victron energy
BLUE POWER

ŞEBEKEDEN BAĞIMSIZ YEDEKLEME VE ADA SİSTEMLERİ

ENERJI, HER ZAMAN, HER YERDE

Şebekeden bağımsız
İşlevsel bir elektrik şebekesinin varlığı her zaman göründüğü kadar bariz değildir. Güvenilmez bir şebekenin nedeni genellikle yetersiz bir altyapıdır. Hiç şebeke yoksa işler daha da zorlaşır. Ancak yine de güvenilir bir elektrik kaynağına ihtiyaç duyulur. Bu noktada tek cevap yerel ve doğru bir şekilde çalışan bir sistemdir. Victron Energy size bu cevabı sunuyor. Özgürlük ve bağımsızlığın modern tercümesini size sunmaktan gurur duyuyoruz. Enerji, Her Zaman, Her Yerde

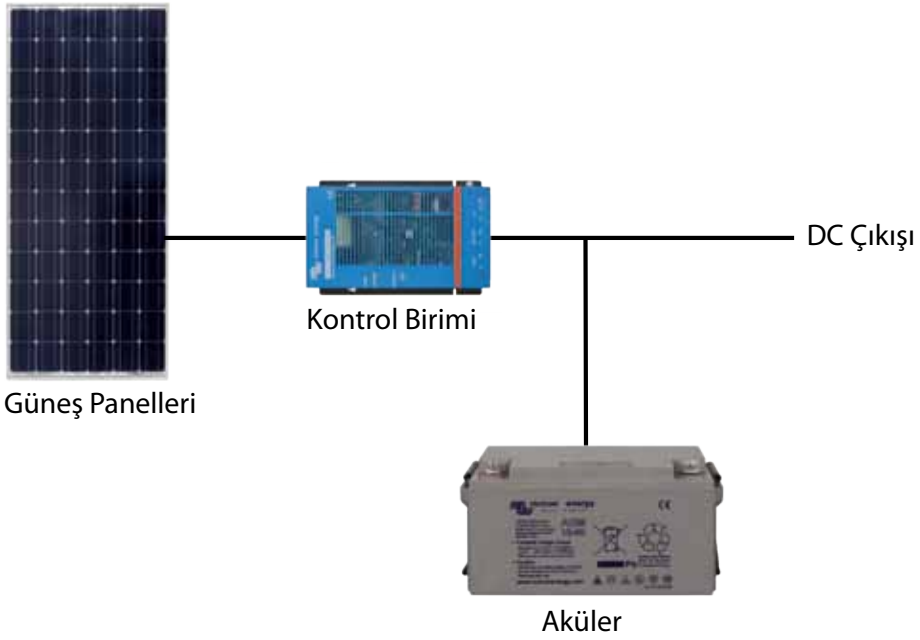
İNDEKS

Hibrit sistemler
Kullanılabilir tek enerji kaynağı güneşse, çözüm basit. Enerji talebinizi karşılamak için bir güneş sistemi tercih edeceksiniz. Eğer daha fazla kaynak kullanılabiliyorsa, bunlar da güneş sisteminizi destekleyebilir. Güneş enerji talebinizi tamamen karşılayamadığı için bir güneş sistemi genellikle bir jeneratörle veya bir rüzgar jeneratörüyle desteklenir. Bu enerji kaynakları güneş açığının karşılanmasını sağlar. Bunun gibi birden fazla enerji kaynağından oluşan kombinasyonlar tasarlamak Victron Energy'nin en iyi yaptığı iştir.

Fotoğraf: Claudia Rehm/Hollandse Hoogte

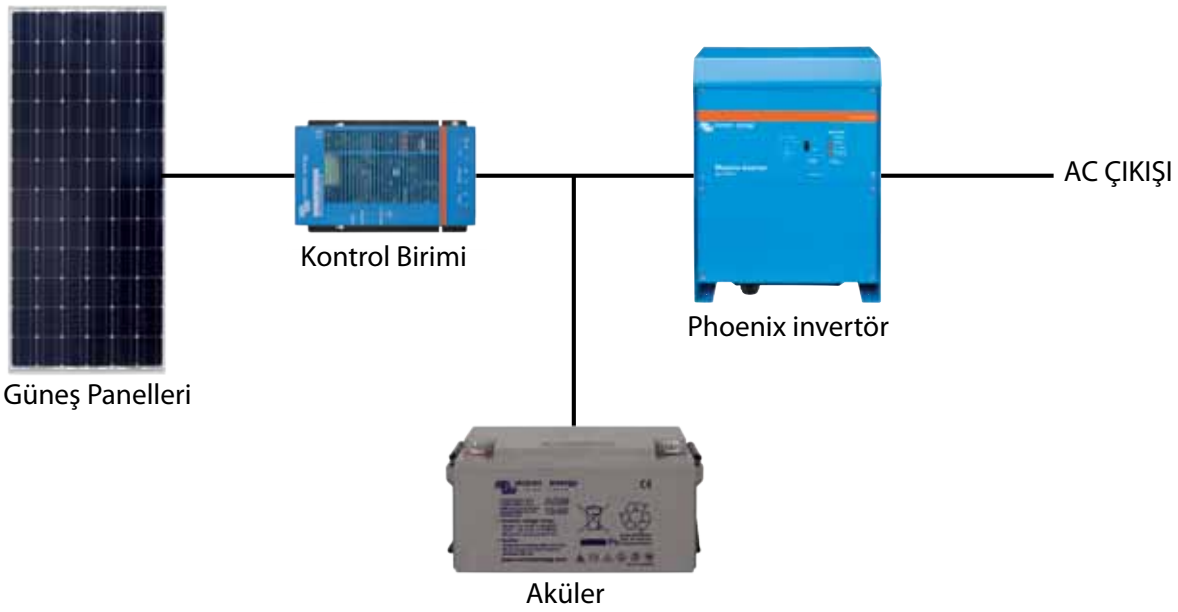
DC SİSTEMLERİ

DC Sistemleri
DC sistemlerinde, güneş enerjisi regüle edilmiş DCa dönüştürülür. Sonuç olarak, regüle edilmiş DC pillere ve tüketicilere sağlanır. Bir invertör DC sistemine bağlı AC tüketicilerine güç sağlar.s DC sistemlerinin aksine, güneş enerjisi AC sistemlerinde doğrudan ACa dönüştürülür. Bu broşürün 7. sayfasında, alternatif akım sistemleri hakkında detaylı bir açıklama bulacaksınız.

