and cause a fire. This is not just theory; vessels and RV's are lost every year due to onboard fires that are often caused by faulty wiring.

Connection wire dimensions:

Conductor diameter (mm ²)	Current acc. to rule of thumb DC	Current acc. to rule of thumb AC	American Wire Gauge AWG
0.5	1.5 - 2 A	3 - 4 A	20
0.75	2 - 3 A	4 - 6 A	18
1	3 - 4 A	6 - 8 A	17
1.5	4 .5 - 6 A	9 - 12 A	15
2.5	7.5 - 10 A	15 - 20 A	13
4	12 - 16 A	24 - 32 A	11
6	18 - 24 A	36 - 48 A	9
10	30 - 40 A	60 - 80 A	7
16	48 - 64 A	96 - 128 A	5
25	75 - 100 A	-	3
35	105 - 140 A	-	2
50	150 - 200 A	-	0
70	210 - 280 A	-	2/0
95	285 - 380 A	-	4/0

As lower voltages involve higher currents, it is even more important to use the right cable thickness.

The current (A) is higher because direct current with 12 V or 24 V is lower than alternating current with 230 V while the (required) power stays the same.
As a result the current will increase as P = V x I.

The rule of thumb below can be used:

- For 12 or 24 V DC systems, 3 amps power per 1 mm² cable diameter applies.
- For 230/120 V AC systems, 6 amps power per 1 mm² cable diameter applies.

Example:
If a battery or battery charger provides an expected current of 75 amps, you require a cable of at least 25 mm².

Generating electrical power

There are various ways to generate power:

- With an onboard petrol or diesel generator (usually AC, also available in DC).
- By the alternator(s) on the main engine.
- Grid (AC).
- Solar panels (DC).
- Wind generator.

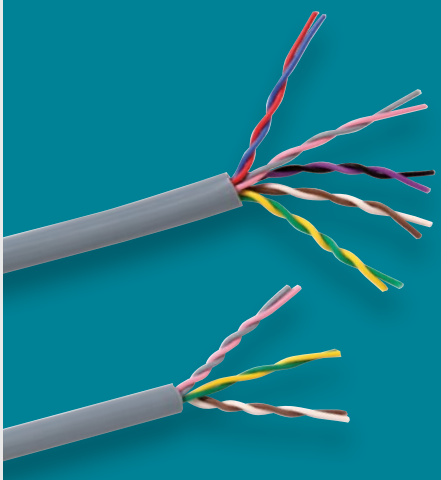
Conversion

Generated energy can be used immediately or stored in the batteries using a battery charger. A battery charger is a converter that converts the AC voltage into DC. An inverter usually converts a low DC voltage of 12/24 Volt into an AC voltage of 230/120 Volt, 50 or 60 Hz.

You may also encounter DC-DC converters onboard; these devices convert DC voltage into another DC value, for instance 24 V from a battery to 12 V to power your navigation equipment.

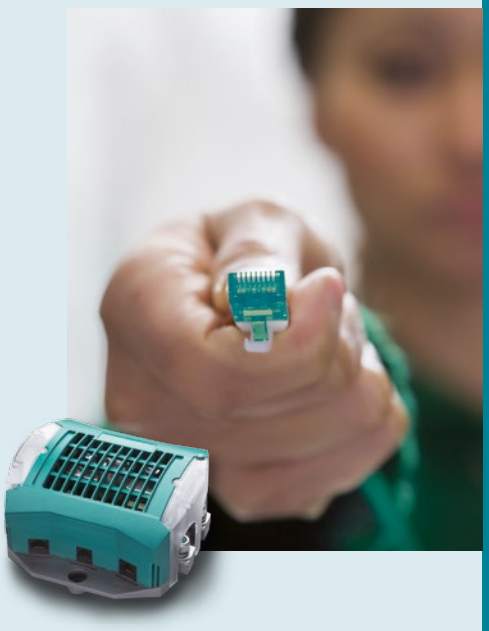
NB.

Designing a complete electrical system requires detailed knowledge, experience and information (the subject has filled entire encyclopaedias!). The specialised Mastervolt dealers are at your disposal.



The MasterBus revolution

Mastervolt is your ideal system supplier. The products we supply fit seamlessly together and communicate easily to ensure a top system performance. Optimal operation is also provided by Mastervolt's in-house developed communication and network platform: MasterBus.



The masterful MasterBus:

- Complete system integration.
- Simple to operate.
- Easy installation.
- Save on installation time and costs.
- Easily expandable.
- Perfect to monitor.
- Ready for the future.

MasterBus is unique for the way a wide range of products, recognisable by the MasterBus symbol, are fitted with the same communication port. This results in a mine of information on all connected components. Everything becomes clear and easy to operate via one central touch screen panel. Operation from multiple locations is also possible, for example via PC/laptop or SMS. Installation is also incredibly simple and the minimal amount of cabling significantly reduces the chance of failures.

Reliable

Thanks to galvanic isolation, nearly all devices can supply power to the MasterBus, ensuring a safe and stable network. Each MasterBus product has an 'intelligence' of its own and can function independently. This feature reduces the dependency of individual products and enhances the overall reliability of your system.

Flexible

New equipment can easily be added to your existing MasterBus network by simply extending the network. This means the MasterBus network has an enormous degree of flexibility, not just today but also in the future. Moreover, Mastervolt supplies various interfaces with which you can also connect equipment that does not have a MasterBus link. For example, we supply the MasterBus NMEA 2000 Interface for the integration of navigation equipment.

Complete system

MasterBus is a network that makes use of CANbus technology, which already has a proven track record in the automotive and maritime markets. MasterBus controls the supply for all connected equipment, including the inverter, battery charger, generator and much more besides. This makes an intelligent system performance possible.

- ***A practical example:*** The generator is instructed to start automatically when the batteries are almost empty.

Easy to install

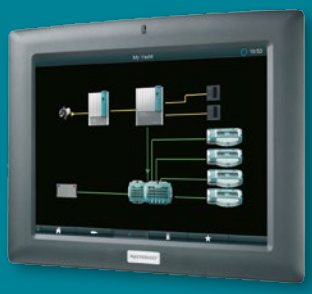
MasterBus makes an electrical installation far less complex by reducing the number of cables. Each system component has two MasterBus communication ports. As soon as two or more devices are connected to each other via these communication ports they form a local data network - what we call a MasterBus network. As this requires very few communication cables you enjoy considerable savings in space, material costs and installation time.

Using your PC

The MasterBus USB Interface allows you to monitor, control and configure the entire MasterBus network from a Windows PC or laptop. The galvanic isolation of the interface ensures you safe operation in all situations. The required MasterView software can be easily downloaded from www.mastervolt.com.

Central operation

Mastervolt offers various (touch screen) control panels for the display and operation of the connected equipment, giving you a complete overview of the status of your electrical system. Control is at your fingertips and the full colour MasterView System panel allows you to read all information on one central panel. All control panels are suitable for the display, operation and configuration of all connected MasterBus devices.



Remote control

Communicating via your cell phone is no longer a pipe-dream. Using MasterBus you can request information and control onboard equipment via SMS. If desired you can even set the interface to inform your cell phone when an alarm goes off onboard.

Frequently asked questions about MasterBus

1 What is MasterBus?

MasterBus is a protocol for exchanging information between the connected components within an electric system. MasterBus is also the standard for a plug & play information system for (de)centralised operation, service and monitoring. MasterBus ensures you a simple, logical and reliable energy system.

2 What can I do with MasterBus?

The MasterBus system is incredibly flexible and can be designed and extended to any size. Using several handy interfaces, it is also possible to connect all sorts of conventional products to MasterBus. Via the MasterBus USB interface, for example, you can connect a PC or a laptop to the system.

3 Can I connect other products to the MasterBus?

Yes, that is possible. Although MasterBus is a Mastervolt-specific protocol, non-Mastervolt products can still be connected to the system. Equipment with maritime standard NMEA 2000 connections can be easily connected via the MasterBus NMEA 2000 interface. In addition, the MasterBus network can be integrated within your own central system by means of the MasterBus Modbus Interface.

4 Is MasterBus an open source?

No, MasterBus is a closed protocol. This allows Mastervolt to guarantee that a MasterBus system works safely and without interference, with a uniform data supply and no unwanted interruptions. Components from other suppliers can be connected via the communication interfaces specially designed by Mastervolt. They ensure a safe and pure transition to the protocol and operate as a firewall against data interference and voltage conflicts. This ensures that the MasterBus network is always safe and reliable.

5 What is the basis of MasterBus?

MasterBus hardware is based on CANbus V2.0 technology. The software communication protocol was designed by Mastervolt to maximise the performance of an electrical power system.

6 How many products can I connect to a MasterBus?

You can connect a maximum of 63 products within a MasterBus data network.

7 What is the maximum cable length?

- 250 m with less than 10 connected products.
- 150 m with up to 25 connected products.
- 100 m with up to 50 connected products.

Or use a MasterBus Repeater.

8 What cables should I use?

We advise using the green Mastervolt cables, but MasterBus also works with high quality UTP cables.
A Mastervolt DIY kit contains all you need to make the cables for a complete system of any desired length.

9 How do I connect a MasterBus?

The MasterBus data network lifeline is the cable, which runs as a chain from component to component. Both ends of the cable should be provided with a Mastervolt Terminator. On each MasterBus product are two equal communication ports for connection. By connecting a MasterBus cable to each of the ports you add the product to the chain. The Terminators at both ends of the cable ensure interference-free operation, prevent reflection of data signals and ensure high communication speeds.

10 Do components always have to be connected as a chain?

The MasterBus network requires that all components together create a chain with Terminators at both ends. Circular configurations or branch systems may interrupt the data supply and power supply, damaging the connected equipment.

11 What might be the causes of a malfunctioning MasterBus network?

- One or both Terminators are missing on the outside components in the chain.
- One of the cables is not or incorrectly connected: Check whether you see an open communication port.
- One of the plugs is not properly connected to the cable.

12 Do I need an additional power supply for MasterBus components?

No. A number of the connected components, such as the MasterShunt and the ChargeMaster, can supply the necessary MasterBus power. Other components such as interfaces and MasterView panels consume this power. The MasterBus cable is simultaneously responsible for data communication and power provision.

13 Can I connect different batteries to the same MasterBus circuit?

Yes. As all power supply sources within a MasterBus circuit are galvanically isolated, all connections are completely safe.

More on the next page...

14 Do I need additional accessories for the MasterBus system?

Not for Mastervolt products. All MasterBus products come with the necessary accessories included.

15 What happens if the MasterBus data network fails?

The electrical onboard system will not shut down. Mastervolt components such as the inverter and battery charger will default to normal autonomous operation. You will be able to operate the equipment itself and still have power onboard. A fault in the MasterBus network causes two distribution points that no longer work together, although they still work independently.

16 Can I adjust a MasterBus system while it is in operation?

Yes, that is possible. However, do remember that the communication network is only complete and able to function properly when all connections and Terminators have been added to the network chain again. NB: Events may 'occur' without reaching the right equipment.

17 Why do I have Terminators left over after installing a complete system?

All MasterBus products are standard supplied with one Terminator. As there are only two Terminators required within one system, you may have one or more Terminators left over. Keep them as spares.

The remarkable simplicity of MasterBus events

Every MasterBus system can be set to your requirements - in essence, it's like welcoming your own personal butler onboard. And MasterBus 'events' are how you train the butler. For example, you can set the generator to start automatically when the batteries are almost empty. Use MasterBus events to configure your system so that each component can activate another. MasterBus: At your service!

Example of an event

In the given example you set the following event: The batteries/battery monitor tell(s) the generator to start.

Say that you use the MasterShunt as a battery monitor within the MasterBus network. In this scenario the MasterShunt is the initiator or the 'source' and the generator is the 'target'. The Commando = start or autostart. The Data = on. By setting multiple events (source, target, commando + data) you can program the entire MasterBus network.

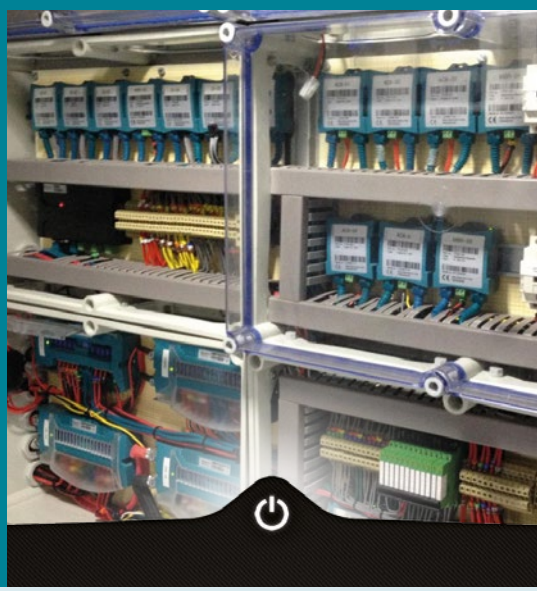
Digital switching with MasterBus

Another example of a MasterBus event is the use of Digital Switching. The pressing of a light switch, for instance, activates the lighting. The source is the switch, the target the lamp. One source can also be used to control multiple targets, such as the lamps in this example.

Endless possibilities

Thanks to the underlying communication between all the equipment connected to the MasterBus network, the configuration of events offers you endless possibilities. If you wish, the switch in the example can, for instance, activate not only the lights but also the inverter that provides power to your TV.

All this and much more is available without the installation of extra components.



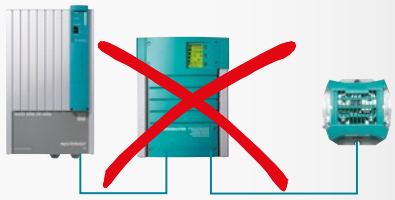
Summary

Within every MasterBus network all available sources for your connected products can be linked to all available targets. The manuals of the products concerned provide a clear overview of available sources and targets and simplify the configuration of events.

How to create a MasterBus network

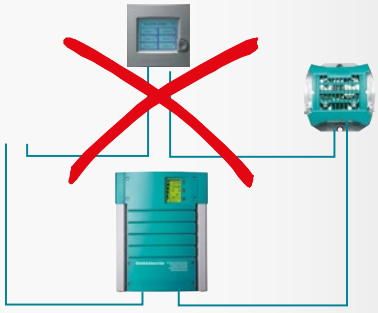
All devices that are suitable for the MasterBus network are equipped with two communication ports. As soon as two or more devices are connected with each other via these ports, they form a local data network.
When creating a MasterBus network, follow the guidelines given here:

Connections between your devices can be made by using standard UTP cables (straight). Mastervolt can supply these cables. The electricity needed for the network is supplied by the connected devices. At least one in every four devices in each network must be able to supply power to the MasterBus. For eight devices there must be two power suppliers, etc.

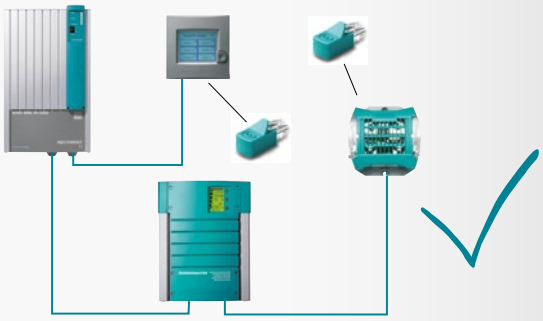


As with all high speed data networks, MasterBus needs a Terminator at both ends of the network.

You need two Terminators to close both ends of the network - communication cables in-between connect a chain of components.

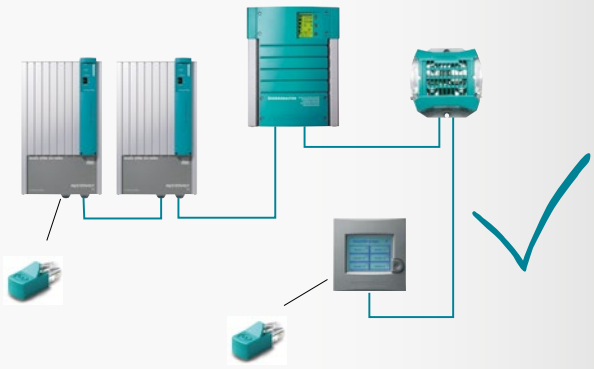


The network should not be circle shaped.



The chain ends at both ends with the Terminators.

Do not make T-connections with so-called splitters:
A network should always be a chain.



Networked monitoring system

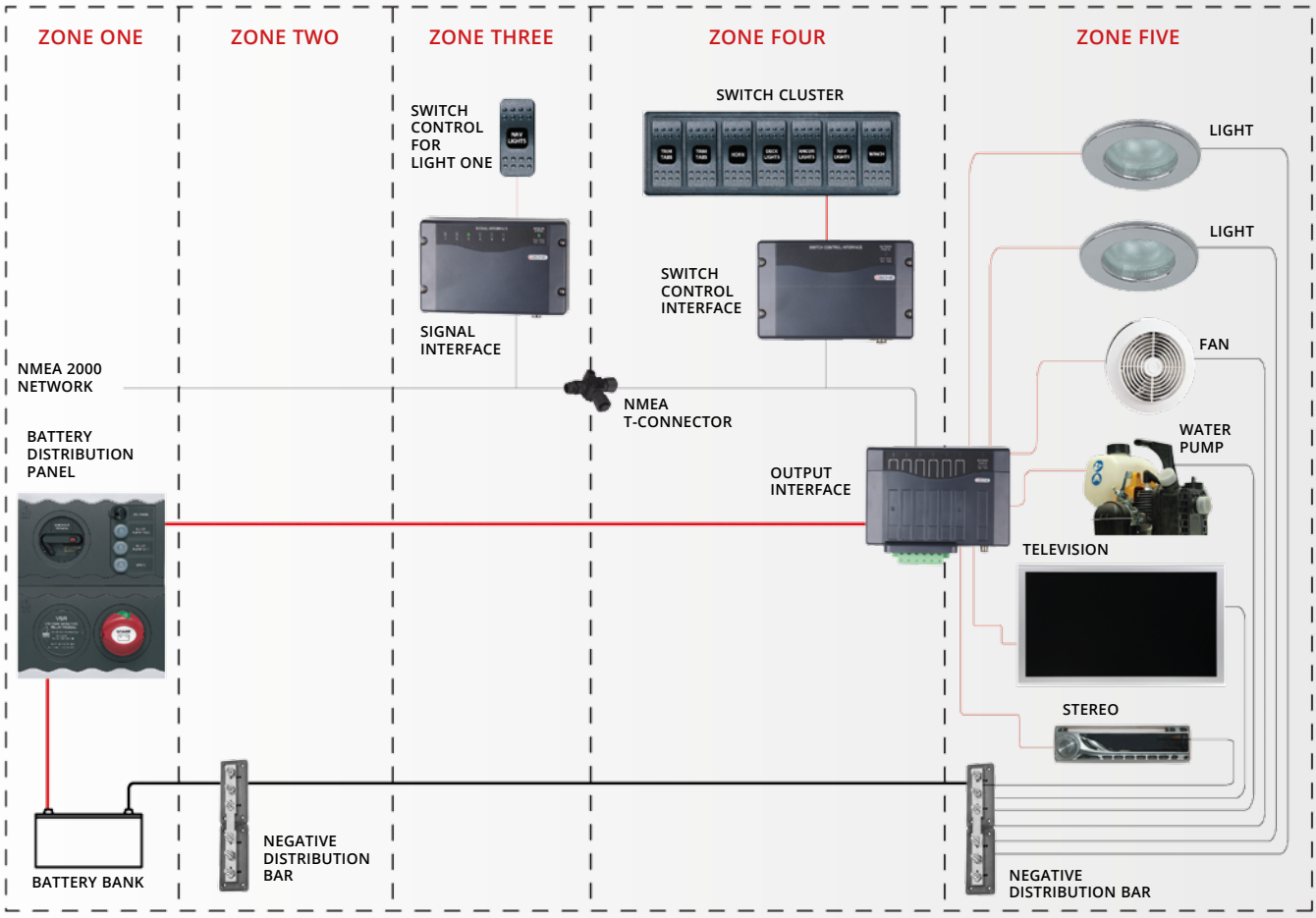
The CZone digital control & monitoring network simplifies installation of electrical systems through the replacement of complicated, cumbersome wiring to switch and fuse panels, with state-of-the-art, robust interfaces and light NMEA 2000 network cable. It also provides a sophisticated solution via the automation of complicated control and monitoring issues associated with today's onboard systems.

Builders recognize an immediate benefit with reductions in cable usage, harness weights and installation times. The CZone system also integrates many standalone components into one intuitive system. Wiring is dramatically simplified as the CZone system is designed to remove complex switching clusters and wiring runs. Modules can easily be added into the system to best suit the OEM and end-users' needs.

CZone DC wiring

The CZone system decentralizes the DC power distribution system, locates circuit control and protection modules closer to loads to shorten cable runs and reduce the size of conductors, significantly decreasing the cost and weight of the electrical wiring harness. The system replaces complex wiring with a single data wire.

- Complex switch panel wiring removed, replaced with single data cable connection.
- The grouping of multiple loads into common areas (zones) with Output Interfaces is the key to the system.
- Heavy-duty battery mains cable, replaced by multiple smaller conductors.



Frequently asked questions about CZone™

1 What is NMEA 2000?

NMEA 2000 is a plug and play marine electronics communication standard based on Controller Area Network (CAN). The network carries data sentences for commands (digital switches) as well as messaging (tank levels) between NMEA 2000 devices.

2 What is a PGN?

All data transmitted on an NMEA 2000 network are organized into groups. These groups are identified by a parameter group number (PGN) that describes the type of data contained in the group. The CZone system can share certain monitoring PGN's with other NMEA 2000 compliant devices, such as engine temps, pressures, SOG, battery monitoring etc.

3 How many devices can I have on the NMEA 2000 network?

No more than 50 NMEA 2000 devices can be connected to any one NMEA 2000 network. It is also important that there is no more than 3 V voltage drop from the power source to the device located farthest from the power source. In case there are more than 50 devices or the voltage drop exceeds 3 V, a CZone Network Bridge Interface can be installed to expand the network to a maximum of 252 devices.

4 How do I connect an NMEA 2000 network?

The main communication channel of the NMEA 2000 network is the backbone to which your NMEA 2000 devices connect to. Each NMEA 2000 device connects to the backbone with a T-connector. The NMEA 2000 backbone must be connected to 12 V DC power, and terminators must be installed at both ends of the network to function correctly. Daisy chaining is not allowed.

5 What are the power requirements on the NMEA 2000 network?

Your NMEA 2000 network must be connected to a 12 V DC power supply. Do not connect the network to any other voltage source, such as a 24 V DC power supply. Supply power as close to the middle of the backbone run as possible. Do not connect the NMEA 2000 network to power in more than one location unless a CZone Network Bridge Interface is used.

6 What cables should I use?

We advise using the NMEA 2000 cables supplied by Mastervolt. These NMEA 2000 Mini cables have a greater current carrying capacity to the standard Micro cables, this reduces voltage drop on the longer backbone runs expected on a CZone network.

7 What is the maximum length for a drop cable?

The maximum length of a single drop cable to a NMEA 2000 device is 6m (20ft).

8 Can I connect other devices to the CZone NMEA 2000 Network?

Yes, that is possible. CZone devices are NMEA 2000 certified, so other NMEA 2000 compatible or certified devices can connect and communicate together on the same network.

9 What happens if a CZone module is damaged?

All CZone modules offer a true 'plug and play' installation. Meaning, if a CZone module is physically damaged and needs replacing, just copy the dipswitch setting to the new module and plug it into the system. The system will recognise the module by its dipswitch setting and configure it automatically.

10 What happens if the CZone network fails?

In the event the CZone network fails, all loads that are controlled through CZone can still be powered by locating the Output Interface, and putting the hardware fuse into the bypass position.

11 How do I configure the CZone system?

The CZone system can be easily configured from a Windows PC or laptop connected to the network with the CZone USB to CAN Adapter. It can also be configured from the 3.5" Display Interface.

12 Can CZone be connected to MasterBus?

Yes, that is possible with a CZone Masterbus Bridge or Wireless Interface.

Frequently asked questions about battery chargers

What factors should I consider when choosing a battery charger?

1. How many battery banks will you be charging? Take into account main, starter, bowthruster, etc. Also consider any possible future extension of your system *(= sufficient battery charger outputs)*.
2. Battery charger must have the same voltage as the battery bank, i.e. 12 V battery voltage = 12 V battery charger.
3. To safely charge the batteries you need to have the correct charging current (measured in amps). See the battery charger specifications in this Powerbook for the recommended capacity.
4. Compare the specifications and prices of the different battery chargers based upon their capacity.

Which battery charger is necessary for a battery capacity of 200 Ah and a 100 Ah starter battery?

The starter battery is generally not considered when calculating the charger capacity - it is only used for starting the engine and will therefore tend to be only partially discharged if at all. While you are using the engine, the alternator recharges the battery and when connected to the grid, it is charged via the second or slave output of the Mastervolt battery charger. As a rule, a charge capacity of 25% (up to 50% for gel batteries) of the battery capacity is sufficient to charge the battery quickly and safely, and also power the onboard systems. For a battery of 200 Ah, for instance, a battery charger of 50 amps would be appropriate.

The charge current is standard specified for the nominal output voltage (12 or 24 V). Mastervolt applies a considerably higher output voltage of 14.25 or 28.5 V. This means a shorter charge period and faster recharging of your batteries.

What type of battery can I charge?

You can easily charge all battery types, such as wet, AGM, gel and Lithium Ion batteries.

Can a Mastervolt battery charger remain connected throughout the winter?

Yes, your Mastervolt battery charger can easily be left connected in the winter. In fact, this is better for the batteries,

Is having 10% of my battery capacity as charge capacity sufficient?

Definitely not. You can assume 25% and up to as much as 50% with Mastervolt batteries. The old 10% rule was common in the days when battery chargers had no current and voltage regulation, and too high a current could overcharge the batteries. Mastervolt battery chargers have perfect current/voltage regulation and are also equipped with a temperature sensor that ensures the voltage is regulated according to the battery's temperature. Several loads are connected during charging the batteries and these loads are also powered by the charger so the available charge current for the batteries will be reduced.

as they will then remain in optimum condition and there is no need to take them home for recharging. The 3-step+ charging method ensures a monthly absorption cycle so the battery stays active.

I sometimes have a limited grid connection. Can I still use a large battery charger?

Yes. All Mastervolt battery chargers and Combis are fitted with the latest electronics, reducing their power consumption by about 40% compared to conventional battery chargers.
For example, the power intake of Mastervolt 12 Volt battery chargers is summarised below for 230 V models. For 120 V versions, multiply by 2. The levels of current specified are relevant to maximum capacity operation, i.e. measured at the moment the battery charger supplies its full capacity.

ChargeMaster 12/10	0.9 amps
ChargeMaster 12/15	1.2 amps
ChargeMaster 12/25	1.9 amps
ChargeMaster 12/35	2.5 amps
ChargeMaster 12/50	3.8 amps
ChargeMaster 12/70	5.2 amps
ChargeMaster 12/100	7.4 amps

In addition, each battery charger with a charge current higher than 15 A (12 V) can be equipped with a remote control panel. This allows output current to be reduced, causing the battery charger to draw even less power and preventing the power fuse from blowing.

Can I install my battery charger in the engine room or compartment?

Yes. All Mastervolt battery chargers can easily be installed in the engine room as higher temperatures do not negatively affect their current output. The output current will be automatically reduced if the ambient temperature becomes very high, ensuring that the battery charger will not be damaged.

Can I charge batteries separately?

Most Mastervolt battery chargers have an additional output for a starter battery. This output supplies for example the starter battery with a maintenance charge. A number of models are even fitted with three outputs, allowing three battery sets to be charged independently of each other. It is also possible to charge multiple battery sets via a battery isolator (also known as a diode splitter). The voltage loss that occurs in the battery isolator wil be compensated by adjusting the charger (jumper or dipswitch settings) or connecting positive and negative voltage sense wires on the Mass series.

Can the battery charger be connected to the same battery isolator as the alternator?

Although this is possible, it is better and more convenient to fit two separate battery isolators. If this should be problematic, use the battery isolator for both. In this case, make sure that the battery isolator or Battery Mate is powerful enough to simultaneously handle both the battery charger and alternator current.

What should the cable diameter be between the battery charger and the battery?

When calculating the required diameter of these cables follow this rule of thumb: 1 mm² of cable thickness for every 3 amps. A battery charger of 50 amps, for instance, calls for a cable of 50:3 or 16.6 mm². The standard cable closest to this is 16 mm². This applies when the distance is three metres at most. For longer distances you will either require a thicker cable or need to connect a voltage sense cable (Mass charger only).

What is the maximum distance allowed between the battery charger and the batteries?

In general, three metres is the maximum length when you are using the calculation method described earlier. A cable length of 6 metres is also possible, but thicker cables must then be used. In the example used above, it is best to use 25 mm² cables if the distance between the charger and the batteries is up to 6 metres.

How long will it take before my batteries are fully recharged?

The charging time of a battery is directly related to the ratio of battery to charger capacity. Other important factors that decide how long it takes for an empty battery to completely recharge are the battery type and the power consumption of the potential consumers.
As a rule, divide the battery capacity by the maximum charge capacity and add four hours. The four hours are for the absorption time, during which the battery determines how much more current is necessary for it to return to its fully charged state. Of course, this rule does not consider the power consumption of other connected equipment: If loads such as a refrigerator or lights are connected, their power consumption needs to be subtracted from the available charge capacity.

Example:

Take an empty 200 Ah battery, a 50 amps battery charger and a connected load consuming 10 amps. Charging time in this case would be around 200/(50-10) = 5 h, or 9 h in total including four hours of absorption time. If the batteries are only half-discharged, the recharge time would be 100/(50-10) = 2.5 + 4 h, 6.5 h in total. The absorption time is shorter with gel and AGM batteries at around two to three hours. These types of battery will therefore recharge faster than conventional ones (see also 'Charging batteries').

What is voltage sense?

No matter how thick, every cable has some resistance, resulting in a certain amount of voltage being lost between the battery charger and the batteries. This voltage loss depends on the thickness of the cable and the battery charger current. A battery charger measures as standard the voltage at its output terminals. This voltage is higher than the battery voltage. The output voltage of the battery charger minus the voltage loss across the cables is the battery voltage. When a lot of voltage is lost on the cables, the battery charger might switch to the absorption phase too early, which means that the battery will not become fully charged or charging time will increase. To compensate for voltage loss via the cables, sense wires have to be connected between the battery charger and the batteries. These thin wires ensure that the charger measures the voltage directly at the positive and negative poles of the battery rather than on its output terminals. The voltage lost during charging is compensated and the batteries are charged quickly and effectively. The voltage drop over, for example, a diode splitter can also be compensated in this way.

What is 3-step +charging technology?

Mastervolt's 3-step+ charging technology is the fastest and safest way to charge gel, AGM and open wet type batteries. It consists of the following phases:

First step:
BULK phase

In the first step, the bulk phase, the battery charger delivers its maximum current (e.g. 50 amps for a ChargeMaster 12/50) and battery voltage increases. The duration of this phase depends on the battery capacity, charger capacity and any consumers connected to the battery during charging. The bigger the battery, the longer this step takes; the larger the charger, the shorter the stage. If consumers such as a refrigerator is connected, it will also need to be powered by the charger, reducing the charge current going into the batteries and increasing the time necessary for charging.

Second step:
ABSORPTION phase

The second step, the absorption phase, begins once the battery has reached its maximum voltage. At this point the battery is around 80% full, and the charge current begins to slowly decrease. At 25 °C, the maximum voltage is 14.25 Volts for a 12 V battery and 28.5 Volts for a 24 V one. The absorption phase lasts three to four hours on average, depending on the battery type, battery charger, and the extent to which the battery was charged at the beginning. During this stage the battery will be charged to 100%.

Third step:
FLOAT phase

Once the battery is fully charged at the end of the absorption phase, the float phase begins. The Mastervolt battery charger switches over to a maintenance voltage so that the battery remains fully charged and in optimum condition. Any existing consumer loads are also powered. The charger remains in the float phase until the battery voltage falls due to a major load, or the battery charger is unplugged because the power connection was removed.

What is a temperature sensor for?

It is vital that you use the right charge voltage to charge a battery. The correct charge voltage is not always the same however: Cold batteries need a slightly higher voltage to fully charge and, conversely, warmer batteries require a lower charge voltage to avoid overcharging. Mastervolt battery chargers are pre-set to a battery temperature of 25 °C.

When the temperature sensor is connected to the charger, the output voltage will vary by 0.03 V per °C (for a 12 Volt system) and 0.06 V per °C (for a 24 Volt system). This is in accordance with the advice of most battery manufacturers. At a temperature of 15 °C, for instance, the maximum charge voltage for a 12 Volt system is 14.55 Volt, and at 30 °C it is 14.1 Volt (the corresponding values for a 24 Volt system are 29.1 and 28.2 Volt). Voltage is no longer increased once temperatures drop below 12 °C, ensuring that the onboard system is protected against excessive voltage. Conversely, the charge voltage is reduced to 12 or 24 Volt above 55 °C in order to protect the battery against overcharging at this extremely high temperature.
The connection of a temperature sensor ensures that the battery is quickly and safely charged with the right voltage.

PLUS phase

Most Mastervolt battery chargers are equipped with an extra step, the PLUS phase. During periods when the battery is resting, an absorption cycle lasting one hour will take place every 12 days to ensure that the battery stays in perfect condition. This increases the lifetime of your batteries.

Return Amps

During the absorption phase, the battery accepts progressively less current. Once the charge current remains under a certain level for a given period of time, the battery is considered to be fully charged. This maximum charge current is called the Return Amps, and the corresponding period the Return Amps Time. The battery charger takes this as a signal to switch over to the next step, the float phase. Just like many other parameters of the battery charger, Return Amps and Return Amps Time can be set by the installer with the help of software that is freely available on the Mastervolt website.

In fact, the installer can use this software to customise the battery charger to your onboard system requirements.

Can I charge different types of Lithium Ion batteries?

Yes, that is no problem with a Mastervolt battery charger because the desired charge characteristic can be set.

Can multiple battery chargers be parallel connected?

In addition to simply being chargers, Mastervolt battery chargers also provide power for the 12 or 24 Volt onboard system. They can easily be parallel connected should you wish to increase capacity. In fact, this is often the only way to power your 12 or 24 Volt system with the 230 or 400 Volt power connection. Similarly, should you need a charge current higher than 100 amps for a 24 V system or 80 amps for a 12 V system, several battery chargers can be parallel connected. A parallel system with multiple battery chargers does not require any special equipment.

It can be installed in exactly the same way as a single charger, except that each charger will have its own cables leading to the battery or the DC distribution.

Wiring for the voltage compensation is also connected separately for each charger: Remember to make sure that the sense wires used to compensate for voltage loss over the cables are connected before the main fuse and on the system side. This will prevent the output voltage of the charger from becoming too high if a fuse is defective. The temperature sensor for each charger needs to be separately connected to the battery, that you expect to reach the highest temperature. If the chargers and sensors are properly linked, the charge current will be evenly distributed over the connected chargers.

The possibility remains that one of the chargers will switch to the absorption phase sooner than the others. This is a perfectly normal phenomenon caused by tolerances in the adjustment, with no effect on charge time and charger operation. When parallel connecting multiple battery chargers, we recommend that they be of the same model, type and charge capacity. For instance, when a 100 amps charger is linked parallel to a 50 amps charger, the charge current will not be evenly distributed over both. Although this will not affect the charging process or be detrimental for the chargers, it is more efficient to install two chargers of 75 amps each. Mass battery chargers are also capable of synchronising the charging process.

Can I parallel connect a battery charger to the alternator?

It is possible to parallel connect a battery charger with, for instance, the alternator of the propulsion engine. This situation occurs if the 230 V generator is also started up while the engine is running, and is not a problem in itself.

How can I charge batteries with limited power?

The available power connection is often too weak when multiple battery chargers are fitted in parallel. In order to prevent the power connection from being overloaded, it is best to only connect one of the battery chargers.

Although this will increase the time needed for charging, you are normally connected to the grid for a longer period of time (overnight) anyway. Both battery chargers can be powered if the generator is running, as the generator usually delivers more output than a power connection. The two battery chargers will not cause the power connection to be overloaded.

Mastervolt battery charger alarms

The Mass battery chargers come standard with alarms. The following alarm signals are indicated on the Read Out Module on the front of the Mass chargers via LED combinations:

1 + 6 =	Voltage sense error
2 + 6 =	Battery charger temperature too high
3 + 6 =	Short-circuit on output
4 + 6 =	Battery voltage too high/low
5 + 6 =	Battery temperature sensor error

In addition to these visual alarms, all Mass battery chargers have a potential-free relay contact.

A

Charger Status Interface (CSI) with combined DC alarm, active as standard

Relay contact is activated (no alarm) if:

- Charger on (AC on input, switch turned to *'on'*).
- Temperature sensor within range.
- DC voltage within range.
- No short-circuit on output.
- Voltage sense (cable loss ***less*** than 3 V).

Relay contact is disabled (alarm situation) if:

- Charger off (no AC on input, switch turned to *'off'*).
- Temperature sensor out of range.
- DC voltage out of range.
- Short-circuit on output.
- Voltage sense (cable loss ***more*** than 3 V).
- General fault of the charger.

The DC alarm only works if the battery charger is switched on. If you require a permanent DC alarm, regardless of whether the charger has input voltage and/or the charger is turned on, select the DC Alarm setting.

Optional:
A separate CSI alarm is optionally available for the Mass battery chargers and is placed in the connection box (if you require multiple alarms).
Art. no. 21702000.

B

DC alarm, active after programming dipswitch

Relay contact is activated (no alarm) if:

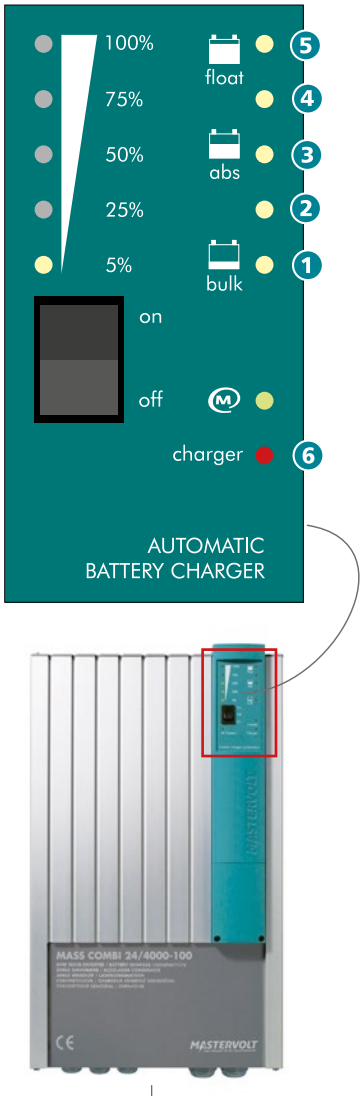
• DC voltage is within range

Relay contact is disabled (alarm situation) if:

• DC voltage is out of range

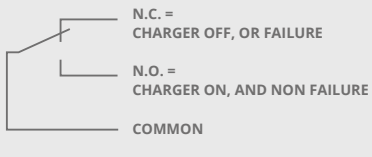
The DC alarm works whether or not the charger has input voltage and/or the charger is turned on or off. Programming of the dipswitch is marked with continuous monitoring mode (ContMon).