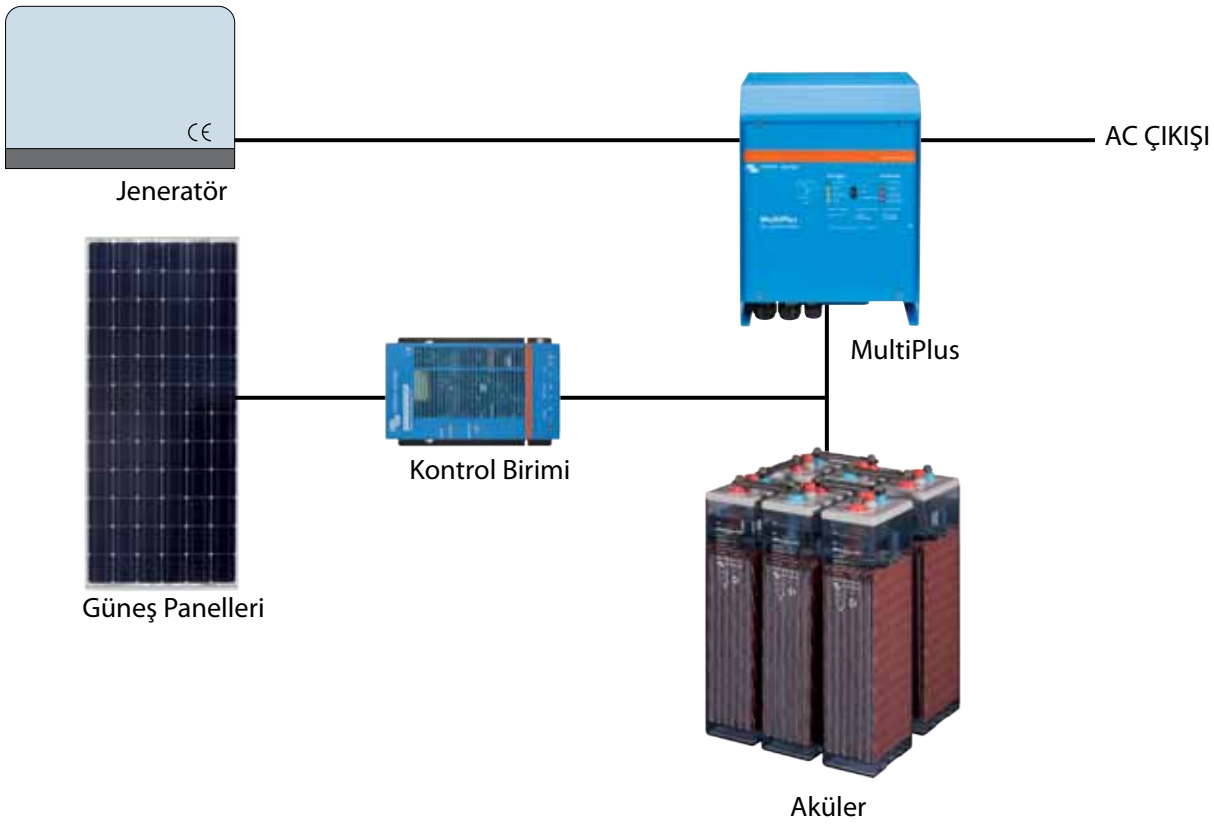


1. DC tüketicileri
Bir güneş paneli pratikte tüketicilere doğrudan güç sağlar. Panel ile güç tüketicisi arasındaki tek madde şarj kontrol birimidir. Bu Blue Solar Şarj Kontrol Birimi tüketiciler ve aküler için voltajları kontrol eder. DC tüketicileri doğrudan akülere bağlıdır.

Cezayir, Kuzey Afrika: Sahra Çölünde solar panelli geleneksel ev.



2. AC tüketicileri
Bu AC tüketicilerine yönelik 230 Volt çıkışa sahip bir DC sistemidir. Yukarıdaki örnekte, AC çıkışı sağlamak için bir Victron Phoenix invertör eklenir.

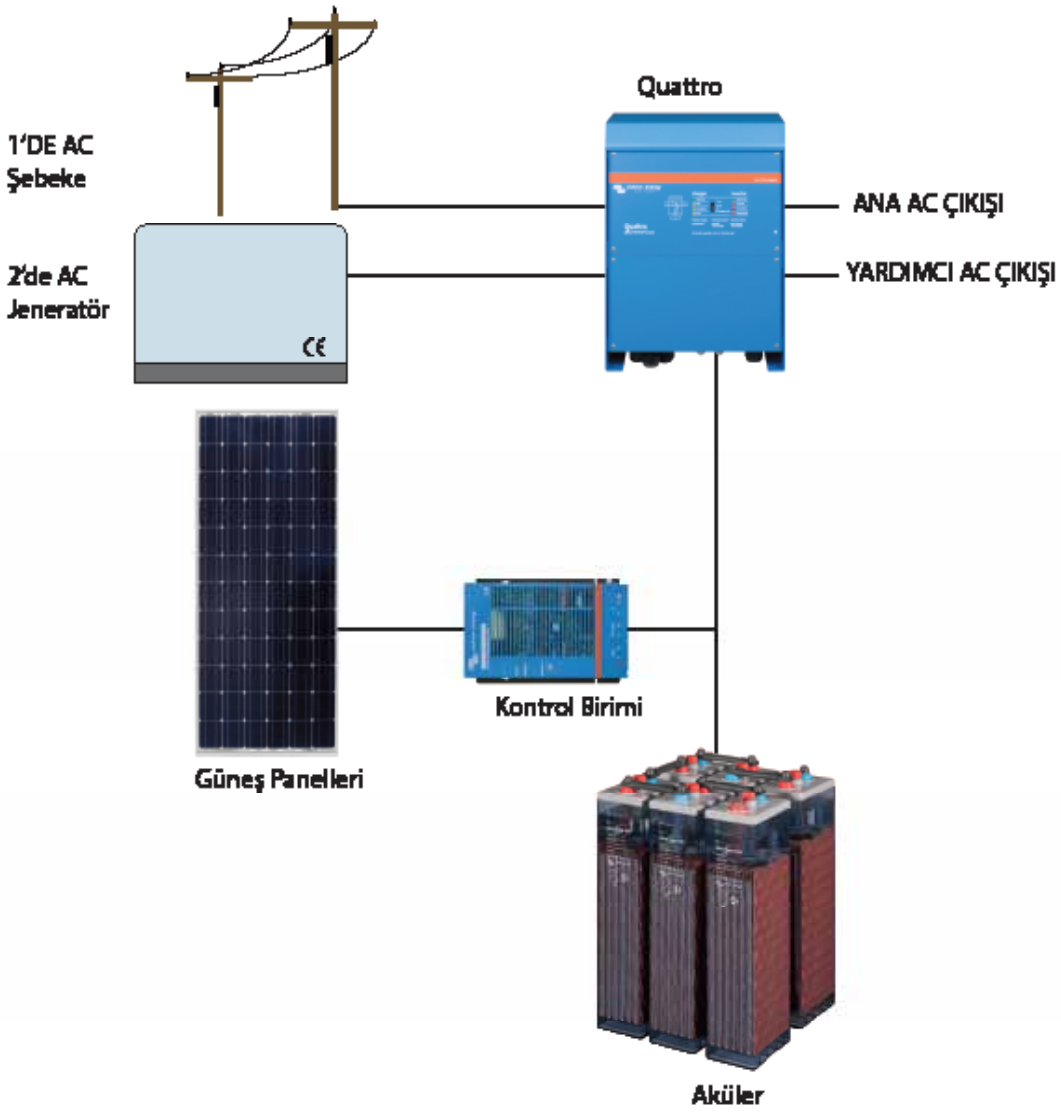


3. Yeterli güneş mevcut değil – hibrit güç
Güneş yeterli enerji sağlamıyorsa, sisteme bir jeneratör eklenir. Bu durumda, bir invertör yerine bir Multiplus invertör/şarj cihazı kullanılır. Jeneratör doğrudan MultiPlus'a bağlıdır. MultiPlus solar güç kullanımını en üst seviyeye çıkarıp uzun bir akü ömrü sağlarken, otomatik olarak jeneratörün çalışmasını ve durmasını düzenler.