Optional:
A separate DC alarm is available for all Mass battery chargers and is placed in the connection box (if you require multiple alarms).
Art. no. 21702100.

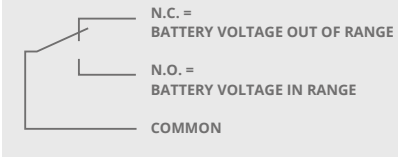


Alarm options/settings:

A
Non continous mode
C.S.I. / DC-Alarm



B
Continous mode
DC high / low alarm



Internal alarm contact

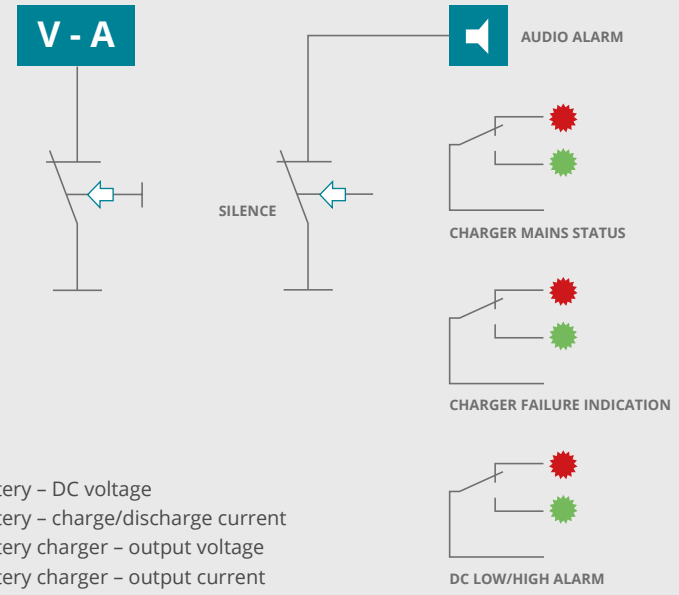
Mass Charger Interface

Every Mass battery charger can be equipped with an intelligent front panel. The Mass Charger Alarm Interface combines the following functions:

- ***LCD display:*** DC voltage and charge/discharge current.
- ***Alarm functions:*** DC high/low voltage alarm visual/acoustic and potential-free contact.
- ***Alarm functions:*** AC alarm, no input voltage AC visual/acoustic and potential-free contact.
- ***CSI-alarm:*** Charger Status Interface, charger error visual/acoustic and potential-free contact.

The Mass Charger Interface makes your Mass battery charger suitable as a power supply/battery charger for devices such as GMDSS emergency systems for seagoing vessels and yachts. The alarm settings, charge current and charging method can easily be adapted using the LCD display and control button, and the front display can be easily and quickly installed on the charger. The Mass Charger Alarm Interface is optional and is delivered complete with shunt and detailed manual. The battery charger needs to be separately ordered.

Operating principle:



- Battery – DC voltage
- Battery – charge/discharge current
- Battery charger – output voltage
- Battery charger – output current

For professional use: GMDSS

For the professional user, there is a front display with alarm functions according to GMDSS available.
The GMDSS (“Global Maritime Distress and Safety System”) is a global maritime communication system which is part of SOLAS (Safety Of Life At Sea), using DSC and satellite communications.

Frequently asked questions about inverters

How much battery capacity do I need with an inverter?

As a rule of thumb, the minimum required battery capacity for a 12 Volt system is around 20% of the inverter capacity. For 24 Volt inverters, it is 10%. The battery capacity for a 12 Volt Mass Sine 12/1200, for instance, is 240 Ah, while a 24 Volt Mass Sine 24/1500 inverter would require at least 150 Ah.

How much power does an inverter consume?

Mastervolt sine wave inverters have an output efficiency of more than 92%, which is the maximum that can be achieved with modern technology. If you connect an 850 W coffee maker to a Mass sine wave inverter, consumption will be 850 W divided by the onboard voltage of 12 Volt, approx. 70 A. Of course, a coffee maker will only be in use for a short period of time, so the consumption measured in Ah will be relatively modest (76 x 5 min. = 6.5 Ah). As a rule of thumb you should divide the connected capacity by 10 for 12 Volts and by 20 for 24 Volts. This also includes all the power losses in the cables, fuses and the inverter.

Is there a stand-by switch on the inverter?

Definitely! Although the no-load consumption is extremely low, most Mastervolt inverters and Combis are even equipped with two energy saving solutions. Activating the Economy mode reduces battery consumption by an extra 10%. A dipswitch or jumper arrangement needs to be adjusted for this function, which takes output voltage down to 208 Volt, thereby also reducing power consumption from the battery. Low-load devices like microwaves and DVD clocks function as normal at this lower voltage. With some inverter models it is even possible to activate a stand-by mode. In this mode the inverter sets a tiny pulse on the 230 Volts installation, checking for any connected appliances. As soon as the pulse detects consumption, voltage returns to normal strength to power the connected equipment. The economy mode ensures that the power consumption of the inverter stays at virtually zero.

Can I power a computer with an inverter?

Yes, you can. All Mastervolt sine wave inverters can easily and safely supply a computer without the slightest problem or risk. In fact, the output voltage from an inverter is often better than that from the electricity grid or shore power. This is why Mastervolt inverters, combined with a battery charger and a battery set, are often used as a back-up system in places where the grid connection is unreliable. Laptops can also be powered by an inverter.

Can a microwave be powered with an inverter?

Any microwave model can be connected to a Mastervolt inverter. Bear in mind that an 800 Watt microwave consumes about 1200 to 1300 Watt from the 230 Volt system, and that the capacity of the inverter and battery must be able to handle this. Apart from that, the total consumption of the microwave-inverter combination is moderate: Using the microwave for five minutes will use around 12 Ah on a 12 Volt system and 6 Ah on a 24 Volt system.

Are there any appliances that cannot be powered by an inverter?

You can connect almost any appliance to an inverter, with a few practical exceptions. While heavy loads, such as that required by an electric heater, can be supplied by the inverter, battery capacity will usually be insufficient to maintain the supply for any significant length of time. Appliances that are only used for a limited time period, such as washing machines, driers or a small hotplate, should be fine as long as the battery has sufficient capacity. In these cases it is advisable to use a power source such as an alternator, which also powers the battery. Keep in mind that heavy users such as engines, pumps, air conditioning and fridges have a starting current that is between 5 to 12 times higher than the nominal absorbed capacity. The inverter has to be able to supply accordingly.

How much current will an inverter draw from my batteries?

This depends on the equipment connected to the inverter. There is a simple method to calculate how much power your inverter is using: For 12 Volt inverters, divide the connected load by 10; for 24 Volt inverters, divide by 20.

Example: How much does an inverter consume with a 400 W load connected?

For a 12 V inverter such as a Mass Sine 12/1200, consumption will be 400/10 = approx. 40 amps. For a 24 V inverter, say a Mass 24/1500, the corresponding figure is 400/20 = approx. 20 amps.

It is important to remember that this is only an approximation: The actual consumption will tend to be some 5 to 15% less, depending on the load type.

How thick should my battery cables be?

Using the method described above, calculate how much power your inverter will be drawing at maximum capacity (120 amps in the case of a Mass Sine 12/1200, for example). Then count 3 amps per mm². In the above example this is 120 divided by 3 = 40 mm². The standard cable thickness closest to that is 35 mm². This rule applies to cables up to three metres in length. If the inverter is further away from the battery, choose the next size up (50 mm² for instance).

Does an inverter need a lot of ventilation?

An inverter needs very little ventilation - two approx. 60 cm² ventilation openings are usually enough. Larger inverters, from 1500 W upwards, need twice that size. Inverters used in high ambient temperatures, and those expected to be operating at full capacity for a long period, require openings that are four times as large.

Can an inverter be used in parallel with the generator or the grid?

No, stand-alone inverters cannot function in parallel with a generator or grid connection. A Mastervolt Mass Combi is the solution if you need more power than is available from the grid connection or the generator. If grid or generator power is connected to the onboard grid simultaneously with an inverter, we strongly advise installing a Masterswitch or Systemswitch junction. The main function of the Masterswitch is the automatic and safe switching between grid, generator and inverter power.

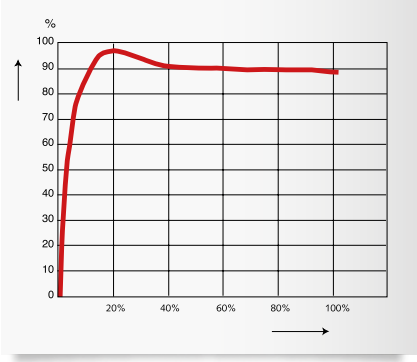
What is no-load consumption?

No-load consumption is the amount of power used by the inverter during periods that there is no load connected while the inverter is still switched on. With modern inverters, this amount is approximately 4 Watt. Mastervolt inverters are equipped with an economy mode (see stand-by switch) so that no-load consumption can be reduced even further.

What is efficiency?

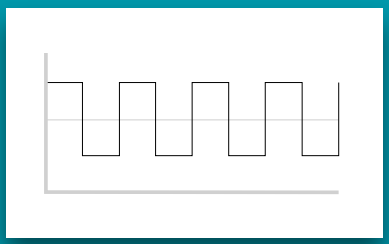
An inverter uses a small amount of energy during the conversion process. The difference between the input power and the output power is expressed in percentages. The efficiency of modern inverters is more than 92%. This means that 8% of the power consumption is used to convert battery voltage to 230 V 50 Hz. A connected load of 250 Watt, for instance, requires less than 270 Watt to be supplied by the batteries.

Efficiency versus capacity:

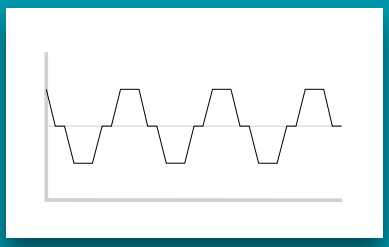


What are trapezoidal or square wave inverters?

Modern inverters generate a sine wave-shaped output current similar or even better to that of the public grid and perfectly suited to powering sensitive equipment. Trapezoidal inverters, also called modified sine wave, are the ancestors of the modern sine wave inverters. As the name suggests, they generate an output voltage in the shape of a trapezium. This type of voltage is inappropriate for sensitive equipment. The square wave inverter is the predecessor of the trapezoidal inverter and represents the first generation of inverters. It is also very unsuitable for delicate equipment.

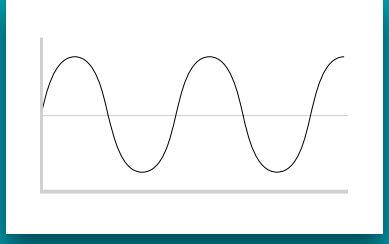


Square wave



Trapezoidal or modified sine wave

The best choice is a Mastervolt inverter with a sine wave-shaped output current. This will ensure problem-free operation of the connected equipment.



Sine wave

Can I power a small air conditioning system via the inverter?

It is perfectly possible to power a small air conditioning installation of, for instance, 4500-6000 BTU via an inverter. While it is important to remember not to leave the air conditioning running for too long, cooling down a cabin before going to sleep is fine as long as the battery bank and inverter are correctly sized. Also remember to pay attention to the start-up current, which can be up to eight or twelve times higher than nominal capacity.

Can I cook with electric appliances using an inverter?

Cooking is definitely possible with an inverter as long as the battery set is reasonably large and the inverter has a capacity of at least 2 kW. The preparation of a complete meal will, in general, require the generator to be activated or power to be plugged in. Switching on the generator to heat up a cup of soup or cook a steak or an egg is rather wasteful, since the generator will not even warm up properly before it is turned off again: This is bad for the generator and environment. Instead, we recommend that you power only one or two of the hotplates via the inverter - a snack can then still be prepared or heated without needing to start the generator. The inverter can also power the entire electric cooker, as long as a 7 to 10 kW inverter is combined with a battery of 24 Volt (with a minimum capacity of 600 Ah). Just remember to recharge the battery with the alternator or battery charger after use.

Inverter selection table

AC appliances	AC Master 300 W	AC Master 500 W Marinco 700 W Mass Sine 800 W	Marinco 1500 W Mass Sine 1200/1500 W	Marinco 2000 W Mass Sine 2000/2500 W	Mass Sine 5000 W
TV/DVD/audio	■	■	■	■	■
NiCad battery charger	■	■	■	■	■
PC/laptop	■	■	■	■	■
Small drill	■	■	■	■	■
Fluorescent LED lights	■	■	■	■	■
Small kitchen appliances	■	■	■	■	■
Small refrigerator	□	■	■	■	■
Small microwave	◪	□	■	■	■
Coffee maker	□	□	■	■	■
Hairdryer (1000W)	□	◪	■	■	■
Vacuum cleaner	□	□	■	■	■
Refrigerator/freezer	□	■	■	■	■
Angle grinder	□	□	■	■	■
Water pump	□	◪	■	■	■
Electric tools	□	□	■	■	■
Microwave/oven	□	□	■	■	■
Washing machine 3 kg	□	□	□	■	■
Air conditioning/electric hob	□	□	□	■	■
Battery capacity 12 V/min.	60-80 Ah	100-150 Ah	250-350 Ah	300-500 Ah	
Battery capacity 24 V/min.	30-50 Ah	50-80 Ah	120-180 Ah	200-300 Ah	400-600 Ah

■ Appliance can operate continuously if connected to inverter, capacity of battery decides operation time.
◪ Appliance or tool can operate for a reasonable amount of time (not continuously).
□ Use next model.

Frequently asked questions about Combis

What battery capacity do I need to fit a Mass Combi 12/2000 or 24/2000?

A simple rule of thumb states that a 12 Volt system needs a minimum battery capacity of around 20% of the inverter capacity, while the corresponding figure for 24 Volt inverters is 10%. The battery capacity required for a 12 Volt Mass Combi 2000 is therefore minimial 400 Ah, and needed for a 24 Volt Mass Combi 2000 is minimial 200 Ah.

How much power does a Combi use?

The efficiency of Mastervolt equipment is very high due to the application of high frequency (HF) technology. If the Mass Combi needs to power a Senseo coffee machine (1450 Watt) for instance, power consumption will be 1450 Watt divided by the onboard voltage of 12 Volt = 120 amps. Making a cup of coffee takes less than a minute, so consumption in Ah can be considered fairly small at 120 x 1 min = 2 Ah. The power used by the inverter itself is negligible.

Does the Combi need a lot of ventilation?

The Combi (if installed in a cabinet) needs very little ventilation - two approx. 80 cm² (9 x 9 cm) ventilation openings are minimum required. Combis that are used in high ambient temperatures, or are expected to be operating at full capacity for a long period, require openings that are at least four times as large.

How thick should the battery cables be?

To calculate the right cable size, determine the highest possible current which will flow through the cable. For the Combi this is the inverter current. When running at full capacity, a 2000 W inverter for instance draws around 200 amps from the batteries (100 amps for a 24 Volt system). The rule is simple: For every 3 amps you need 1 mm² in cable thickness. The advice for a Combi 12/2000 would be 70 mm² cable thickness and 35 mm² for a 24 Volt version.

Is the Mass Combi noisy?

HF technology has rendered large low frequency transformers obsolete, so you no longer have the irritating humming sound generated by equipment with a large transformer. Ultra quiet and temperature-regulated ventilators take care of the cooling, ensuring that noise levels are kept low. The only remaining sound is the soft hum of the cooling air. A Mass Combi can therefore be installed virtually anywhere.

Can I reduce the power intake in situations where power is limited?

Yes. The Mass Combi comes with Power Sharing and the Power Support function. Power Sharing ensures that the battery charger in the Combi automatically switches to a lower capacity as soon as a given preset value is reached.
This value usually corresponds to the available AC power fuse or generator capacity. The current required by the battery charger and the current required to power connected equipment are added up. Should the total exceed the pre-set critical value, the battery charger current will be automatically reduced to the extent where grid or generator power intake is equal to the pre-set value. The battery charger can even be set to operate at zero-amps charge current. If the output load of the Combi exceeds the preset value of, for instance, the AC power fuse, the system will quickly switch back to the inverter: This prevents the power fuse from blowing or the generator from becoming overloaded. Once the current required to power the connected equipment becomes lower - when a number of appliances have been turned off, for example - then the system will switch back to incoming current and the batteries will be recharged again.

Do I need a transfer system?

A transfer system is not needed.
In case you have only one 230 Volt connection, using a Mass Combi brings an integrated transfer system between the incoming current and the inverter current. Incoming 230 Volt power current is automatically directed to the outlet and the batteries are charged. The inverter will immediately take over should the 230 Volt input drop or be switched off, resulting in virtually no interruption.
The Mass Combi Ultra even allows you to directly connect two 230 Volt connections; a mains/grid connection and an AC generator. The Combi Ultra automatically switches between all power sources, including the inverter.

Can I power a computer with a Combi?

Yes, the Mass Combi can easily and safely supply a computer without the slightest problem or risk. The Combi can even function as an emergency power system. If, for instance, the 230 Volt grid drops, the Combi will automatically switch over to inverter operation. As the switching time is very short and the inverter was already keeping up with the incoming voltage in standby-mode, the computer will continue to work normally. Once the mains is restored, the system switches back to charger operation and the incoming voltage from the grid or generator again powers the computer. The Mass Combi MasterAdjust software allows you to set the minimum level of grid/ generator voltage at which the inverter is switched on.

Does the Mass Combi work with washing machines?

The Mass Combi can easily power a washing machine. One whole washing cycle will, on average, take 80-100 Ah (with a 12 Volt system), and 40-50 Ah (with a 24 Volt system). Most of the energy is used to heat up the water, so consumption is properly correlated to the water temperature. Washing your laundry will put considerable strain on your battery for a short period of time, so it is important that battery capacity be sufficient: 600 Ah should be enough for a 12 Volt system and 300 Ah for a 24 Volt one.

The value for maximum power intake can be adjusted via the optional remote control panels or by dipswitches in the equipment.

Can a Combi power a microwave?

Yes, all microwave models can be connected to a Mastervolt Combi. Bear in mind that an 800 Watt microwave consumes 1200 to 1300 Watt from the 230 Volts system, and that the capacity of the Combi (inverter) must be able to handle this. Apart from this, the total consumption of the microwave is modest: Five minutes of microwave use will consume around 8 Ah on a 12 Volt system and 4 Ah on a 24 Volt system. A combination microwave with oven and grill can also be connected to the Mass Combi. As power consumption will be high when the oven and the microwave are used simultaneously, you will need a robust battery of at least 600 Ah for 12 Volt and 400 Ah for 24 Volt.

Can I parallel connect Mass Combis?