PowerAssist – şebeke veya jeneratör gücünün kapasitesini yükseltir
Bu benzersiz Victron özelliği MultiPlus'ın şebeke veya jeneratör gücü kapasitesine ilave yapmayı sağlar. Pik gücün genellikle sadece sınırlı bir süre için gerektiği durumlarda, MultiPlus yetersiz kıyı veya jeneratör gücünün derhal aküden alınan güçle telafi edilmesini sağlar. Yük azaldığında, akü şarj ünitesini yeniden şarj etmek için yedek güç kullanılır.

Dolayısıyla, maksimum pik yükte bir jeneratörü boyunlandırmak gerekmez. Bunun yerine en etkin boyutta jeneratörü kullanın.

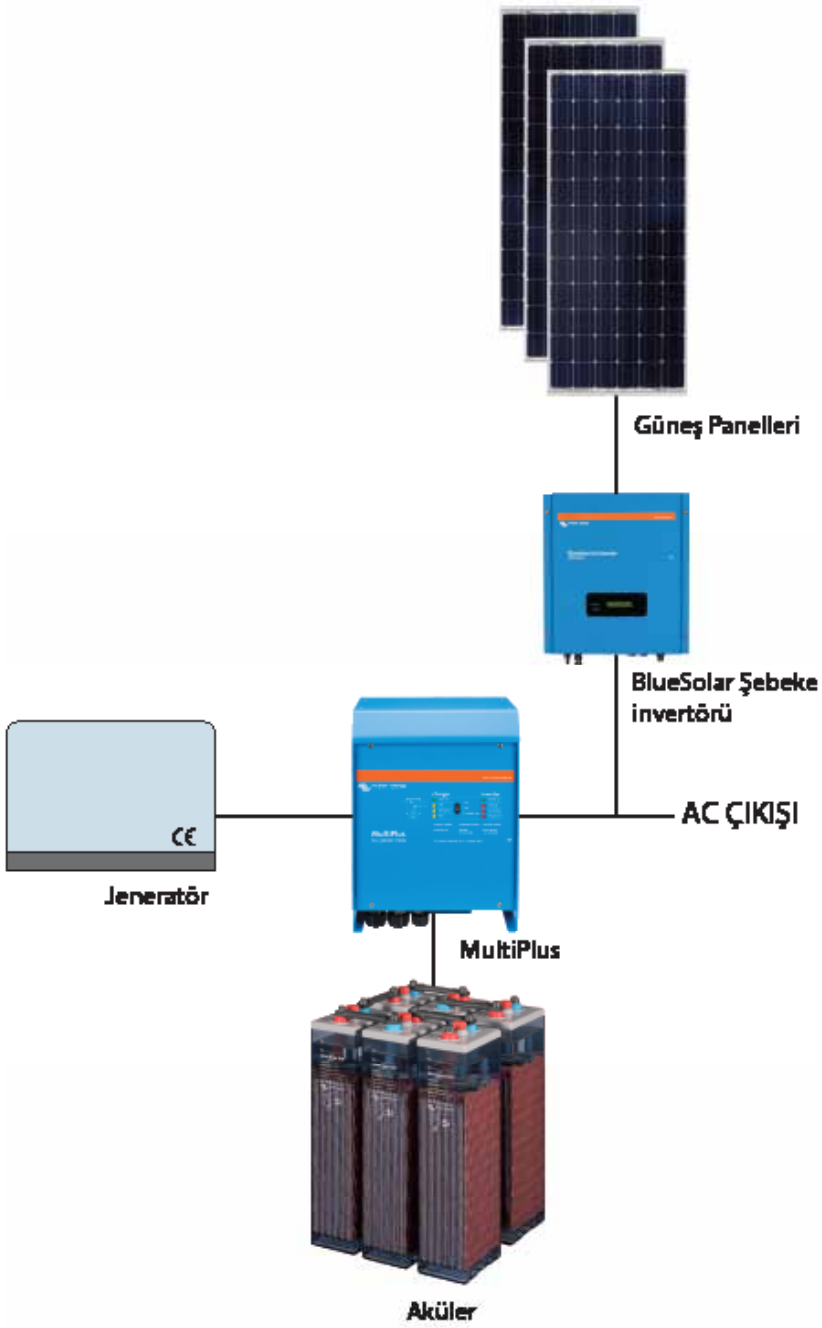
Not: Bu özellik hem MultiPlus'ta hem de Quattro'da mevcuttur.



4. Yedek sistem
Solar enerji bir şebeke bağlantısıyla da kombine edilebilir. Ancak yetersiz bir solar kaynakla birlikte güç kesintileri yaşayan bir şebeke bir jeneratör desteğine ihtiyaç duyar. Bir MultiPlus yerine size hem şebekeye hem de jeneratöre bağlamak için tümleşik bir aktarma anahtarına sahip bir MultiPlus olan Quattro'yu öneririz. Bu şebeke ile jeneratör arasındaki anahtarlama işlemini tamamen otomatik hale getirir.