Yes, the Mastervolt Mass Combi 2500 W and Mass Combi Ultra can be parallel connected without any problem. The Mass Combi Ultra can even be parallel up to ten units. Such a set-up means that you both double the inverter capacity as well as the charger capacity. With more batteries or a need to power more equipment, parallel connect a second Combi to the existing one. This doubles the available inverter and charge capacity. No additional equipment is required, apart from the connection of a few signal cables. It will, however, be necessary to adapt wire and cable diameters in the system to cope with the increased capacity.

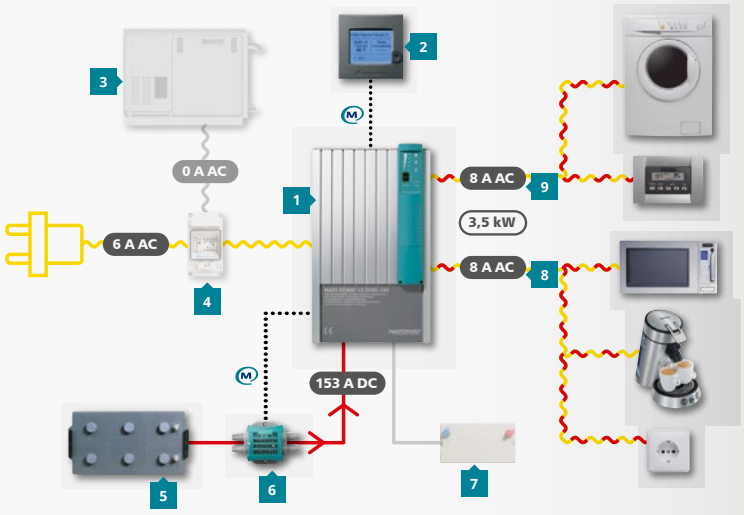
What is the power support function?

Mastervolt Mass Combis are equipped with an extremely advanced system to prevent the AC power fuse from becoming overloaded. The output current of the battery charger is reduced as soon as there is a risk of this happening. If this proves insufficient, the system rapidly switches to inverter operation so that the battery temporarily powers a part of the connected load. Since the inverter will already have been synchronised and the switching is so fast, computers will continue functioning, as will clocks and timers on, for instance, microwave ovens. Once the load decreases, the system switches back to power and the battery charger returns to charging the batteries. Your Combi can therefore also function as an efficient emergency power system.

1. Mass Combi (Ultra) inverter/charger combination.
2. MasterView Easy, control panel for all devices in a MasterBus network.
3. Generator.
4. Masterswitch transfer system.
5. Service battery, gel.
6. MasterShunt.
7. Starter battery, AGM.
8. Inverter output.
9. High Power output.
10. Lithium Ion battery.

Example 1 - Mass Combi

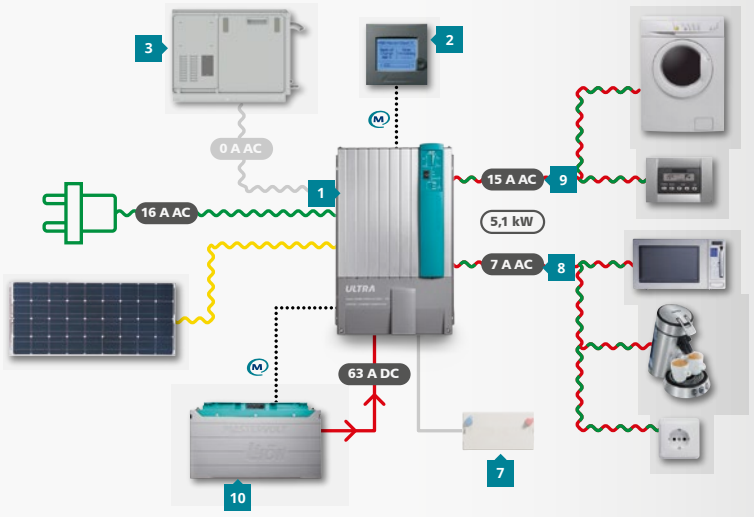
Higher consumption than available from the grid.



The electrical system is connected to the grid. The circuit breaker is limited to 8 amps. Several 230 V appliances are switched on, consuming 3.5 kW. A total of 16 amps is required. The additional 230 V (6 A) is supplied via the service battery and the Mass Combi. Automatic switching off prevents excessive discharge of the batteries. You can program the setting via Power Sharing in the Mass Combi, or remotely using the MasterView Easy panel.

Example 2 - Mass Combi Ultra

No grid - only generator and battery power.



In this case your power sources are a generator and the grid connection. Both sources can charge the batteries and provide power to the connected consumers. The Mass Combi Ultra regulates supply and demand and can optionally even start the generator through MasterBus. In case of large power demand, the Mass Combi Ultra provides an additional AC power from the Lithium Ion battery, in parallel with either the generator or the grid connection. This way you can operate larger loads without overloading the generator or blowing the main fuse.

All you need to know about alternators

To quickly charge the batteries while the engine is running, we recommend a (second) 'high output' Mastervolt alternator on the engine.

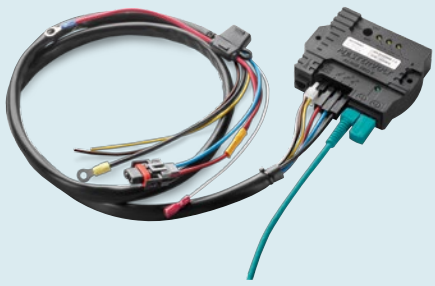
Why a Mastervolt alternator?

Standard alternators, originally designed for the car industry, only deliver sufficient energy to both charge the batteries and power the various onboard consumers when they reach a very high rpm. These alternators also tend to be temperature-sensitive: In a higher ambient temperature, such as common in an engine room, their output quickly falls by 50% or more. This is not a problem in cars as the small amount of energy used during, for instance, starting can be recharged in no time, and windscreen wipers, ventilators, etc. do not need a great deal of power. In general, a car engine also runs at a far higher rpm compared to a boat's engine, and the temperature under the bonnet is lower due to the cooling effect of the head wind.

Specially designed for ships and professional mobile applications

Mastervolt Alpha alternators are specially designed to provide sufficient power even with a low rpm. A pulley ratio of 1:3 and an engine idle speed of around 700-800 rpm will generate substantial current for charging the battery sets and powering the connected equipment. Mastervolt alternators are also resistant to the high temperature of the engine room, allowing the engine to serve as the energy source for onboard consumers and as a quick charger for the service batteries. Make sure you do not choose your alternator too small. A larger one will ensure that the battery is charged faster and engine hours are kept to a minimum - we suggest choosing an amperage between 30 and 50% of the battery capacity.

The standard alternator designed for road vehicles has a voltage regulator mounted to the back of the alternator and set to a single charge voltage of 14 or 28 Volt. This is sufficient for a car battery, which is rarely (if ever) discharged. Furthermore, the voltage regulator of an automotive alternator is often temperature sensitive and in high temperatures regulates the voltage even further down, often to 13.5 or 26.5 Volt. This is way too low for sufficiently recharging a discharged battery. The maximum achievable battery capacity for these voltage levels is around 60 to 70%. The lifespan of a battery is significantly lower if it is never properly charged. In order to adequately recharge a partially empty or completely flat battery at 25 °C, voltage need to be 14.25 Volt for a 12 Volt battery and 28.5 Volt for a 24 Volt one. Once the battery is 100% full, this voltage must be reduced to 13.25 or 26.5 Volt to prevent the batteries from becoming overcharged.



Alpha Pro MB charge regulator, standardly supplied with the Mastervolt alternator.

More information on alternators and installation diagrams are available at:

- **ww.mastervolt.com/alternators**

Alpha Pro MB charge regulator

The Alpha Pro MB charge regulator, supplied as a standard with Mastervolt alternators, automatically adjusts the voltage according to the same charge characteristic as found in Mastervolt battery chargers. The batteries are charged with a voltage of 14.25 or 28.5 Volt until full, at which point the voltage is reduced to a lower level. The Alpha Pro MB charge regulator is also equipped with a battery temperature sensor, which should be attached to the batteries. The charge voltage is adjusted according to the battery temperature and is not influenced by the ambient temperature or the temperatur of the alternator.

Ungrounded - also for aluminium vessels

Mastervolt alternators are delivered ungrounded, i.e. the negative pole of the alternator is not connected to the alternator casing but has a separate connection. This means that they are also suitable for aluminium boats, where the negative needs to be seperated from the hull.

More output

Mastervolt alternators offer a much higher output than the alternators supplied with engines. As a result, the standard single belt is insufficient to transfer the power from the engine to the alternator. Two belts are required and the pulley of the engine will often need to be changed as well. Your engine supplier can help you choose an appropriate double pulley and give advice on setting up the alternator. In order to handle the high output you will also have to adjust the alternator support.

The battery as power source

There are different kinds of rechargeable batteries. The most common type is the lead acid battery. A less familiar one is the nickel-cadmium (NiCad) battery, which can still often be found in old emergency power systems. Due to the high charge voltage required by a NiCad battery, and the fact that they are very environmentally unfriendly, these batteries are not suitable for use onboard a vessel or car/truck.

Principle of the lead acid battery

A battery is a device that stores electric power in the form of chemical energy. When necessary, the energy is again released as electric power for DC consumers such as lighting and starter motors. A battery consists of several galvanic cells with a voltage of 2 Volt each. For a 12 Volt battery, six cells are linked in series and fitted inside a single casing. To achieve 24 Volt, two 12 Volt batteries are linked in series. Each cell has positive oxidised lead plates and negative lead metal plates, and has an electrolyte consisting of water and sulphuric acid. During discharging, the lead oxide on the lead plates is converted into lead. The acid content decreases because sulphuric acid is required for this process.

To recharge the battery, an external power source - such as a battery charger, alternator or solar panel - with a voltage of around 2.4 V per cell must be connected. The lead sulphate will then be converted back into lead and lead oxide, and the sulphuric acid content will rise. There are limits set for the charge voltage to prevent the release of an excessive amount of hydrogen. A charge voltage of more than 2.4 V per cell, for instance, releases a lot of hydrogen gas, which can form a highly explosive mixture with the oxygen in the air.

The upper limit on charge voltage for a 12 V battery is 14.4 V, and the corresponding value for a 24 V battery is 28.8 V. The relationship between how full a battery is and the specific gravity of the water/sulphuric acid mixture is as follows:

percentage charged	battery voltage	specific gravity	percentage discharged
0%	11.64 V	1.100	100%
20%	11.88 V	1.140	80%
40%	12.09 V	1.175	60%
60%	12.30 V	1.210	40%
80%	12.51 V	1.245	20%
100%	12.72 V	1.280	0%

Different types of battery - in terms of the thickness and number of plates per cell - correspond to different applications. The maximum current that can be delivered is determined by the total plate surface. The number of times that a battery can be discharged and recharged - the number of cycles - depends on the thickness of the plates. A battery can feature either many thin plates or a few thick ones.

The starter battery

A starter battery has many thin plates per cell, leading to a large total plate surface. This type of battery is, therefore, suitable for delivering a high level of current over a short period of time.
The number of times that a starter battery can be heavily discharged is limited to around 50. But as starting the engine uses only a small part of the energy stored (around 0.01%), the battery lasts for many years. This type of battery is generally unsuitable for cyclic use.

The semi-traction battery

A semi-traction battery has fewer but thicker plates in each cell. These batteries supply a relatively lower starter current, but can be discharged more often and to a greater extent (200 to 600 full cycles). This kind of battery is highly appropriate for the combined function of starter and service battery.

The Lithium Ion battery

Until recently Lithium Ion batteries were mainly available as chargeable batteries with a small capacity, which made them popular for use in mobile phones and laptops. Mastervolt offers Lithium Ion batteries with large capacities. Our Lithium Ion batteries have a high energy density and are perfect for cyclic applications. Compared to traditional lead acid batteries, Lithium Ion batteries offer savings of up to 70% in volume and weight, while the number of charging cycles is three times higher, compared to semi-traction lead acid batteries. An added benefit is that Lithium Ion batteries can supply a constant capacity, regardless of the connected load.

The available capacity of a lead acid battery is reduced in case of higher discharge currents. Lithium Ion batteries can be discharged to 80% without affecting their lifespan, whereas lead acid batteries are more affected by deep discharge.

Lasts longer

Lithium Ion batteries also offer major benefits compared to nickel-cadmium batteries, such as a much larger power density and a longer lifespan. And because lithium is the lightest metal, Lithium Ion batteries are also more lightweight. They can also be charged at any time, while nickel-cadmium batteries require complete discharge for an optimal performance and to prevent memory effect. Furthermore, Lithium Ion batteries can be charged with a very high current, up to 100% of the capacity, resulting in a very short charging time and no memory effect.

Battery Management System

Mastervolt Lithium Ion batteries are equipped with a Battery Management System that automatically compensates for the imbalance between the cells and increases the lifespan.

The traction battery

This type of battery has even fewer, but very thick, flat or cylindrical plates. It can therefore be discharged many times and fairly completely (1000-1500 full cycles). This is why wet traction batteries are often used in forklifts and small electrical equipment such as industrial-grade cleaning machines.

But wet traction batteries require a special charge method. Because these batteries are mostly tall, they are sensitive to the accumulation of sulphuric acid at the bottom of the battery container. This phenomenon is called stratification and occurs because sulphuric acid is denser than water. Acid content increases in the lower part of the battery, locally intensifying plate corrosion, and decreases in the upper part, reducing capacity. The battery is discharged unevenly, significantly reducing its lifespan. In order to spread out the acid evenly again, the battery has to be purposefully overloaded using excessive voltage. This generates a large amount of hydrogen gas, which will form a dangerous mixture with oxygen in the air.

The voltage required to recharge these batteries is around 2.7 Volt per cell, or 16.2 Volt for a 12 V system and 32.4 Volt for a 24 V system. These high levels of voltage are extremely dangerous for the connected equipment and the large amount of gas generated makes these batteries unsuitable for use in vessels and vehicles, except for propulsion.

Frequently asked questions about batteries

How long will it take before my battery is discharged?

This depends on its capacity and the amount of power consumed by the connected equipment. As a rule, the faster a battery is discharged, the less power it supplies. This also works the other way around: The longer it takes before a battery discharges, the more energy you can get from it.
A 100 Ah lead-acid battery supplies a current of 5 amps for 20 hours, during which time the voltage does not drop below 10.5 Volt. This amounts to 100 Ah. If a load of 100 amps is connected to the same battery, the battery will be able to power it for only 45 minutes. After this time the battery voltage will fall to 10.5 Volt and the battery will be empty, having supplied no more than 75 Ah. In contradiction to the lead-acid batteries, the capacity of Lithium Ion batteries will not be effected by the load connected. A Li-ion battery will always supply 100% capacity, independent of the connected load.

How long will my battery last?

The lifespan of a battery is related to how often and to what extent it is discharged. Proper charging with the right charger is also crucial. At a normal use for holidays and weekends, a lifespan of between five and seven years is quite common for gel and AGM batteries. When batteries are frequently discharged you will need to adjust the capacity. There is also an option to use 2 Volt cells. A lifespan of 15 years is not exceptional for this type of battery as long as they have the right capacity and are properly charged. Lithium Ion batteries are top of the bill. You can discharge and recharge them super fast and they last up to three times as many cycles than other types of batteries.

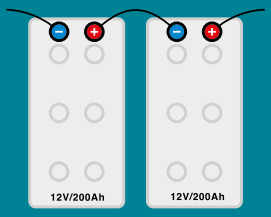
What is series connection and parallel connection?

A series connection is used to increase voltage, while keeping capacity at the same level. Two serially connected 12 V/120 Ah batteries make a combined battery set of 24 V/120 Ah. In a series connection, the positive pole of one battery is connected to the negative pole of the other, with the poles that remain at the ends being connected to the system. Batteries with different capacities should never be linked in series.

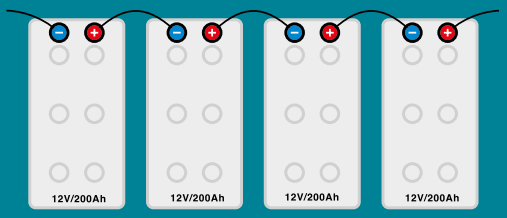
Examples

The examples below apply to the use of normal 12 V batteries. Mastervolt also supplies 2 V, 6 V and 24 V batteries; the principle of series and parallel connecting remains the same.

Series connection



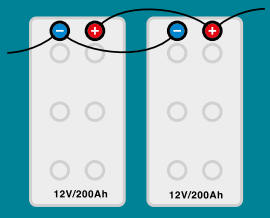
Series connection 24 V/200 Ah.



Series connection 48 V/200 Ah.

Parallel connection

Parallel connection is used when you need to increase your capacity. The positive leads are connected together, as are the negative leads. The cabling from the battery to the system should be: Positive from battery 1 and negative from battery 2 (or the last in the parallel connection).

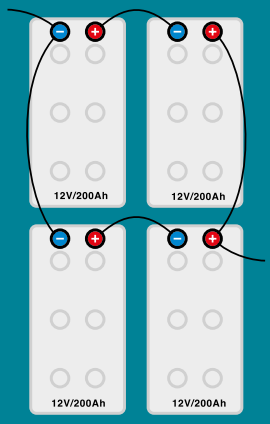


Parallel connection 12 V/400 Ah.

Series/parallel connection

If you need a 24 V battery set with a higher capacity, you can combine series and parallel connections. The cables from the battery to the system must be crossed: Positive from battery 1 and negative from battery 2 (or the last in the parallel connection).

Make sure there is sufficient space between the batteries when installing multiple batteries: There should be a 'finger' of space between them to allow the heat to be diverted.



Series/parallel connection 24 V/400 Ah.

What *NOT* to do with batteries, especially gel and AGM

- Incorrect charge voltage. Too low a voltage means that the battery cannot charge to 100% - the sulphate then hardens on the plates and the battery loses its capacity. Excessive voltage causes the batteries to generate gas, leading to water loss and drying out.
- Excessive discharging. Discharging a battery further than its capacity shortens its lifespan.
- Too large ripple on the charge voltage. Cheap and old-fashioned chargers often have a significant voltage ripple (voltage variation) in the output voltage.
- The use of an alternator without 3-step regulator, a high ambient temperature or charging without temperature compensation.

Can I leave the batteries onboard during winter?

This is fine for all batteries as the lower temperature will actually prolong their lifespan. Remember to charge the batteries completely and to ensure that no consumers are left on. Voltmeters, timers and car radio memory are some of the stealthy consumers to look out for in this respect. Wet batteries have to be regularly topped up and charged to avoid freezing. It is advisable to connect the power once every two to three weeks so the batteries can be fully recharged. If you do not have access to power during the winter we advise you to fully charge the batteries before the winter and then disconnect the battery poles so small users cannot discharge your battery. We also advise charging your battery every two months.

How should I maintain gel, AGM and Lithium Ion batteries?

Gel, AGM and Lithium Ion batteries do not need maintenance, which means they can be installed anywhere. However, we recommend checking all the connections once a year to make sure that they are properly attached, and to clean the top surfaces with a slightly moist cloth. The batteries also need to be completely charged every time for a maximum lifespan.

What are maintenance-free batteries?

Various types of batteries are used, each with its own specific characteristics. Here is a summary:

The gel battery

With wet lead acid batteries, that use a liquid electrolyte of water and sulphuric acid, the water is seperated into hydrogen and oxygen during charging, mostly at the end of the charging cycle. These gases subsequently escape through the filler cap. This means water is used and distilled (battery) water needs to be added.The electrolyte in a gel battery is a gel that binds the water with the acid. While the batteries are being filled, the gel is heated and liquefies. After the battery has been filled with the liquefied gel, the gel cools and solidifies. This process results in tiny hairline cracks in the gel between the plates.

During the charging process, oxygen O_2 is generated on the positive plate and hydrogen H_2 on the negative plate. The cracks in the gel let the gases combine to create water. The gel then absorbs the water so that no water disappears from the system and no gases are produced.

Gel batteries are not a new technology and have been in use since the late 1950s. The most important applications are in emergency power systems, telecommunications systems, power supply and, for the last 20-25 years, as service batteries in various systems. Gel batteries come in two different versions. The 12 Volt design is appropriate for regular use and available in capacities up to 200 Ah. The second design is a 2 Volt traction battery, available in capacities up to 2700 Ah and highly suitable for systems with frequent and significant discharging where a long lifespan is needed. For a battery of 12 or 24 Volt, six or twelve gel batteries need to be connected in series to provide the required voltage. Major benefits of gel batteries include very limited self-discharging, the possibility of a short charging time, and the lack of gas production under normal circumstances. All of this makes gel batteries very suitable for nautical applications. They are also ideal for heavy cyclical applications.

The AGM battery

A different type of lead acid battery is the AGM (Absorbed Glass Mat) battery. In this model, the electrolyte (water and sulphuric acid) is absorbed into an extremely delicate glass fibre mat. Just like with any other battery, charging generates hydrogen gas and oxygen, which are transported through the capillary tubes of the glass fibre mat. Once the two gases are recombined, water is once again obtained and subsequently reabsorbed into the glass fibre mat. The recombination process is then complete. The glass fibre mat also serves as insulation between the plates, allowing the plates to be close together and leading to very low internal resistance. This means that a high discharge current is no problem. The charge current could be a little lower than with gel batteries (approx. 30%) because the glass fibre mat is also an efficient heat insulator, and heat generated by charging is gradually conducted to the outside of the case. This requires the charge current to be somewhat restricted and results in a slightly longer charging time. AGM batteries are highly suitable for applications requiring a high discharge current, such as a bowthruster or winches and for medium cycle use.

The AGM battery is entirely closed and therefore maintenance free. If the AGM battery is overcharged, for instance due to the use of a (cheap) unregulated battery charger, a small amount of hydrogen gas is formed. This gas escapes through a special vent in the battery casing that is designed to prevent oxygen from entering the battery. Incorrect charging will reduce the battery's lifespan.

The Lithium Ion battery

Mastervolt's Lithium Ion batteries are based on Lithium Ion iron phosphate, which has an energy density of three times higher than that of lead acid batteries. Although there are materials with an even higher energy density, these are generally considered less safe. Mastervolt's Lithium Ion batteries are the safest batteries of their kind. A unique feature is their built-in Battery Management System (BMS). The system controls cell voltage and temperature, and guarantees optimal safety. Lithium Ion batteries are MasterBus compatible and up to 15% more efficient than lead acid batteries.

This gives you:

- Shorter charging times.
- Less generator time required for charging.
- More power than from a traditional battery of the same dimensions.
- A normal open lead acid battery, for example, has a DOD (depth of discharge) of 50%. This means that you can only use up to 200 Ah from a 400 Ah battery. A Mastervolt Lithium Ion has a DOD of 80%, almost 60% more usable battery capacity. With this percentage, a battery of 400 Ah supplies 320 Ah, or 120 Ah more.
- Lithium Ion batteries are also ideal for electric and hybrid propulsion. Mastervolt Lithium Ion batteries can be paralleled up to ten units.
- Another benefit is that Lithium Ion batteries weigh less and require less space.

Conclusions and recommendations

- The low internal resistance of AGM batteries makes them highly suitable for powering winches, windlasses and bowthrusters, for starting engines, and for limited cyclic use.
- Gel batteries are very suitable as service batteries due to the fact that they can be quickly charged and have a long lifespan, even with many charge/discharge cycles
- For a service battery you can choose for either a 6 Volt, 12 Volt or 24 Volt version or the 2 Volt model.
- Mastervolt batteries are completely maintenance free and in normal circumstances do not release acid or generate dangerous gas. They are easy to install anywhere onboard, such as next to the bilge or in the engine room (reduced lifespan due to higher temperatures). Special battery cases or external ventilation is usually unnecessary as natural ventilation will suffice.
- Lithium Ion batteries save up to 70% in space and weight, last three times longer and can be recharged and discharged very quickly, 2000 charge cycles is no exception.

Determining lifespan

The average lifespan of a 12 Volt gel or AGM battery is up to six years if the battery remains unused and is kept in a charged state. After five or six years of float voltage at an average ambient temperature of 25 °C, the battery still retains 80% of its original capacity. Higher average temperatures will shorten the lifespan of the battery. The number of charge and discharge cycles of a 12 Volt battery is strongly correlated to its structure and quality. Mastervolt's 12 Volt gel batteries can take around 500 full cycles of being discharged down to 20% and charged back to full capacity.

Most manufacturers consider batteries to be spent at a remaining capacity of 80%. This does not, however, mean that the battery has to be replaced immediately.

For example, the battery can still be used if only 50% of the battery capacity is actually required.

It is therefore not necessary to replace the battery after six years or 500 full cycles. An average use of seven years is perfectly normal for 12 Volt gel batteries.

2 Volt traction gel batteries

The lifespan for 2 Volt traction gel cells is around 10 to 15 years and the maximum number of full cycles is 1000-1500 when discharging to 60% of capacity. These batteries are therefore highly suitable for larger systems that require intensive use and a very long lifespan.

Lithium Ion batteries

Mastervolt Lithium Ion batteries have a lifespan of more than 2000 cycles, which is three times longer than most standard lead acid batteries.
This can be attributed to a wide range of features including cell management, the negligible self discharge, the absence of 'memory effect' and a DOD of 80%.

Transport

Transportation of Mastervolt gel and AGM batteries

Mastervolt gel and AGM batteries are considered as non-spillable batteries. This means that they can be transported as non-dangerous goods as they are exempt from Dangerous Goods Regulations which cover transport by road, rail, sea freight or air cargo. So they can be sent to any destination in the world quickly and relatively cheaply.

Transportation of Mastervolt Lithium Ion Ultra batteries

Extra care is to be taken for proper transport of Lithium Ion batteries. Mastervolt's Lithium Ion batteries and their packaging have undergone all the required safety testings as prescribed by the United Nations and the transport authorities (both road, rail, sea and air) to achieve this. Below you will find the technical details of what this means.
The Mastervolt Lithium Ion batteries have been tested according to UN Handbook of Tests and Criteria, part III, sub section 38.3 (ST/SG/AC.10/11/Rev.5). For transport the batteries belong to the category UN3480, Class 9, Packaging Group II and have to be transported according to this regulation. This means that for land and sea transport (ADR, RID & IMDG) they have to be packed according to packaging instruction P903 and for air transport (IATA) according to packaging instruction P965. The original packaging of the Mastervolt Lithium Ion batteries satisfies these instructions.

3-Step+ charging

This modern charging technology allows a battery to be quickly and safely charged in three phases (steps).

The first step is the ***BULK PHASE***, in which the battery is charged quickly.
The output current of the battery charger is at maximum (100%) during this phase and the battery voltage depends on the charging degree of the battery. The duration of this phase depends on the ratio of battery to charger capacity, and on the degree to which the batteries were discharged to begin with.

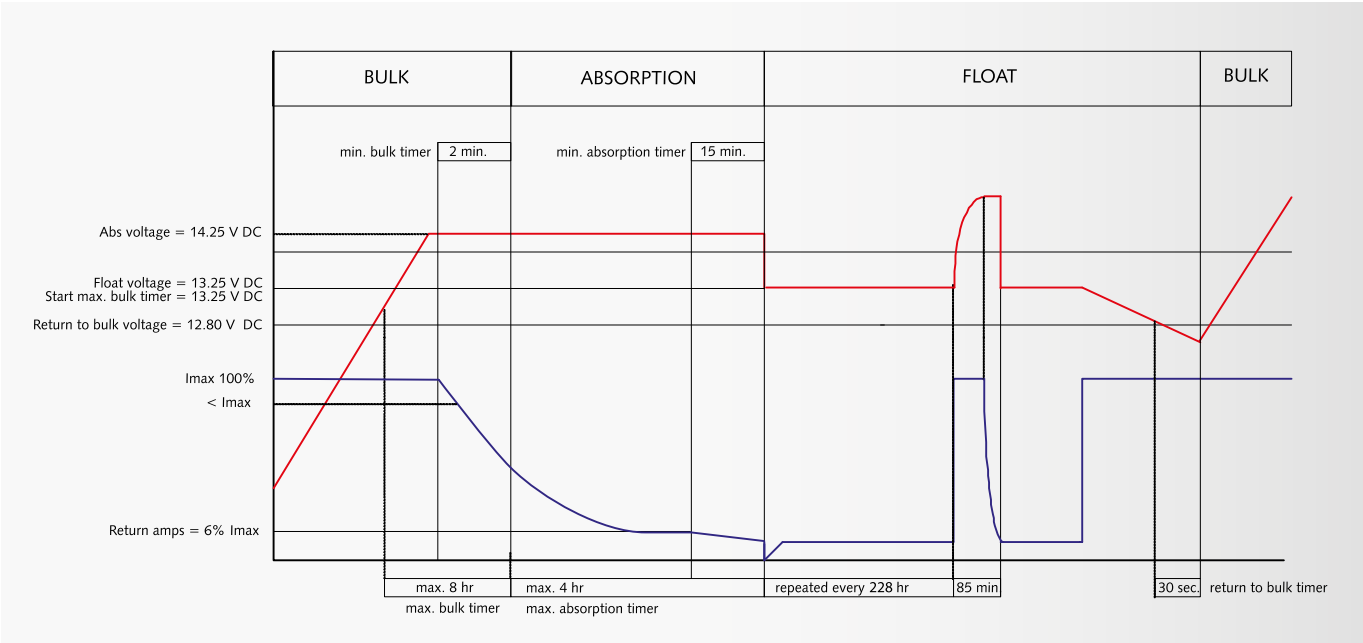
The bulk phase is followed by the ***ABSORPTION PHASE***, which begins once a battery has been charged to ± 80% (90% for gel and AGM batteries), and ends when the battery is completely full. Battery voltage remains constant throughout this stage, and the charging current depends on the degree to which the battery was initially discharged, the battery type, the ambient temperature, and so on. With a wet battery this phase lasts some four hours, with gel and AGM batteries around three.
This does not apply to Lithium Ion batteries as these are charged to 100% with full current.

Once the battery is 100% charged, the Mastervolt charger automatically switches to the ***FLOAT PHASE***.
In this step, the batteries are kept in optimal condition and the connected users are supplied with power. If power consumption is higher than can be supplied by the battery charger, the remaining power is supplied by the battery. The battery is then (partly) discharged and the charger automatically switches back to the bulk phase.
If consumption is reduced, the charger will start charging the battery again via 3-step+ charging. A battery charger with 3-step+ charging can remain connected to the battery, even in winter, and ensures a long lifespan for your batteries as well as being safe for the connected equipment.

Absorption time

The duration of the second phase in the charging of a battery. The battery will, in general, be charged from 80 to 100% during this phase, which lasts around four hours with a wet lead battery, and three hours with gel and AGM batteries. With Lithium Ion batteries the absorption time is very short as they can be charged to 100% with full current. This phase is automatically set for Mastervolt battery chargers.

3-Step+ charging characteristic (IUoUo)



Charge factor

The charge factor indicates the efficiency of a battery. The efficiency of the average wet battery is approx. 80%, which means it must be recharged 1.2 times the eventual capacity in Ah to get the same capacity. This translates into a charge factor of 1.2. The lower the charge factor or the higher the battery efficiency, the better the quality. Mastervolt's gel and AGM batteries have an efficiency of > 90% and a low charge factor of 1.1 to 1.15 and offer the very best quality.

Discharge factor

This is also known as Peukert's Law, and allows you to determine how long a battery can be used at a given load before it needs recharging.

Cycle

A battery only lasts a certain number of charge/discharge cycles, depending on its type and quality. In theory one charge/discharge cycle is the process of discharging a battery to 0% of capacity and recharging it back to 100%. Twice recharging after discharging to 50% is also one cycle, as is four times discharging to 75% and recharging. A starter battery, for instance, can take around 50 to 80 cycles, which may seem little but is in practice more than sufficient: While the current used for starting an engine is high, it only lasts a short time and represents 0.001 of a cycle. In other words, an engine can be started 80,000 times before a battery is worn out. A high-quality semi-traction battery lasts for around 250 to 300 cycles.

If the battery is only discharged to 50% of capacity, 600 cycles are available. Assuming 25 weekends of sailing (50 days) plus 20 days of holiday and discharging only to 50%, the battery will go through 70 half cycles or 35 full cycles.

Charging batteries

Charge voltage

Gel (12 and 2 Volt) and AGM (6 and 12 Volt) batteries need to be charged with a voltage of 2.38 Volt per cell at a temperature of 25 ºC. For a 12 Volt battery set, this corresponds to 14.25 Volt, and for a 24 Volt battery set to 28.5 V. The maximum time that a battery can be charged at this voltage is four hours, after which the voltage has to be reduced to 2.2 Volt per cell, or 13.25 and 26.5 Volt, respectively. Lithium Ion batteries need to be charged with a voltage of 29.2 Volt for a 24 Volt system and 14.6 Volt for a 12 Volt system. The float voltage is 26.5 and 13.25 respectively.

With emergency power systems, where gel batteries can be in float condition for long periods of times (years), the float voltage needs to be slightly increased to 13.8 and 27.6 respectively at a temperature of 25 ºC. Mastervolt supplies DC-DC converters that regulate the onboard voltage to a lower level (13.8 or 27.6 Volt) thus ensuring that (halogen) lamps do not fail during charging.

The charge current

A rule of thumb for gel and AGM batteries states that the minimum charge current should be 15 to 25% of the battery capacity. Connected equipment usually also needs to be powered during charging, so include the power used for that purpose in the abovementioned figure. This means that, with a battery set of 400 Ah and a connected load of 10 amps, battery charger capacity has to be between 70 and 90 amps in order to charge the battery in reasonable time.

The maximum charge current is 50% for a gel battery and 30% for an AGM battery. For a Lithium Ion battery the charge current can be the same as the capacity. A 180 Ah Lithium Ion battery, for example, can be recharged with 180 amps.

The charge system

Ensuring the longest possible lifespan for gel, AGM and Lithium Ion batteries requires a modern battery charger with 3-step+ charging and a sensor for measuring battery temperature. These battery chargers will constantly regulate charge voltage and charge current and adapt the charge voltage to the battery temperature.
As there is always equipment onboard such as refrigerators that draw power from a battery even when it is being charged, a maximum charge voltage has been set to protect the connected appliances. This maximum is 14.55 Volt for a 12 Volt system and 29.1 Volt for a 24 Volt system, which is also the charge voltage applicable at an ambient temperature of 12 ºC.
Mastervolt's modern battery chargers come with a temperature sensor for attaching to the battery, which allows the charger to automatically regulate the charge voltage in accordance with battery temperature. Adjusting voltage to high or low temperatures is not necessary with Lithium Ion batteries.

In order to prevent premature failure of the battery, the ripple voltage of the battery charger has to stay below 5%. If the battery also powers navigation or communication equipment such as GPS or VHF, the ripple voltage must be less than 100 mV (0.1 Volt) or problems may occur with the equipment. Another advantage of a low ripple voltage is that onboard power systems will not be damaged if a battery pole is corroded or incorrectly attached. A low ripple voltage even allows the charger to power the system without being connected to a battery.

Mastervolt chargers are, of course, all equipped with an excellent voltage regulation that keeps ripple voltage below 100 mV. For GMDSS (Global Maritime Distress Safety System) systems onboard larger ocean-going vessels, the battery charger also can be equipped with an amps and voltmeter plus an alarm contact. The alarm contact is connected to the ship's alarm system so that any interruptions to the operation of the charger – due to a cut in the 230 Volt supply, for instance – are detected on time. The optional Mass Charger Interface makes Mass chargers very suitable as GMDSS chargers.

Calculating charging time

Various factors have to be taken into account when calculating the charging time for a battery.

The first consideration is battery efficieny. With a standard wet battery, efficieny is about 80%. This means that 120 Ah has to be charged into the battery in order to be able to draw 100 Ah later. With gel, AGM and Lithium Ion batteries the efficieny is higher - 85 to 90% - so there is less losses and charging time is shorter compared to wet batteries.

Another issue that has to be considered when calculating charging time is the fact that the last 20% of the charging process (80-100%) takes ± four hours (this does not apply to Lithium Ion batteries). In the second stage, also known as the absorption phase, the battery dedicates how much current it needs to absorb independently of the output of the battery charger.

The amount of power depends on the type of battery (wet, AGM, gel or Lithium Ion) and other factors such as the extent to which it was charged to begin with, temperature, lifespan and the ambient temperature.

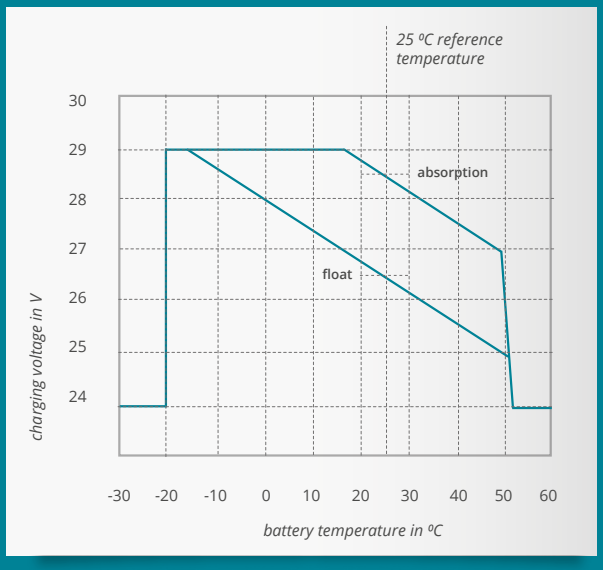
The following formula can be used to calculate the charging time of a gel or AGM battery:

$$Lt = \frac{Co \times eff}{Al - Ab} + 4h$$

Lt = charging time
Co = capacity drawn from the battery
eff = efficiency; 1.1 for a gel battery, 1.15 for a AGM battery and 1.2 for a wet battery
Al = battery charger current
Ab = consumption of the connected equipment during the charging process

Taking a battery that is discharged to 50% and applying the example of a 400 Ah gel battery and an 80 amps charger, charging up to 100% will take:

$$Lt = \frac{200 \times 1{,}1}{80 - 10} + 4h \approx 7h$$



Temperature compensation curve

Checking the remaining capacity of a sealed AGM or gel battery

The simplest way to check the remaining capacity or condition of a battery is with an Ah meter, such as Mastervolt's MasterShunt or BTM-III battery monitor. In addition to charge and discharge current, the monitor also tracks battery voltage, the number of amp-hours consumed and how much longer the battery has before it needs recharging. The device also provides data on how often the battery has been discharged and to what extent, with both the average and highest discharge level shown. The MasterShunt is easy to connect to the MasterBus network and, with its integrated system clock combined with command-based events, you can program the system to your preference.

A different but very imprecise method of checking your battery is to measure the voltage, which can only be done when the battery has not been used (discharged) or charged for at least 24 hours. While measuring voltage provides a rough estimation of how discharged a battery is, small variations in voltage make an accurate digital voltmeter essential.

remaining battery capacity	battery voltage
25%	between 11.7 and 12.3 Volt
50%	between 12.0 and 12.6 Volt
75%	between 12.1 and 13.0 Volt
100%	between 12.6 and 13.35 Volt

This method is only 15-20% accurate and gives a rough indication of the power remaining in the battery.