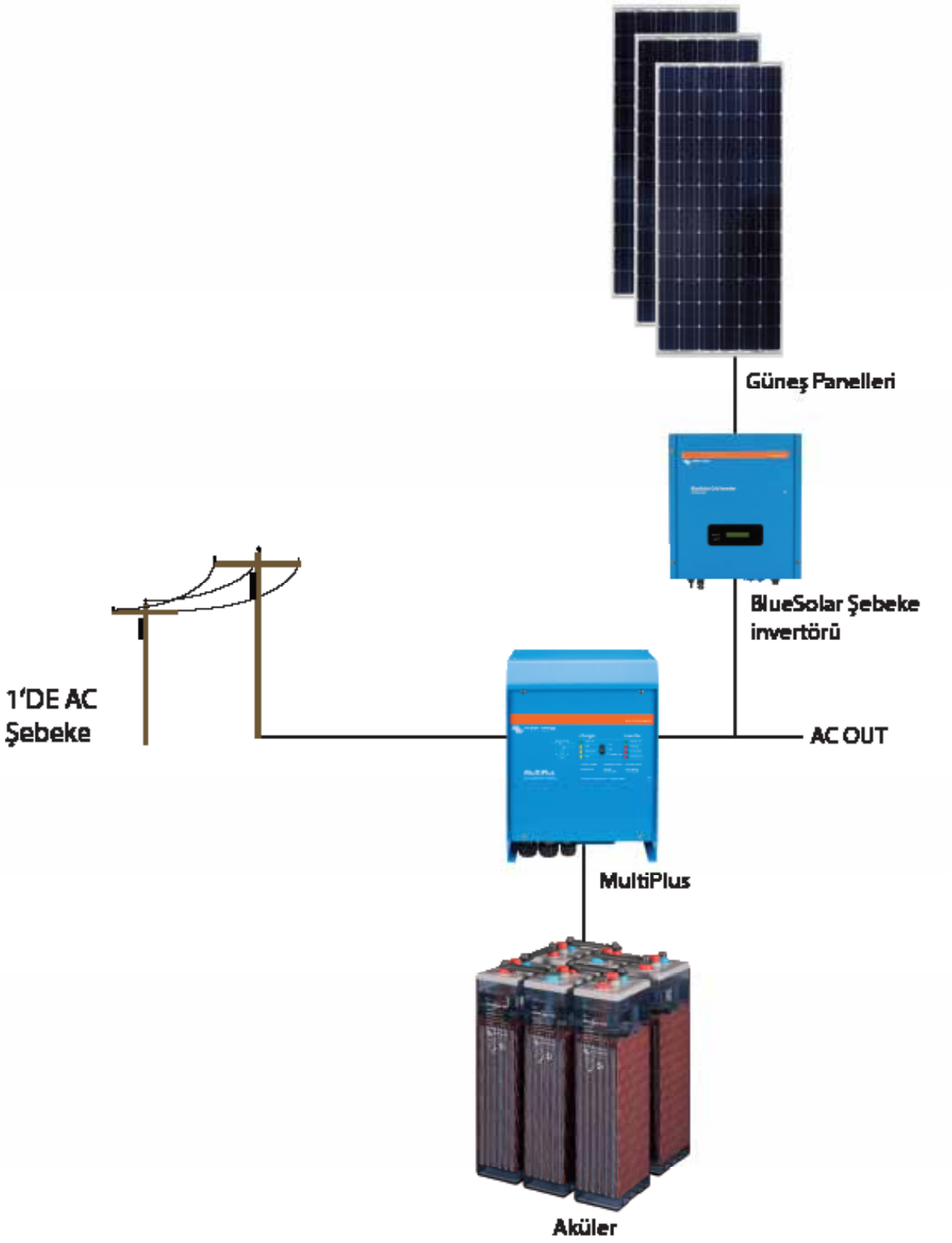
AC SİSTEMLERİ

AC Sistemleri
Genellikle AC tüketicilerine güç sağlayan daha büyük solar sistemler için, solar gücü derhal AC'ye dönüştürmek daha verimlidir. Bu nedenle bunlara "AC sistemleri" denir. AC sistemleri DC sistemlerine kıyasla daha yüksek bir enerji verimliliğine sahiptir. BlueSolar Şebeke İnvertörü solar enerjiyi doğrudan AC'ye dönüştürür. Bu invertör bir MultiPlus veya Quattro tarafından sağlanan bir "şebekeye" ihtiyaç duyar. AC tüketicileri tarafından kullanılmayan solar güç fazlası aküleri şarj etmek için kullanılır.



1. Jeneratörlü ada sistemi
Enerji solar paneller tarafından toplanır toplanmaz, Blue Solar Şebeke İnvertörü tarafından AC'ye dönüştürülür. Jeneratör alternatif akımını doğrudan MultiPlus invertör/şarj cihazına sağlar. MultiPlus solar güç kullanımını en üst seviyeye çıkarırken jeneratörü otomatik olarak çalıştırıp durduracaktır.

AC SİSTEMLERİ

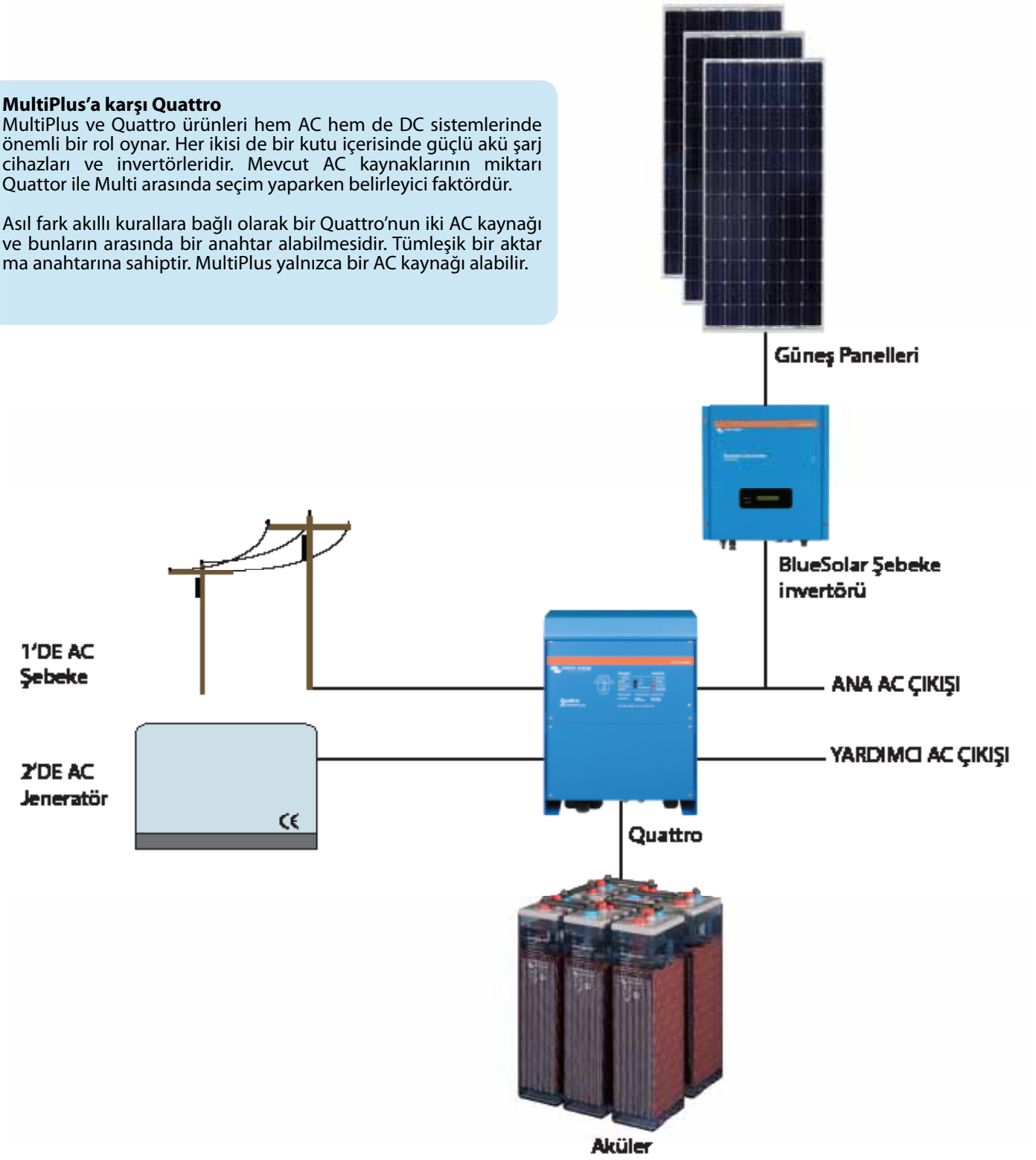


2. Solar ve şebeke
Bu yedek sistemde, şebekeden gelen AC solar panellerden gelen enerjiye ilave yapabilir. Ve aynı şekilde, solar panellerden gelen enerji oluşabilecek tüm şebeke kesintilerini telafi edebilir.