Peukert's Law

On the surface it seems easy to calculate how much longer a battery will continue to supply sufficient power. One of the most common methods is to divide battery capacity by discharge current. In practice, however, such calculations often turn out to be wrong. Most battery manufacturers specify battery capacity assuming a discharge time of 20 hours.
A 100 Ah battery, for instance, is supposed to deliver 5 amps per hour for 20 hours, during which time voltage should not drop below 10.5 Volt (1.75 V/cell). Unfortunately, when discharged at a current level of 100 amps, a 100 Ah battery will deliver only 45 Ah, meaning that it can only be used for less than 30 minutes. This phenomenon is described in a formula – Peukert's Law - devised more than a century ago by the battery pioneers Peukert (1897) and Schroder (1894).
Peukert's Law describes the effect of different discharge values on the capacity of a battery, i.e. that battery capacity is reduced at higher discharge rates. All Mastervolt battery monitors take this equation into account so you will always know the correct status of your batteries.

Peukert's Law does not apply for Lithium Ion batteries as the connected load will have no effect on the available capacity.

The Peukert formula for battery capacity at a given discharge current is:

$$Cp = I^n t$$

Cp = battery capacity available with the given discharge current

I = the discharge current level

n = the Peukert exponent = $\frac{\log T2 - \log T1}{\log I1 - \log I2}$

T = discharge time in hours

I1, I2 and T1, T2 can be found by carrying out two discharge tests. This involves draining the battery twice at two different current levels.

One high (I1) - 50% of battery capacity, say - and one low (I2) - around 5%. In each of the tests, the time T1 and T2 that passes before battery voltage has dropped to 10.5 Volt is recorded. Carrying out two discharge tests is not always simple. Often, no large load will be available or there will be no time for a slow discharge test.

Ventilation

Under normal conditions, gel, AGM and Lithium Ion batteries produce little or no dangerous hydrogen gas. The little gas that escapes is negligible. However, just like with all other batteries, heat is generated during charging. To ensure the longest possible lifespan, it is important for this heat to be removed from the battery as quickly as possible. The following formula can be used to calculate the ventilation required for Mastervolt battery chargers.

Q = 0.05 x I x f1 x f2 x n
Q = required ventilation in m^3/h
I = maximum charge current of the battery charger
f1 = 0.5 reduction for gel batteries
f2 = 0.5 reduction for closed batteries
n = number of cells used
(a 12 Volt battery has six cells of 2 Volt each)

Returning to the example of a 12V/400Ah battery set and an 80 amps charger, the minimum ventilation necessary will be:
$Q = 0.05 \times 80 \times 0.5 \times 0.5 \times 6 = 6\ m^3/h$

This air flow is so small that normally natural ventilation will be sufficient. If the batteries are installed in a closed casing, two openings will be needed: One on the top and one underneath. The dimensions of the ventilation opening can be calculated using the following formula:

A = 28 x Q
A = opening in cm^2
Q = ventilation in m^3

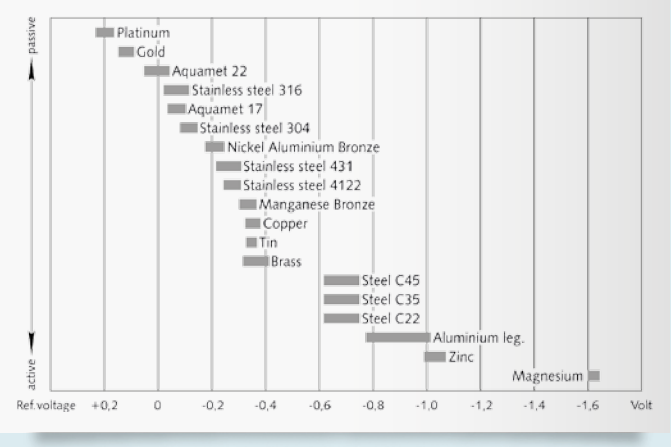
In our case, this amounts to $28 \times 6 = 168\ cm^2$ (around 10 x 17 cm) for each opening.

Lithium Ion batteries do not produce any hydrogen gas and are therefore safe to use. When batteries are charged quickly there is some degree of heat production, in which case the above formula can be used to remove the heat.

Contact your installer for larger systems with multiple battery chargers.

Preventing corrosion onboard boats

Preventing galvanic corrosion is a vital consideration when installing an onboard electric system. Galvanic corrosion is the corroding of metal under the influence of an electric current. As you can see in the table, every type of metal has a difference in potential with respect to other metals. If components made of two different metals are dipped into a liquid (electrolyte) and short-circuited, a (low) current will flow. This will result in corrosion of the metal with the lowest potential, eventually dissolving it completely.



There are three situations that can cause two different kinds of metal to be submerged in electrolyte on a vessel. And it is important to remember that while saltwater is an excellent conductor, brackish water and freshwater can also conduct electricity.

1 Although the first situation is not directly related to the onboard power circuit as such, it is a major cause of corrosion, especially pitting. A propeller made of, for example, manganese bronze is connected to the hull via the propeller shaft, the engine and the negative pole of the battery. On a steel boat, this will result in a difference in potential between the hull and the propeller. The bottom of the boat is normally protected by paint and, therefore, insulated in theory. However, any scratch in the paint will result in two different metals being dipped in electrolyte and short-circuited, and an electrical current will immediately start flowing.
To solve this problem, you will need to fit a sacrificial anode made of a metal with a lower potential than the hull, such as zinc or aluminium. The difference in potential between the anode and the propeller ensures that the anode is corroded, not the hull.

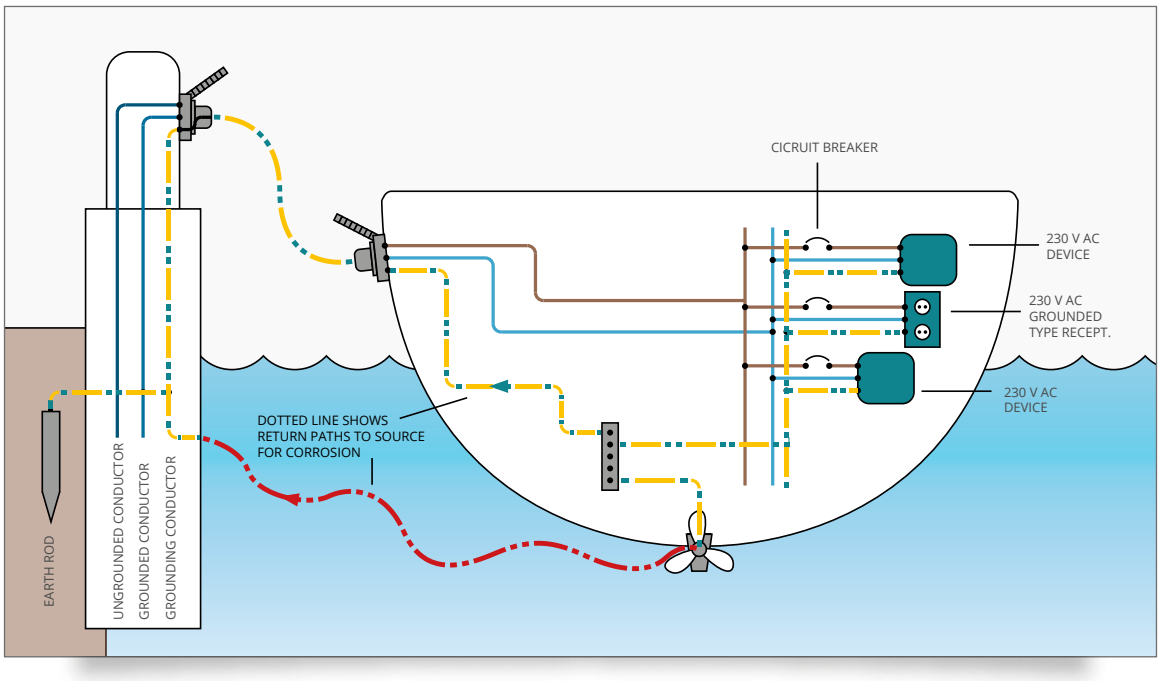
2 The second situation does concern the onboard power system. The negative pole of the battery is usually connected to the hull, via the engine for instance. If the boat is used as a conductor, perhaps because the negative pole of the lighting system is not wired directly to the battery but connected through the hull, a small difference in potential can arise between these two connections. This can also cause corrosion and the risk is especially high with aluminium boats if the hull is used as a conductor. In this case, all equipment, including engines, generators, alternators and navigation equipment, needs to be unearthed and the negative pole of the battery has to be connected with the hull at a single central point only.

3 The third relevant situation involves the shore power earth connection. In power installations, the neutral and protective earth are connected to each other at the power station and connected to groundwater via a thick steel rod. This means that all protective earth connections in a harbour are linked to each other. Steel sheet pile walls and quays are also connected to the protective earth via groundwater.

When an aluminium boat is moored next to one made of steel, for instance, the two different metals (steel and aluminium) are dipped in electrolyte (water) and a small difference in potential arises between them. If both hulls are connected to the protective earth, a short-circuit will arise and lead to corrosion.

The same can happen if a steel boat is moored next to a steel sheet pile wall. There will be a different potential caused by the different materials. And since they are connected via the protective earth, corrosion will be the result again.

The protective earth plays a very important role in securing your electric system, and cannot be omitted. In fact, current legislation (ISO 13297) legally requires a boat to be equipped with a sound earthing system.



Potential dangerous situation, where galvanic corrosion can occur.

Using an isolation transformer

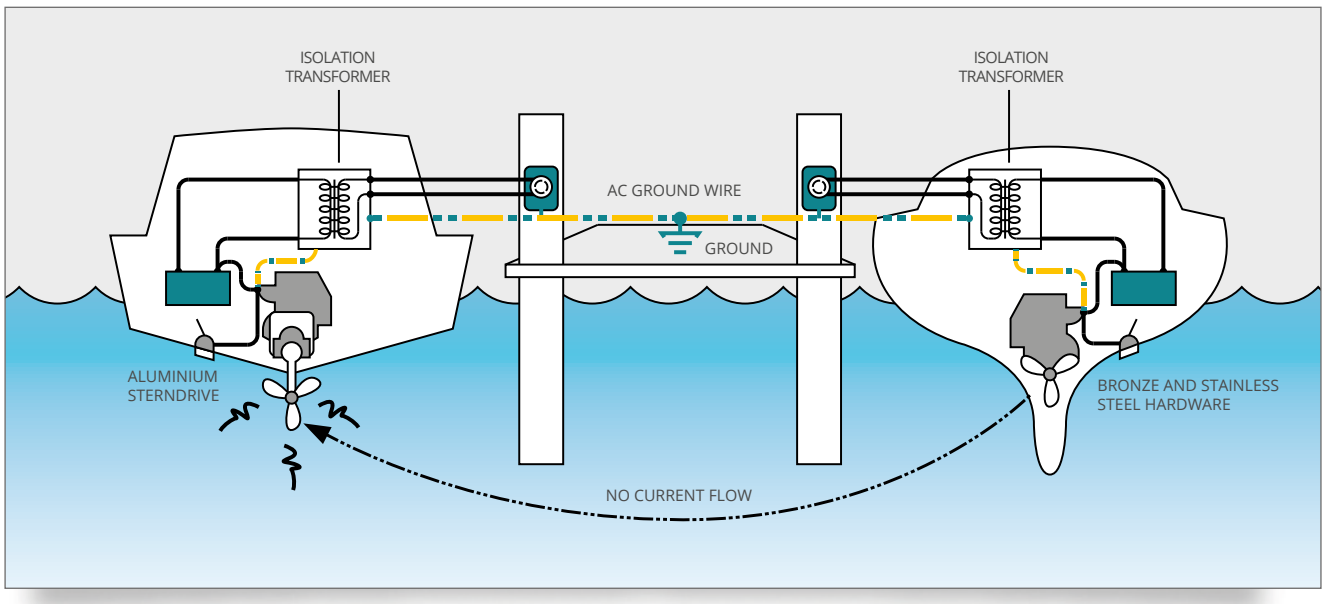
The risk of corrosion may mean you do not wish to fit your protective earth onto the hull of your boat. However, to ensure your power system is safe you will need to install an isolation transformer.

With an isolation transformer, the earth wire remains within the power cable for safety reasons but is not connected to the boat. The phase and the neutral of the power connection will instead be connected to the primary (shore) side of the transformer, which will 'convert' the voltage to the same or, if necessary, a different voltage.

A new phase and neutral, galvanically separated from the shore, will be available on the secondary (boat) side of the transformer. The neutral will be connected to the onboard protective earth system, which will now have nothing to do, electrically, with the protective earth of the power connection. This way the connection between two different metals (or two different types of the same metal) is blocked, eliminating the risk of electrolytic corrosion.

The neutral connection of the other power suppliers onboard, such as the generator and the inverter, also needs to be linked to the onboard protective earth system. An earth leakage switch is prescribed by directive ISO 13297 for recreational craft up to 25 metres. The various options for earth leakage switches and isolation monitoring are subject to this directive.

Consult an expert for more details.



By the proper use of an isolation transformer, galvanic corrosion can be avoided.

DC fuses

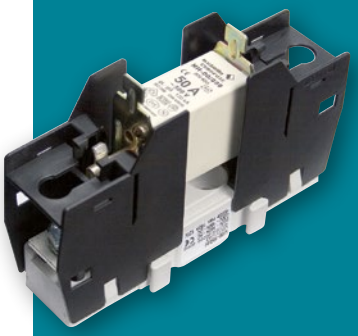
To protect the DC wiring wiring from overloading, fuses need to be used as overloaded cables or wires can cause fire and hazardous situations.

Overloaded wiring can be caused by faulty equipment or by simply too much equipment connected to the same wiring. Ingres of water in the navigation lamps is an example of a possible overload.

There are many fuses available and the most common for smaller loads is the ATO/ATC (car type) fuse. This fuse can protect wiring up to 2.5-4 mm². Although these fuses are available with a rating of more than 30 amps, this will not be recommended as the heat production will be high and a premature failure of the fuse might be expected.

For higher loads or loads that are continuously powered, so called ANL or plate fuses will often be installed. These fuses are commonly used for currents of approx. 20 to 100-125 amps, but higher ratings are available.

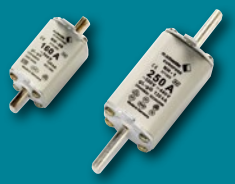
For more professional or high power installations, like for example winches or bowtrusters, often the NH (knife type) or T-fuse will be installed. Although these fuses are sometimes, due to their physical size, not easy to install, they are very reliable. They are commonly used for currents of 50 amps and more.



ATO fuse.

ATC fuse.

ANL fuse.



NH fuses (knife type).

T-fuse.

Example:

wire size	max. current	fuse required	preferred type
0.75 mm²	12 A	10 A	ATO/ATC (car type)
1 mm²	18 A	15 A	ATO/ATC (car type)
1.5 mm²	21 A	20 A	ATO/ATC (car type)
2.5 mm²	30 A	30 A	ATO/ATC (car type)
4 mm²	40 A	40 A	ANL Blade type
6 mm²	50 A	50 A	ANL Blade type
10 mm²	70 A	80 A	ANL Blade type
16 mm²	100 A	100 A	NH (knife type) or T-fuse
25 mm²	140 A	125 A	NH (knife type) or T-fuse
35 mm²	185 A	160 A	NH (knife type) or T-fuse
50 mm²	230 A	224 A	NH (knife type) or T-fuse
70 mm²	285 A	25 A	NH (knife type) or T-fuse
95 mm²	330 A	315 A	NH (knife type) or T-fuse
120 mm²	400 A	400 A	NH (knife type) or T-fuse
150 mm²	430 A	425 A	NH (knife type) or T-fuse
240 mm²	710 A	630 A	NH (knife type) or T-fuse

Please note that fuse and cable ratings are subject to local regulations, consult your supplier for more detailed advice and installation.

Technical terms - glossary

A

Absorption phase
The second stage in a modern 3-step+ charging process. Batteries are charged from around 80% up to 100% during this stage. Voltage is somewhat lower than the gas voltage of the battery, which is 2.38 Volt per cell at 25 °C (or 14.25 Volt for a 12 Volt and 28.5 Volt for a 24 Volt battery). The absorption phase follows the bulk phase and is, in turn, followed by the float phase.

ABYC standards
The American Boat & Yacht Council is a non-profit organisation that represents American builders. It sets standards and gives recommendations for nautical equipment (including electrical equipment) on pleasure vessels with the goal of enhancing safety. The ABYC therefore issues certification for products.

AGM battery
Battery in which the electrolyte (a mix of water and sulphuric acid) is largely absorbed in glass fibre matting. As these batteries are entirely maintenance-free and do not normally produce gas, they can be fitted anywhere and ventilation is usually unnecessary. Thanks to their construction, AGM batteries can be swiftly discharged while providing a very powerful current. This makes them highly suitable for systems that require high levels of current, such as bowthrusters, winches and engine starting.

Alarm contact
A contact in a battery charger or inverter that will be activated when an external or internal malfunction occurs.

Alternating current (AC)
AC is the electricity that for example comes out a socket in your home. Other terms used for AC include shore power, generator power or inverter power. AC voltage changes polarity with a given frequency: In Europe, for instance, the polarity of the electrical voltage is reversed 50 times per second. The supply therefore has a frequency of 50 Hertz (Hz).

Amps (A)
The unit that measures the current following through a circuit. The current can be calculated by dividing the voltage by the resistance of the consumer. A resistance of 6 Ohm and voltage of 12 Volt gives a current of 2 amps.

Amp-hour (Ah)
The unit that denotes the capacity of a battery, calculated by multiplying current in amps by the duration of the discharge in hours. For example: If a battery delivers a current of 5 amps in 20 hours with the voltage constantly above 10.5 Volt, this amounts to 20 x 5 =100 Ah. The capacity of a battery usually depends on the amount of lead and battery acid it contains.

B

Battery
Converts chemical energy into electrical power and vice versa. The nominal voltage of a battery is 2 Volt, and higher voltages are achieved by connecting several batteries in series. For instance, six 2 Volt batteries can be combined to provide a nominal voltage of 12 Volt.

Battery acid
An electrolyte that consists of water and sulphuric acid. The specific gravity of battery acid in a charged battery varies between 1.28 and 1.30.

Battery charger
Used to charge batteries. Its capacity should be at least 15 to 25% of the battery capacity with a wet battery and max. 30% with an AGM battery, up to 50% with a gel battery and up to 100% with a Lithium Ion battery.

Battery Management System
A natural phenomenon of Li-ion batteries is the natural imbalance between stronger and weaker cells. In the charging process, one or more cells will reach their maximum charge level faster due to this imbalance, while others do not get fully charged. The lower cells will be discharged faster, causing the battery to be empty sooner due to under-voltage and so reducing the lifespan of the battery. To prevent this, Mastervolt Lithium Ion batteries are equipped with a Battery Management System that automatically compensates for the imbalance between the cells and increases the lifespan and the total capacity of the battery.

Battery monitor
Indicates battery status. Mastervolt offers two different models: The conventional BTM-III provides information about charge and discharge current, battery voltage, number of amp-hours consumed and time remaining before recharging becomes necessary. The modern MasterShunt gives extensive information on current, voltage, historical data and information on usage. It is easy to connect to the MasterBus network and with command-based events you can program the system entirely to your wishes.