AC SİSTEMLERİ

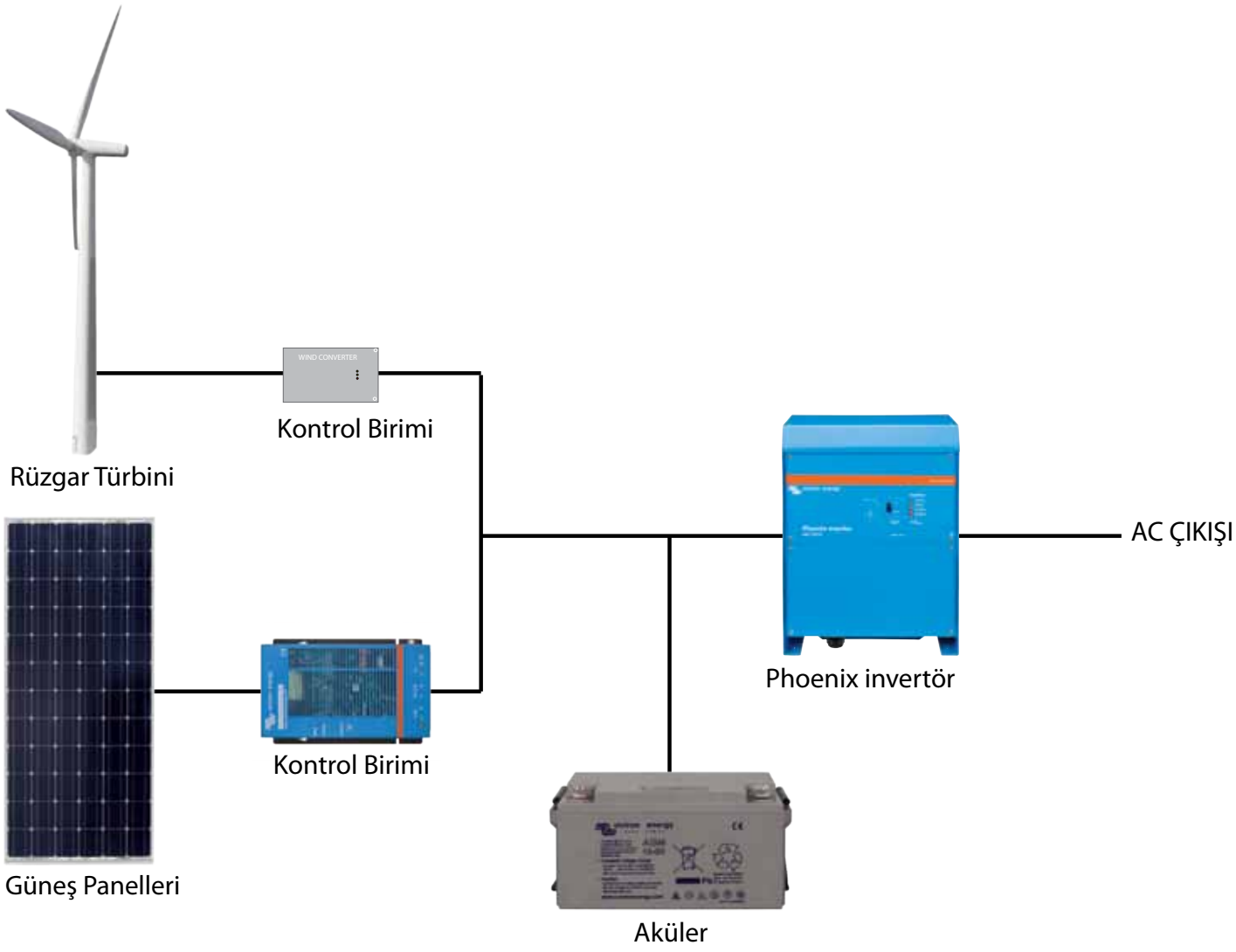
MultiPlus'a karşı Quattro
MultiPlus ve Quattro ürünleri hem AC hem de DC sistemlerinde önemli bir rol oynar. Her ikisi de bir kutu içerisinde güçlü akü şarj cihazları ve invertörleridir. Mevcut AC kaynaklarının miktarı Quattor ile Multi arasında seçim yaparken belirleyici faktördür.

Asıl fark akıllı kurallara bağlı olarak bir Quattro'nun iki AC kaynağı ve bunların arasında bir anahtar alabilmesidir. Tümleşik bir aktar ma anahtarına sahiptir. MultiPlus yalnızca bir AC kaynağı alabilir.



3. Solar, jeneratör ve şebeke
Burada gösterilen gibi kapsamlı bir yedek sistem kesintisiz bir enerji tedariki sağlar. Örneğin, bir şebeke kesintisi gerçekleşir, aküler boşalır ve aynı zamanda mevcut olarak kısıtlı miktarda solar enerji olursa, Quattro invertör/şarj cihazı jeneratörü çalıştırır. Jeneratöre artık ihtiyaç duyulmadığında, otomatik olarak durdurur.

DAHA FAZLA YENILENEBILIR ENERJI KAYNAĞI EKLEME



DC vasıtasıyla diğer yenilenebilir enerji kaynaklarının nasıl ekleneceğini gösteren örnek

AKSESUARLAR

Solar sistemlerimiz çeşitli bileşenlerden oluşur. Bunlardan bazıları solar sistemler için özel olarak tasarlanır. Diğer Victron bileşenlerimiz geniş bir takım uygulamalar için kullanılabilir. Bu bileşenler hakkındaki teknik özellikleri ve diğer detaylı bilgileri sayfa 21'de "Teknik Bilgiler" bölümünde bulabilirsiniz.

Akü Monitörü
Victron Akü Monitörünün temel görevleri şarj ve deşarj akımlarının ölçülmesi, ayrıca şarj durumunu ve akünün kalan süresini hesaplamaktır. Belli limitler aşıldığında bir alarm gönderilir (örneğin aşırı deşarj). Akü monitörünün Victron Global Remote ile veri alışverişi yapması da mümkündür. Bu alarmların gönderilmesini de kapsar.

Victron Global Remote
Victron Global Remote ile uzak bir mesafeden izleme yapmak mümkündür. Global Remote bir cep telefonuna metin mesajları gönderen bir modemdir. Bu mesajlar sistemin durumu hakkında bilgi ve ayrıca uyarı ve alarmları içerir. Global Remote aynı zamanda Victron Akü Monitörleri, Multi'ler, Quattro'lar ve İnvertörlerden gelen çeşitli veri türlerini de kaydeder. Sonuç olarak, bu veriler GPRS bağlantısıyla bir internet sitesine gönderilir. Bu da okunan değerlere uzaktan erişim imkanı tanır.

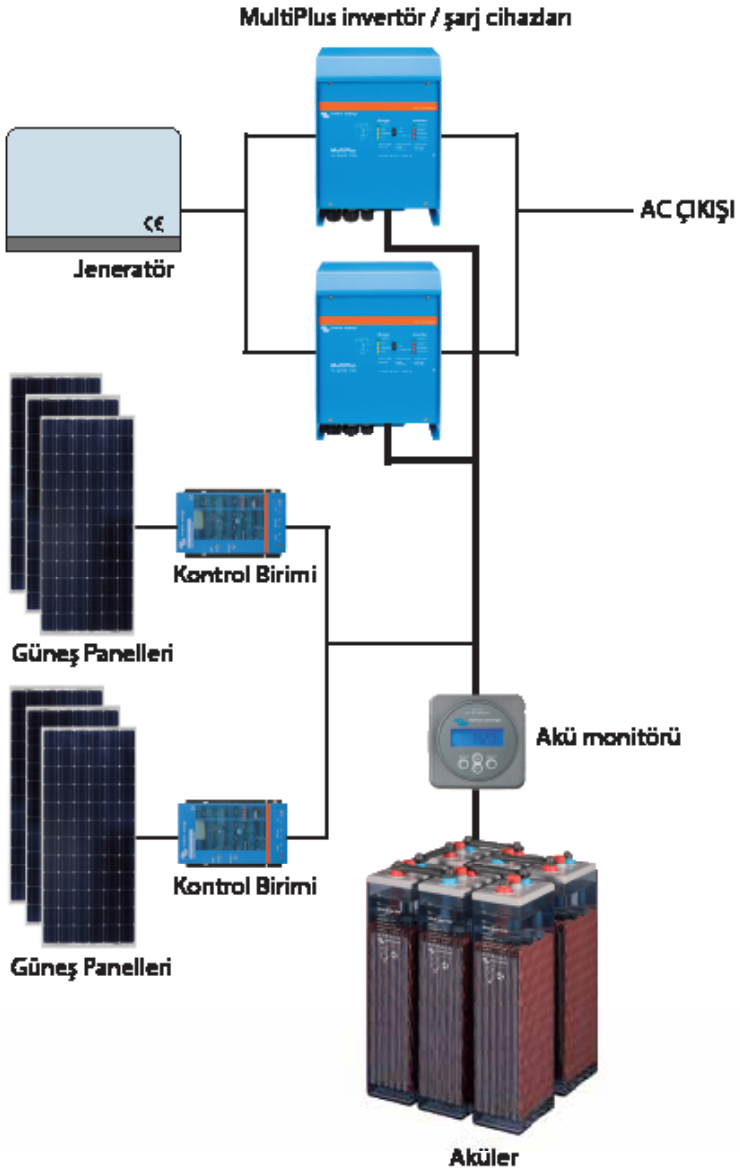
Victron Ethernet Remote
Ethernet Remote Global Remote'a benzerdir. Farkı Ethernet Remote'un bir LAN-bağlantısına sahip olmasıdır. Ethernet Remote'u doğrudan mevcut bir internet bağlantısına bağlamak için özel bir kablo kullanılabilir.

Dijital Çoklu Kontrol Paneli
Bu panel ile, Multiplus ve Quattro sistemlerini uzaktan izleyebilir ve kontrol edebilirsiniz. Düğmenin basit bir hareketle döndürülmesi örneğin bir jeneratörün ve/veya kıyı tarafı akımının güç kaynağını sınırlayabilir. Ayar aralığı en fazla 200A'dır.

Blue Power Panel
Sisteminiz büyüdükçe net bir genel bakış elde etmek zorlaşabilir. Ancak, Blue Power Panel'de durum bundan ibaret değildir. Net ekranı ve sezgisel kontrolü sayesinde, VE.Net ve VE.Bus'a bağlı tüm aygıtları kolaylıkla izlemenize ve kontrol etmenize imkan tanır. Örnekler akü şarj ünitesinin durumu kayıt eden Multi's, Quattro's ve VE.Net Akü Kontrol Birimidir.

DAHA FAZLA GÜÇ

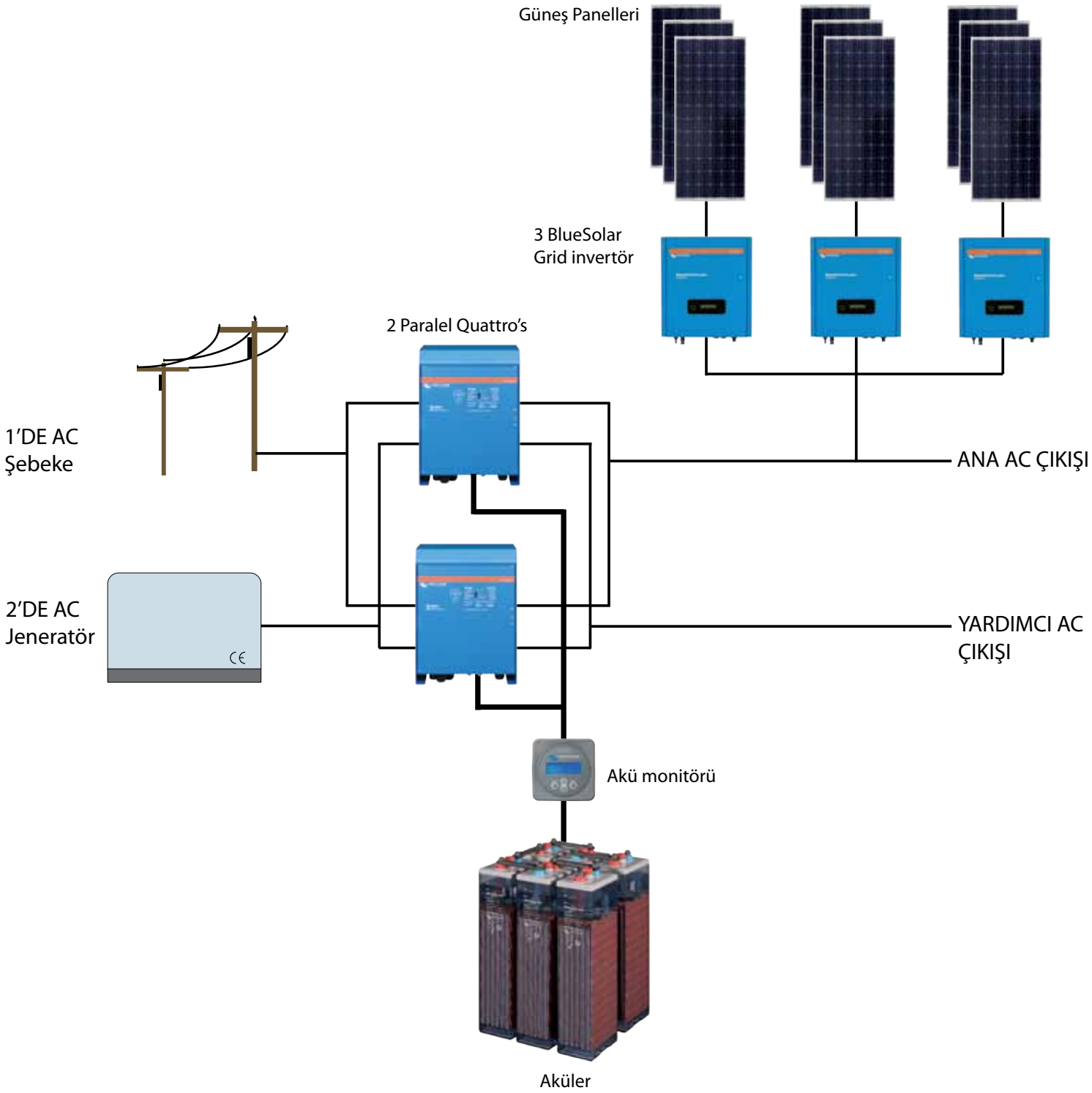
Bu broşürde gösterilen AC ve DC sistemleri Victron Energy'nin sunduğu çeşitli imkanların örnekleridir. Gösterildiği üzere, basitten çok kapsamlı çözümlere kadar farklılaşabilirler. Gerekli güç tek bir ünite için çok yüksekse ürünlerimiz paralel veya üç-fazlı konfigürasyonlar şeklinde konulabilir.



Yapılandırılması kolay
Paralel ve üç fazlı sistemleri yapılandırmak kolaydır. VE-Configure yazılım aracımız hiç bir donanım değişikliği veya dip anahtarı olmaksızın yükleyicinin bileşenleri bir araya getirmesine imkan tanır. Standart ürünleri kullanır.

1. DC sistemi
Yukarıdaki resim paralel tek bir jeneratör olarak yapılandırılan üç şarj kontrol birimi, iki MultiPlus invertör/şarj aletini göstermektedir.