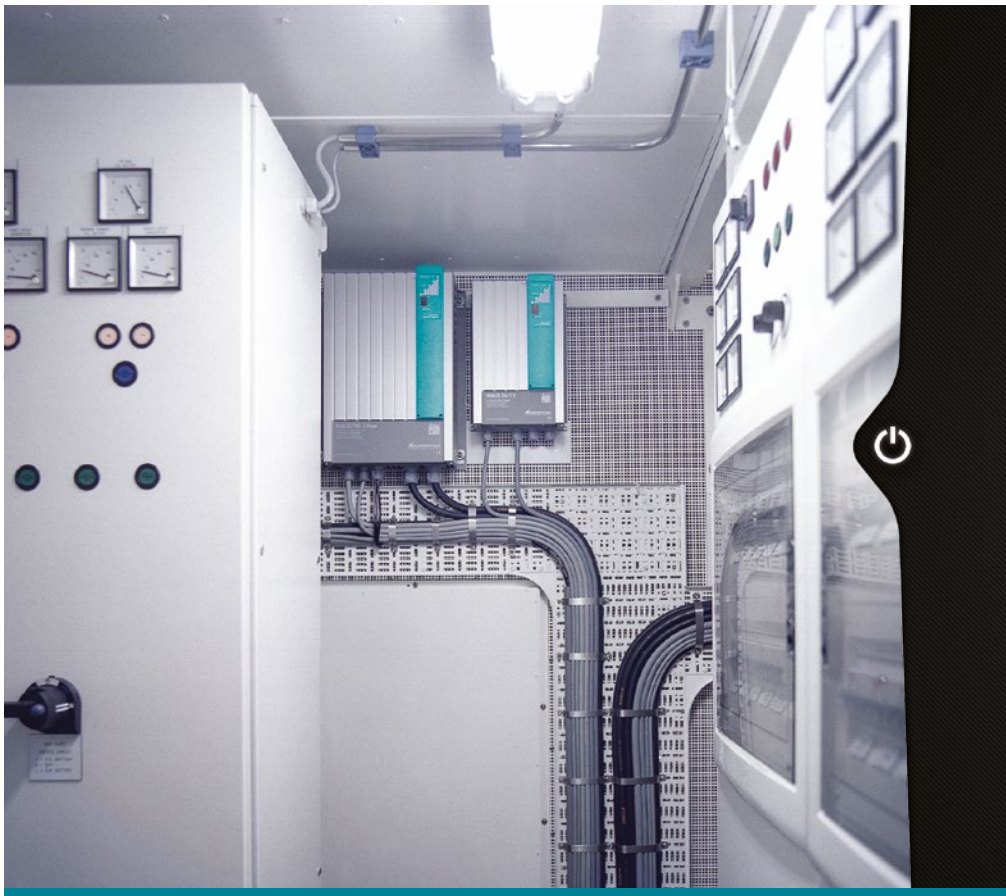
Bulk phase
The first stage in a modern 3-step+ charging system. The output current of the battery charger is 100% during this stage, while voltage depends on the power remaining in the battery. The bulk phase is followed by the absorption phase.

BV approval
Bureau Veritas is a French classification society for shipping, passenger vessels and some large yachts. The requirements in terms of safety and functionality are stringent and approval is required by many insurance companies. Most Mastervolt equipment exceeds BV's rigorous standards.

C

Cable losses
A loss of voltage resulting from the resistance of the cable. The losses also depend on the current flow.

CE marking
Marking placed on a product by manufacturers or importers to declare that it meets EU safety, health and environmental requirements. These requirements are derived from European product directives, which have been incorporated into the national legislation of most EU member states. The CE mark therefore shows compliance with a law and is not informal advice. It should be visible on the outside of equipment and suppliers have to make available a declaration stating which requirements of the CE marking the equipment meets. All Mastervolt equipment exceeds these rigorous standards.



Charge voltage
Voltage used to charge batteries. On average, it amounts to 14.25 Volt or 28.5 Volt during the absorption phase and 13.25 Volt and 26.5 Volt during the float phase, both at 25 °C.

Combi
A device that combines a battery charger, an inverter and a transfer system in one.

Cos phi or power factor
Specifies in AC systems the degree to which current is out of phase with voltage: The lower this value, the larger the discrepancy. In a heating element, for instance, the current is in phase with the voltage, so the cos phi is 1. In a motor, however, there is a divergence, and cos phi tends to be 0.8 or sometimes 0.6. The lower the cos phi, the more current is required to supply a given amount of power.

Current
The flow of electrons through a circuit. Electric current is measured in amps.

Cycle
The theorectical discharging of a battery from 100% to 0% ,and recharging back from 0% to 100% in one cycle. Twice discharging to 50% and fully recharging is also one cycle, as is four times discharging to 75% and fully recharging again. This is all theory however: In practice a battery is discharged not more than 50%.

D

Digital Switching

Digital Switching is a Mastervolt innovation that radically simplifies installation, configuration, control and monitoring of onboard electrical systems. This CAN-based platform is proven in the automotive industry and is fully compatible with most A-brand navigation systems. It offers you a range of luxurious and comfortable options, including remote control.

Dipswitch

A tiny switch usually found on a printed circuit board and used to set the various functions of Mastervolt equipment.

Direct current (DC)

Current that only flows in one direction, such as that in a battery, solar panel, alternator or battery charger.

DNV approval

Det Norske Veritas is a Norwegian classification society for professional shipping and offshore activities. The requirements in term of safety and functionality are very strict, and approval is required by many insurance companies. Most Mastervolt equipment easily satisfies DNV's stringent standards.

E

Earth

The electric no-load potential, also called reference potential. The negative pole of a battery is often connected to the steel chassis of a vehicle or boat, which then serves as the earth. In US English the term grounding is used.

Earth leakage switch

Monitors the onboard supply for electrical leakage, switching it off when leakage exceeds 30 milli-amps. An earth leakage switch protects you against an electric shock in the event of contact with a live component.

Efficiency

The efficiency of a power source is expressed in percentage terms (%). A device with an efficiency of 90%, for instance, has 100% power at the beginning and 90% at the end. The 10% that is lost is primarily transformed into heat. The higher the efficiency of an inverter, the longer the batteries will last.

Electrolyte

The liquid in batteries, composed of a mixture of sulphuric acid and water. Its specific gravity is 1.280-1300 in a charged battery and 1.100 in a discharged one.

E-marking

A standard that indicates whether the relevant equipment can be used on vehicles such as ambulances and fire engines. In order to qualify for an E-marking, equipment has to satisfy strict requirements in terms of safety, EMC and suitability. Most Mastervolt battery chargers and inverters comply with these requirements.

EMC

Short for Electro-Magnetic Compatibility, EMC indicates how much, if any, electromagnetic interference a device may produce and whether it is sensitive to electromagnetic interference from the outside. A good example is that of a battery charger and a microwave oven. The microwave is not allowed to produce more interference than determined by the EMC standard, and the battery charger may not be affected by the interference generated by the microwave. Naturally, the opposite also holds true. Requirements in terms of EMC are established within the CE framework. Mastervolt equipment exceeds these strict requirements.

E-Propulsion

Electrical propulsion is growing in popularity and is compulsory in an increasing number of sailing and nature areas. A hybrid version is also available, allowing you to choose whether to sail using a diesel engine or electric motor.

F

Float phase

The final step in a modern 3-step+ charging process. Although the batteries are fully charged during this phase, they receive a maintenance charge, while the onboard DC circuit is supplied with power. Charge voltage is 2.25 Volt per cell or 13.25 Volt for 12 Volt batteries and 26.5 Volt for 24 Volt ones at an ambient temperature of 25 °C.

Forced inverter

A function on the Mass Systemswitch. At the push of a button, a part of the onboard consumers are powered from the batteries via the inverter, while the battery charger stays connected to power. The power intake of the battery charger can be regulated via the system panel, up to the point where the maximum for the AC fuse has been reached. The advantage of this system is that heavy-duty consumers such as hair dryers are powered via the inverter and cannot therefore overload the AC fuse. When such consumers are connected to the inverter, consumption from the batteries is usually higher than the battery charger can supply. This is rarely a problem as major consumers are usually used for a short time and the consumption measured in Ah tends to be low. After the consumer has been switched off the battery charger will recharge the battery automatically.

Frequency
The number of times per second that alternating current changes direction, expressed in Hertz (Hz).

G

Galvanic isolation
A situation where two circuits are electrically connected without their grounding or earth coming in contact. Galvanic isolation is best achieved by means of a transformer.

Gas voltage
The voltage level at which a battery starts producing gas. At at an ambient temperature of 25 °C, the gas voltage is 2.38 V per cell or 14.25 V for a 12 V battery and 28.5 V for a 24 V one.

Gel battery
Batteries where the electrolyte (mix of water and sulphuric acid) is absorbed in a gel. As they are entirely maintenance free and rarely produce gas, gel batteries can be fitted anywhere. Extra gas extraction is not necessary. Gel batteries are highly suitable for lighting and as onboard service batteries, and can be charged very quickly thanks to their special construction. With normal use the lifespan of a 12 Volt gel battery is between six and seven years. For the 2 Volt traction gel version, 10 to 15 years is not uncommon. A gel battery is very suitable for (deep) cycle usage.

GL approval
Germanischer Lloyd is a German classification society for professional marine vessels. The requirements in terms of safety and functionality are very strict and this approval is often necessary for insurance purposes.

H

Hertz (Hz)
Unit that measures frequency, i.e.the number of times per second that an alternating current (AC) changes direction. In Europe this is 50 Hz, and in the USA 60 Hz.

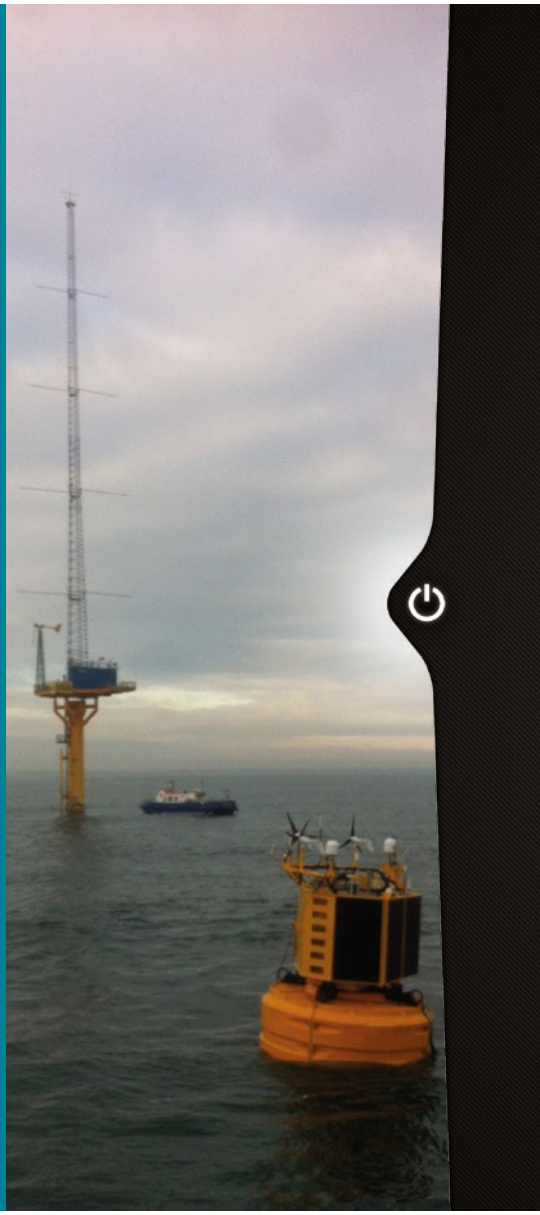
High-frequency (HF) switch technology
This technology allows incoming alternating current to be rectified into direct current over a diode bridge. The resulting DC voltage is chopped into parts with a high frequency by means of an electronic switch that is turned on and off quickly. This creates a simulated alternating current with a high frequency, 35 kHz (35,000 Hertz) for instance. This AC can be converted to a higher or lower voltage via a very small transformer. The higher the frequency, the smaller the transformer can be. Mastervolt uses HF switch technology in all its equipment, offering major benefits in terms of compactness, weight and efficiency. Another advantage is that you say goodbye to the irritating hum of a transformer.

Hydrogen gas
Highly explosive gas mixture of hydrogen and oxygen formed during the charging of wet batteries with an unsuitable charger. Extra ventilation prevents concentrations from becoming too high.

I

IEC approval
The International Electrotechnical Commission (IEC) is headquartered in Geneva, Switzerland, and develops general standards for the safety of electrical components and equipment. Although it proposes standards, the IEC is not responsible for their enforcement, which is usually carried out by independent test laboratories.

Inductive loads
These loads are, for example, the motors in air conditioning systems and diving compressors. They cause the current to flow out of phase with the voltage, a phenomenon also known as phase shift. The degree is indicated by a value, cos phi or power factor, which ranges from 0 to 1 and is inversely proportionate to the size of



the lag. In a heating element (which is resistive load), current flows in step with voltage and cos phi is 1. In a motor, however, there will be a lag, as indicated by the typical value of 0.8 - or sometimes 0.6 - for cos phi. The lower the cos phi, the greater the lag, and the more current is necessary to supply a given level of power.

Inverter
Converts 12, 24 or 48 Volt battery power to alternating current at 230 V/50 Hz (or 120 V/60 Hz). This allows appliances such as computers, microwave ovens and TVs to be powered without the need for a grid connection or generator.

Isolation transformer
Converts shore power voltage to a higher, lower or equal value to ensure that there is galvanic isolation between the shore power connection and the onboard electrical system. This prevents corrosion and increases safety.

K

Kilowatt (kW)
Unit for electrical power equivalent to 1000 Watt. Ten 100-Watt light bulbs consume one kilowatt.

Kilowatt-hour (kWh)
One kW of electricity used in one hour. This is the most common measurement of power consumption.

L

LED (light emitting diode)
Electronic light with very low power consumption. LEDs are generally available in many different colours and sizes. Mastervolt uses them as signal lights on battery chargers and inverters. The latest generation of LEDs can be used as lights as well and are very low in use of energy.

Lithium Ion battery
Lithium Ion batteries have a high energy density and are perfect for cyclic applications. Compared to traditional lead acid batteries, Lithium Ion batteries offer savings of up to 70% in volume and weight, while the number of charging cycles is three times as large. Another major benefit of the Mastervolt Lithium Ion battery is that it is equipped with an integrated Cell Management System, which automatically compensates for any imbalance between the cells to guarantee a longer battery lifespan.

Lloyd's approval
Lloyd's Register of Shipping is a British classification society for yachts, professional shipping, drilling platforms, etcetera. Numerous insurance companies require large vessels to be approved by Lloyd's. This means that the vessel and the onboard equipment have to satisfy stringent requirements.

M

MasterBus
MasterBus is Mastervolt's advanced standard for data communication and integration of Mastervolt components within your electric system. Advantages include complete system integration, easy operation and monitoring, and simple installation with fewer cables. A MasterBus network can be easily extended in a later stage.

N

NiCad batteries
Containing nickel and cadmium, this type of battery is unsuitable for use on boats due to the high charge voltage required. NiCad batteries will soon be banned because of their cadmium content. N.B. All NiCad batteries are considered to be chemical waste.

No-load consumption
Power consumed by an inverter when it is not powering any equipment. This is just a few Watts with modern Mastervolt inverters and Combis. The lower the no-load consumption, the less power is used by the inverter.

O

Ohm
Unit for electrical resistance, indicated by the symbol Ω. The electrical resistance of an electrical conductor is the opposition to the passage of an electric current through that conductor.

Ohm's law
Gives the relationship between voltage (U), current (I) and resistance (R). In formula terms this is expressed as ***U= I x R***.
If two of the three values are known, the third can be calculated.

Overload
A concept related to the safety of an inverter, generator or power connection. A fuse, for instance, ensures against overload. All Mastervolt inverters have electronic protection against overload.

P

Parallel connection
In a parallel connection the current can flow through multiple circuits. By parallel connecting batteries (positive to positive, negative to negative), the capacity of the battery set is increased, while voltage stays the same. For example, while two 12V/55Ah batteries connected in parallel have a voltage of 12 Volt, the capacity is 55 + 55 = 110 Ah.

■ *Peak power*
The maximum current that can be supplied by an inverter for short periods of time. This is often necessary, as electric motors can consume up to ten times their nominal power when starting up. Mastervolt inverters can deliver a high peak current, often reaching two to three times their nominal capacity.

■ *Peukert*
The name of a German scientist who in 1897 observed that a battery supplies progressively less power as the discharge current increases. Peukert created a formula that gives the number of amp-hours a battery can supply at a given discharge current and time. Mastervolt battery monitors all take Peukert's law into account, ensuring that you always have a correct overview of your battery's status.

■ *Power Sharing*
This concept is related to the performance of the charger part of a Combi when connected to the grid or a generator. It involves the automatic power intake regulation of the battery charger when the power is very low. As soon as the power fuse is in danger of being overloaded, the battery charger automatically reduces its output current so that tipping of the power fuse will be prevented.

■ *Power Support*
A feature found in the Mass Combi Ultra. Power Support ensures that the power supply to onboard consumers will be partially powered from the batteries if the power is in danger of becoming overloaded. It is activated after the battery charger's output has been reduced to zero via the power sharing system in the Combi.

R

■ *Recombination technology*
Used in AGM and gel batteries to make sure that the gas (oxygen and hydrogen) generated by charging is recombined into water. This means that the batteries can be entirely maintenance free and sealed.

■ RRR approval
The Russian River Register sets standards for products and manufacturers in terms of quality, safety and environmental friendliness. Only products certified by the RRR are allowed onboard vessels sailing on the country's inland and coastal waters.

■ RS approval
The Russian Maritime Register of Shipping sets standards that products and manufacturers must meet in order to be allowed onboard vessels flying the Russian flag within Russian territorial waters (seas and inland waters). The institute is also responsible for related inspections.

S

■ Self-discharging
The decrease in the capacity of a battery that occurs when no load is connected. A wet battery loses 1% per day, an AGM battery and gel battery 2% per month and a Lithium Ion battery less than 3% per month. The higher the ambient temperature, the more self-discharging will occur. Current leakage due to intense pollution or humidity between the poles can also cause a higher level of self-discharging, so you should always keep the top of your batteries clean and dry.

■ Semi-traction battery
A semi-traction battery has fewer but thicker plates in each cell, compared to starter batteries. Semi-traction batteries supply a relatively lower starter current, but can be discharged more often and to a greater extent (200 to 500 full cycles). This kind of battery is highly appropriate for the combined function of starter/service battery.

Series connection
A series connection (the positive pole of each battery is connected to the negative pole of the next) increases the voltage of the total battery set. For example, when two 12 Volt batteries with a capacity of 55 Ah each are connected in series, the total voltage of the set will be 12 + 12 = 24 Volt, while total capacity remains 55 Ah.

Sine wave
The alternation of voltage can be graphically indicated by a sine wave. This consists of a line that follows a wave pattern around a horizontal axis, which represents the passage of time and also the points at which voltage is zero. Once the line has traced one entire wave above the time axis and one entire wave below, a whole sine wave has been outlined.

Square millimetre (mm²)
Unit in which cable diameters are measured. With a direct current system of 12 or 24 Volt, three amps should correspond to one mm² of cable thickness. For 230 Volt systems allow 8 amps for each mm². Both for a maximum length of 3 metres.