DAHA FAZLA GÜÇ



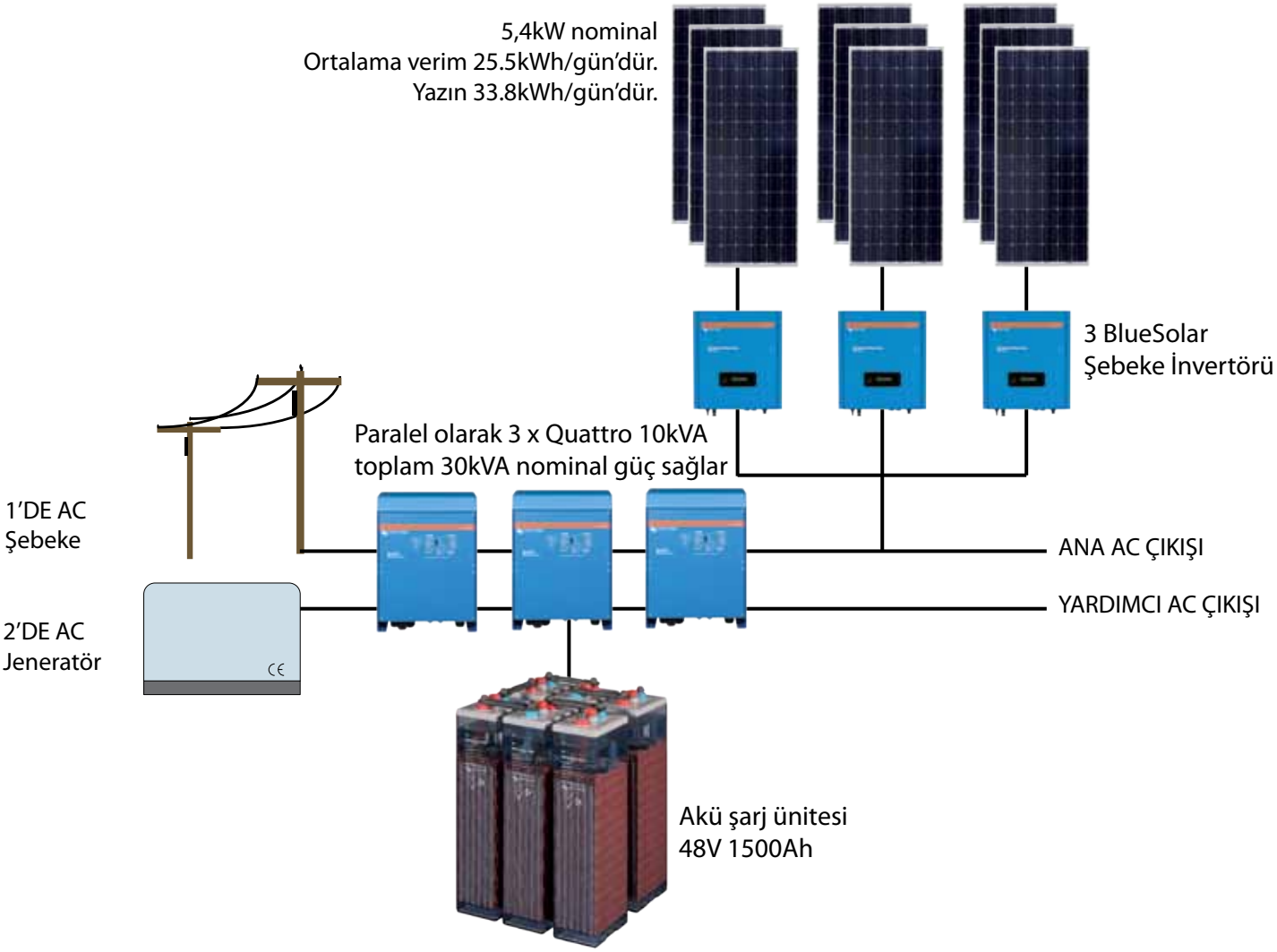
2. AC sistemi
Yukarıdaki resim paralel olarak üç şebeke invertörüne ve iki Quattro'ya sahip bir AC sistemini göstermektedir.

UYGULAMA ÖRNEKLERİ

Calig, İspanya: Quattro ve BlueSolar Şebeke İnvertörlü Şebeke bağlantılı ev

Bu İspanyol şebeke bağlantılı ev yükü desteklemek için solar paneller kullanmaktadır. Üç adet 10kVA Quattro'dan oluşan üç fazlı bir sistem kurulmuş durumda. Fazlar faz başına bir adet olmak üzere 2000W'lık BlueSolar Şebeke İnvertörleriyle birlikte üç fazlı bir konfigürasyon şeklinde düzenlenmiştir. Akü şarj ünitesi 48V 1500Ah'dir. Gün boyunca, BlueSolar Şebeke İnvertörü ev için yük tedarik eder ve aküyü şarj eder. Şayet akü doluysa, Quattro Şebeke İnvertörüne şarj etmeyi durdurması için sinyal verecek çıkış frekansını değiştirir. Bu süre boyunca, tesisat şebekeye bağlı değildir. Akşamları ve hiç güneş olmadığı veya çok az güneş olduğu durumlarda, Quattro akülerden aldığı güçle yük tedarik eder. Akü şarj ünitesi %60'ın altına düştüğünde, Quattro's aküleri yeniden şarj etmek ve yüklere güç vermek için şebekeye bağlanır. Aynı zamanda şebeke kesintileriyle ilgilenmeye yönelik bir de jeneratör vardır.

UYGULAMA ÖRNEKLERİ



Calig, İspanya'daki tesisata genel şematik bakış

UYGULAMA ÖRNEKLERİ

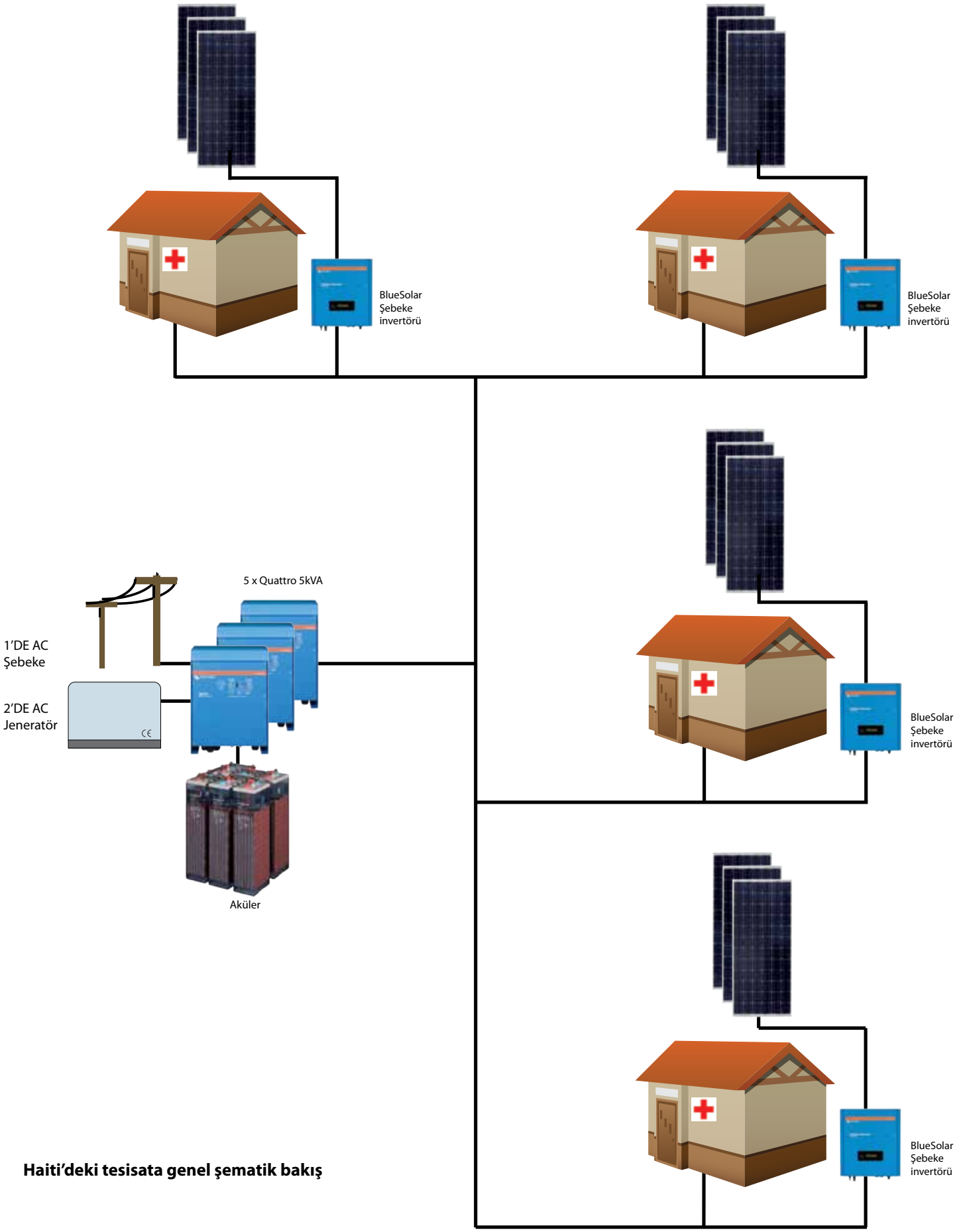
Cap-Hatian, Haiti'de yardım derneği tarafından işletilen hastane