Soft start
Device used to reduce the inrush current of transformers and motors.

Stand-by mode
In this mode the inverter emits a small pulse instead of the usual 230 Volt output. It detects when an appliance is switched on and the inverter automatically switches on, supplying 230 Volt until the output current falls below a pre-set value. When there is little or no output current, this means that no load is connected and the inverter switches back to stand-by. This system saves a great deal of energy.

Starter battery
Mainly used to start engines. Although these batteries can deliver a high current, they should not be excessively or too frequently discharged and are therefore not appropriate for lighting purposes. AGM batteries are ideal to serve as starter battery and limited cyclic use.

T

Temperature correction
If the battery temperature is lower than 25 °C, the charge voltage should be adjusted upwards. When higher, the charge voltage needs to be reduced. This temperature correction is 30 mV per °C for a 12 Volt battery and 60 mV per °C for a 24 Volt one. While this may seem insignificant, it is essential to ensure a long battery life.

Temperature sensor
A temperature sensor should be attached to the battery so that the charger can optimise charge voltage with respect to the battery temperature. The charge voltage depends on the battery temperature (see also Temperature correction).

Traction batteries
Used for propulsion, powering equipment and inverters, etc. They can be discharged often and completely, and in a gel version are highly suitable for onboard use. Wet cell batteries are only appropriate for forklifts, etc.

Transfer system
A (frequently automatic) system used to switch between multiple power sources, such as grid, generator and inverter.

3-Step+ charging
A modern charging technology that has been extended with an extra step in Mastervolt's latest equipment, the Plus phase.

The three steps are:
- Bulk, where the charger supplies maximum power.
- Absorption, during which the charger delivers maximum charge voltage and the battery is charged from around 80% to 100%.
- Float, used for battery maintenance and delivering power to connected equipment.

The 'plus' phase is an automatic one-hour bulk phase once every 12 days when the battery is not being used.

U

UL approval
An American certification provided by Underwriters Laboratories that is similar to the European CE-mark and mainly focused on safety issues.

V

Volt (V)
Unit in which electric potential (voltage) is measured.

Volt-amps (VA)
Unit for measuring electrical power.

Voltage ripple
A voltage ripple is a small alternating current on top of a direct current, which results in a DC voltage that is not entirely smooth but ripples slightly. While a battery delivers pure direct current without any ripple, this is not always the case with a battery charger. In an old-fashioned battery charger, 50% of the voltage will contain ripples.

A large voltage ripple shortens the lifespan of a battery, which needs to be charged with direct (not alternating) current. In addition, a voltage ripple can interfere with onboard audio, navigation and communications systems. Mastervolt battery chargers supply a flat DC voltage with no more than 0.5% of ripple voltage.

W

Watt (W)

Unit that measures the rate of energy, calculated by multiplying Volts by amps.

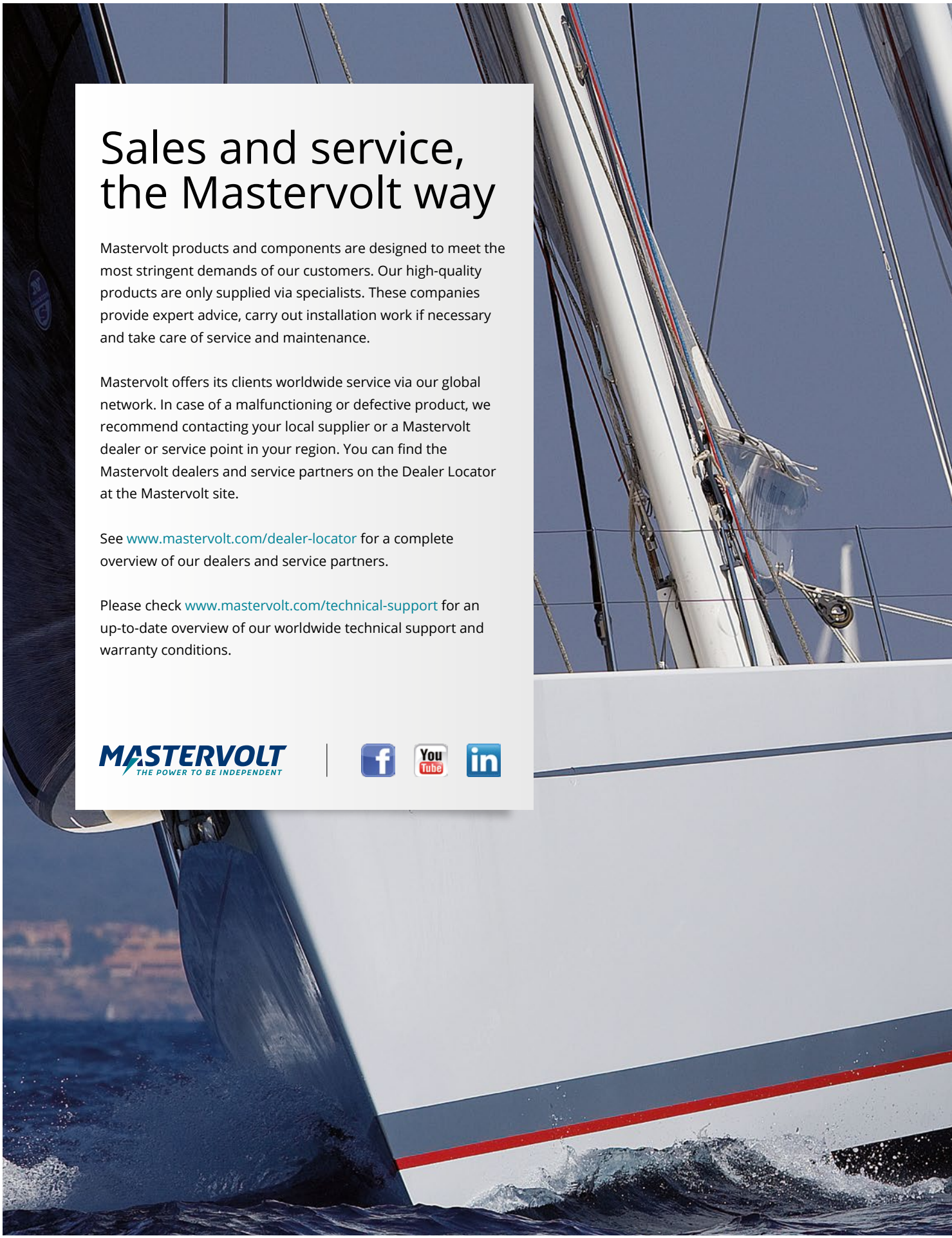
Watt-hour (Wh)

Measure of electrical power in time. One watt-hour of electricity is equal to one Watt of power consumed over one hour. A 10-Watt light bulb uses 10 Watt-hours of electricity in one hour (see also kWh).

QUOTE

"Oyster aims to provide the best customer service in the industry. This is only possible if their key suppliers have similar aims and can provide the service and support that Oyster owner's have become accustomed to. Mastervolt have to date displayed such dedication to service, supporting Oyster yachts around the world. Mastervolt is willing to go that extra mile to provide the service and support which stand Oyster apart."

PETER INGRAM, TECHNICAL MANAGER
OYSTER YACHTS, UNITED KINGDOM



Sales and service, the Mastervolt way

Mastervolt products and components are designed to meet the most stringent demands of our customers. Our high-quality products are only supplied via specialists. These companies provide expert advice, carry out installation work if necessary and take care of service and maintenance.

Mastervolt offers its clients worldwide service via our global network. In case of a malfunctioning or defective product, we recommend contacting your local supplier or a Mastervolt dealer or service point in your region. You can find the Mastervolt dealers and service partners on the Dealer Locator at the Mastervolt site.

See www.mastervolt.com/dealer-locator for a complete overview of our dealers and service partners.

Please check www.mastervolt.com/technical-support for an up-to-date overview of our worldwide technical support and warranty conditions.

MASTERVOLT
THE POWER TO BE INDEPENDENT

The total package of Mastervolt: Meet our other brands

Marinco shore power

The leader in Shore power products, Marinco offers durable, innovative designs to keep your vessel or caravan connected. From cordsets, straight, Y and pigtail adapters to inlets, outlets, and accessories. Marinco offers a broad product line designed with safety in mind for harsh environments, and all products meet rigorous global industry standards. The unique Marinco EEL product line is the first of its kind, with jaw-clamp technology that eliminates the need for a sealing ring and provides a solid connection every time. EEL products include shore power cordsets and adapters.

Charge Pro™

Fixed mount and portable waterproof chargers

With a compact footprint, and a fully sealed, waterproof, IP65 rating, these new chargers feature universal input (90–265 V AC). Highly efficient, microprocessor-controlled, the charging profile also provides “Sense Send” technology, which senses which battery needs the most charge and sends more energy to that battery.

With isolated outputs, the leads may be placed in series or parallel to increase voltage or current as needed. For easy installation, the Marinco chargers are designed for use with the Charge Pro plug. The compact, ergonomic, Marinco portable chargers are ideal for personal watercraft, boats, motorcycles, and more. They charge or maintain 6 V or 12 V, gel, AGM, flooded or high performance batteries. Easy to read, clear graphics indicate voltage, battery type, state of charge, error and power.

The Marinco portable chargers also offer options for installation. Each unit comes complete with a 4 ft cable that connects to a 2 ft lead with ring terminals or a 2 ft lead with alligator clips, all included. Both the Charge Pro fixed mount and portable waterproof chargers meet strict new efficiency standards as well as global standards including CE, CSA, ABYC and are available in 120V/60Hz or 230V/50Hz. Fixed mount 6 A single bank, 10 A dual bank charger, 1.1 A and 4.3 A portable models are available now. Additional single, dual and triple bank models will be available soon.

Marinco sine wave inverters

Clean AC power when and where you desire it; that is what the Marinco inverters provide. With rugged construction for harsh environments, these true sine wave inverters are ideal for sensitive electronics such as monitors, TV and entertainment centers. With a host of safety features including over current, low voltage, reverse polarity and temperature protected, these inverters also feature a low battery alarm and shutdown to protect DC power. Easy to install and operate, the Marinco inverters meet stringent global industry standards including UL-458, FCC Class A, and CE. Models are available from 700 Watts to 2000 Watts in either 120V/60Hz or 230V/50Hz. An optional, easy-to-read remote is also available.

Precision wireless controlled Spotlight

Marinco's innovative Precision Spotlight addresses the common problems found in traditional marine spotlights such as corrosion at the axis point that allows the spotlight to move. With a unique and totally enclosed housing design, all of the critical components are fully protected for long lasting operation. The actual movement of the light up or down is done internally, the reflector moves. Thus, the movement can be smooth and very precise. The neck of the Spotlight only provides side to side movement.

Designed specifically for harsh environments, the Precision Spotlight is constructed for longevity with durable corrosion resistant materials. The smart, wireless communication between the remote control and the Precision Spotlight allow for versatility as to where the control and spotlight can be placed. The Precision Spotlight offers universal 12 or 24 Volt operation in a single design. The bright 100W H3 Halogen bulb and optimized reflector and lens provide a bright and consistent light pattern.

For more information about the complete Marinco product line, please visit **www.marinco.com**

MARINCO

ANCOR

Leader in marine grade wire and connectors

Ancor products

Ancor is the leader in marine grade wire and connectors, serving the marine industry for more than 30 years. Every product we make, from tinned copper wire to insulated connectors to a complete line of hand tools, is designed to withstand the rigors of life on the water. Our wiring products are the longest lasting and most rugged available.

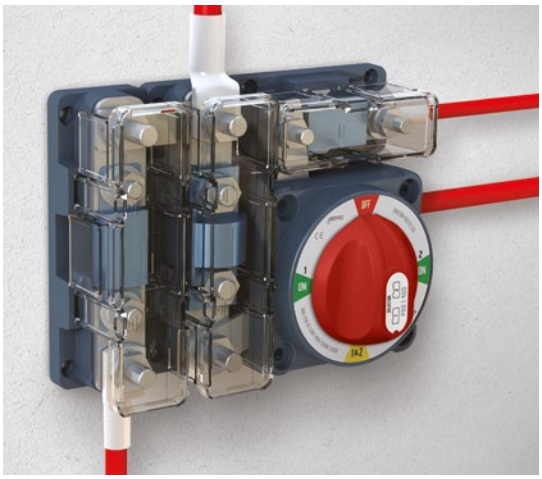
Constructed with the highest quality stranding for improved conductivity and flexibility, and premium vinyl insulation, they exceed UL 1426, ABYC and USCG standards. Ancor's full complement of products means that you are assured of ***Marine Grade™ quality*** throughout your electrical system.

Ancor's product range includes terminals, connectors, cable ties and wraptors, primary, battery and shore power cables, duplex, triplex, signal, instrument, coaxial and audio wires, wire accessories, tools, testers and more.

Visit **ancorproducts.com** to see our full product line.

ANCOR

Pro Installer power management



Onboard power demands continue to increase as users request the comforts of home. Marinco and BEP looked at the common products used by electrical installers everyday and made significant improvements to their design and construction. The result is a robust product line with greater capacity and extended product life.

The valuable space saved onboard gives builders or installers greater flexibility when designing power systems. Since ***Pro Installer*** modular assemblies are designed for fast, flexible installation in tight spaces, it's easy to 'cluster' products and reduce their mounting footprint. The common interconnection height enables solid link bars to connect multiple Pro Installer products - a smart design feature for watercraft or RV's. Like all Marinco products by BEP, you can be assured of durable construction engineered specifically to handle harsh conditions. High temperature, fiber-reinforced base material provides strength and chemical resistance and all ends are radiused to prevent wire chafing. All ***Pro Installer*** products feature stainless steel studs, washers and fasteners, tinned copper conductors, and innovative clear covers with recesses for labeling that protect on three sides with snap-out, side skirts that allow additional cable entry.

Heavy-duty bus bars

The heavy-duty bus bars provide a robust means to connect multiple cables. Available models include a 4-stud, 8mm (5/16") with a 500 A rating, and a 3-stud, 5-stud and 8-stud, 10mm (3/8") bus bar with a 650 A rating. All generous length studs are stainless steel with anti-sieze lubricant.

Z-bus bars

The Z-bus bars innovative design utilizes high and low level bars that allow all of the wiring to enter from one side. The Z-link connects the two levels but may be taken out to isolate one bar from the other. 10-way and 18-way models available and feature four 6mm (1/4") studs with anti-sieze lubricant, 4mm (5/32") terminals, tinned copper conductors, and stainless steel studs, washers and fasteners.

ANL fuse holders

The ANL fuse holders offer unparalleled circuit protection. The innovative Through-Panel fuse holder offers superior access for fuse inspection and replacement as well as a clean installation. Models are available to use with 35–300 A, 35–750 A fuses, or with the through hull version 35–500 A fuses.

Class-T fuse holders

Class-T fuse holders provide the ultimate protection for high power circuits and where extremely fast fuse blow characteristics are needed. Two sizes of Pro Installer Class-T fuse holders are available to accommodate Class-T (JLLN, TJN, A3T) fuses from 225-400 A, or 450-600 A. Fuse studs are 10mm (5/16"), 12mm (1/2"), rating is 50 V DC.

Insulated studs

The insulated studs feature either 8mm (5/16") or 10mm (3/8") generous length studs. The double stud model is ideal for extending outboard motor cables, and feature a 'snap out' insulating partition to allow the linking of studs. The Power Tapping Plate single stud models provide convenient termination points (4mm, 5/16") for additional small cables. Maximum current through the power tapping plate is 50 A per terminal.

Pro Installer
EZ-mount battery switches

1 Fit base

2 Add wiring

3 Clip on actuator

As easy as 1, 2, 3, these revolutionary battery switches allow you to wire from the front.

Never has installation been so easy and cabling so accessible. With their shared interconnection height, EZ-mount battery switches 'cluster' directly with the Pro Installer bus bar range, resulting in the fastest, most compact installations.

All ratings, footprints and features of the EZ-mount switch match the high quality of our standard switches:

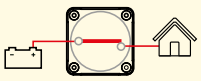
- Easy to install – ability to wire from the front
- Durable construction:
  - Tinned copper 10mm (3/8") studs
  - Stainless steel washers/nuts
  - Fiber reinforced plastics
- Common interconnection height - ability to "cluster"
- Intuitive, ergonomic switch positioning
- Clear graphics indicate switch position
- Standard industry footprint (3.85" x 3.85", 98mm x 98mm)
- 400 A continuous / 600 A intermittent (5 min) / 1500 A cranking (10 sec)
- Waterproof to IP66
- Tested to UL 1107 ignition protection
- CE certified, meets ABYC standards

Pro Installer
standard mount battery switches

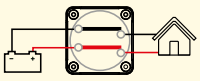
A new range of premium quality battery switches that feature an industry standard mounting footprint. This enables easy mounting into existing or new installations. Improved design and ergonomics provide clear intuitive operation, while attention to all aspects of switch function and use has created superior installation options, high power capacity and improved reliability. The many innovations include a number for which patent applications have been made for switch mounting and functionality.

- **Ease of installation**
  - Choice of 3 mounting options: surface, front or rear panel
  - Standard industry footprint (3.85" x 3.85", 98mm x 98mm)
  - Removable back legs and 3 side plates
  - For use with Imperial or metric fastners
- **Ease of operation**
  - Intuitive, ergonomic switch positioning with clear graphic indication
  - Removable switch knob
  - Proprietary contact and spring design for optimal performance
- **Durable construction**
  - Tinned copper 10mm (3/8") studs
  - Stainless steel washers/nuts
  - Fiber reinforced plastics
- 400 A Continuous / 600 A Intermittent (5 min) / 1500 A Cranking (10 secs)
- Waterproof to IP66
- Tested to UL 1107 ignition protection
- CE certified, meets ABYC standards

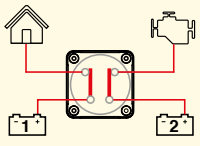
On/Off



Double Pole

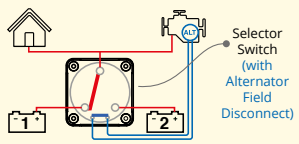


Dual Bank Control



patent pending

Selector



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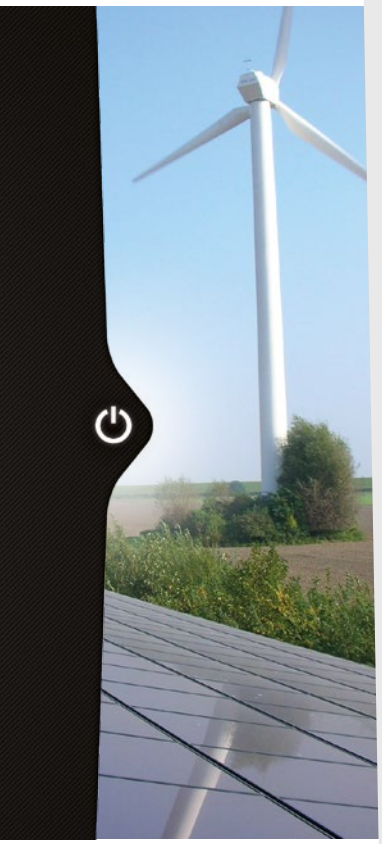

Colophon

This Powerbook is a result of a close co-operation between Mastervolt and the following companies:

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Mastervolt BV
Snijdersbergweg 93
1105 AN AMSTERDAM
The Netherlands
T +31 (0)20 34 22 100
F +31 (0)20 69 71 006
E info@mastervolt.com
I www.mastervolt.com

MASTERVOLT

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