Haiti'deki yıkıcı depremin ardından, halk hala evlerini yeniden inşa etmeye ve toparlanmaya çalışıyor. Cap-Haitian, Haiti'deki yardım derneği tarafından işletilen hastanede, tüm hastaneye güç sağlamak için kapsamlı bir hibrit güç sistemi kuruldu. Sistemin kalbinde paralel olarak bağlanmış beş adet Victron 24/5000/120 Quattro's var. Sadece yüz amper kapasitesinde küçük bir şebeke bağlantısı mevcut. Gerekli gücün daha yüksek olduğu durumlarda, Quattro's şebekeye akülerden gelen enerjiyi sağlayacaktır.

Bu invertörlerin çıkışını şebekeyle senkronize eden PowerAssist adında benzersiz bir Victron özelliğidir. Şebekeye etkin bir şekilde güç ekler. Yük azaldığında, akü şarj ünitesini yeniden şarj etmek için yedek güç kullanılır. Çok küçük olmanın yanı sıra, şebeke bağlantısı aynı zamanda güvenilmezdir. Bir şebeke gücü kaybı durumunda, Quattro's görünmez bir şekilde güç talebini sağlar, böylelikle Hastane güvenilebilir bir güç kaynağına dayanabilir.

Ayrıca güç kesintisi yeterince hızlı bir şekilde giderilmediği durumda 40kVA'lık jeneratörü otomatik olarak başlatır. Hastanenin altı binasının tamamı toplamda 8 adet 180W solar panelle tamamen kaplanmıştır. Bu paneller yüklere güç veren şebeke invertörleri vasıtasıyla Quattro'nun çıkışlarına bağlıdır. Tüm aşırı güç aküleri şarj etmek için kullanılır.

UYGULAMA ÖRNEKLERİ



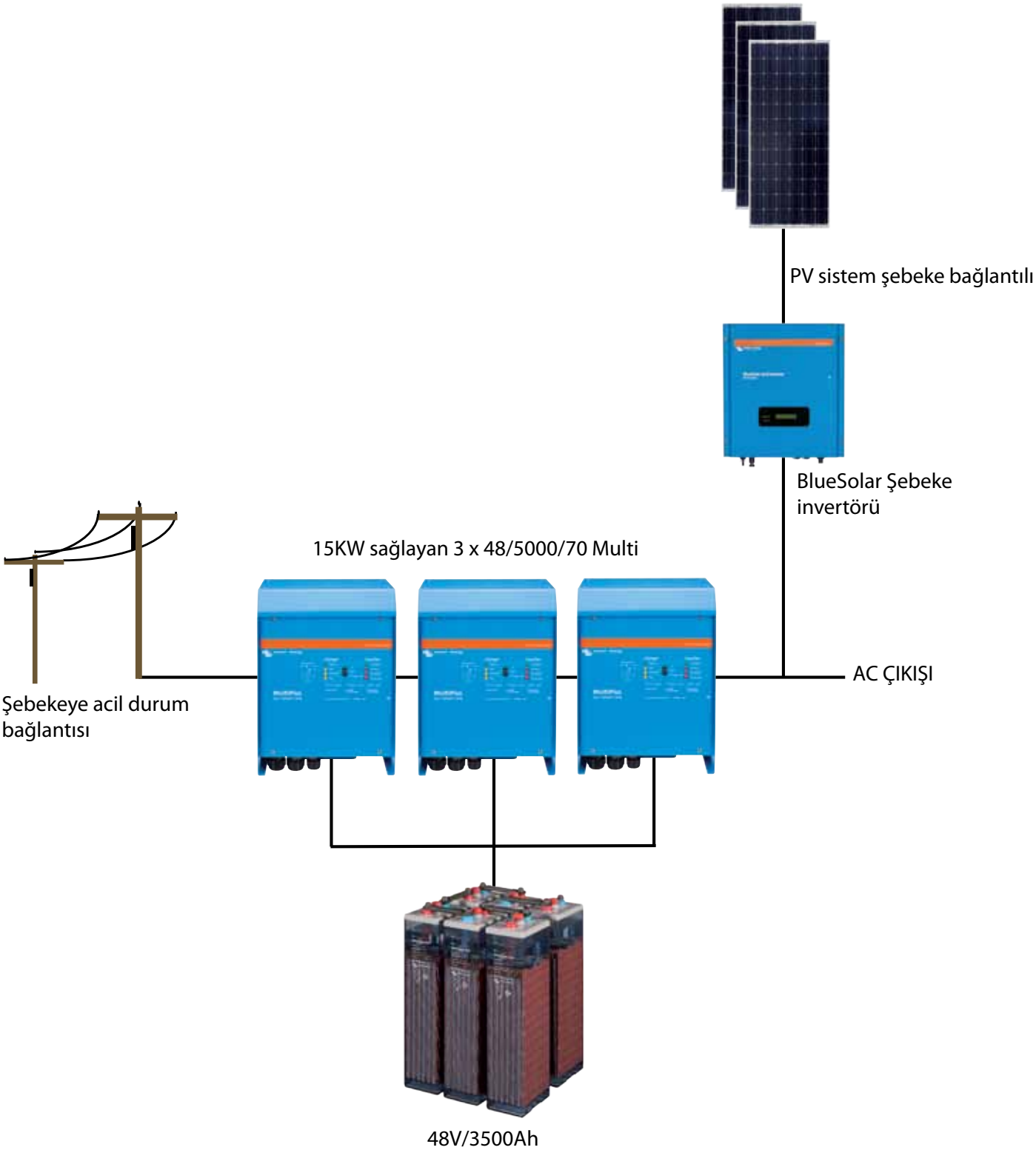
Haiti'deki tesisata genel şematik bakış

UYGULAMA ÖRNEKLERİ

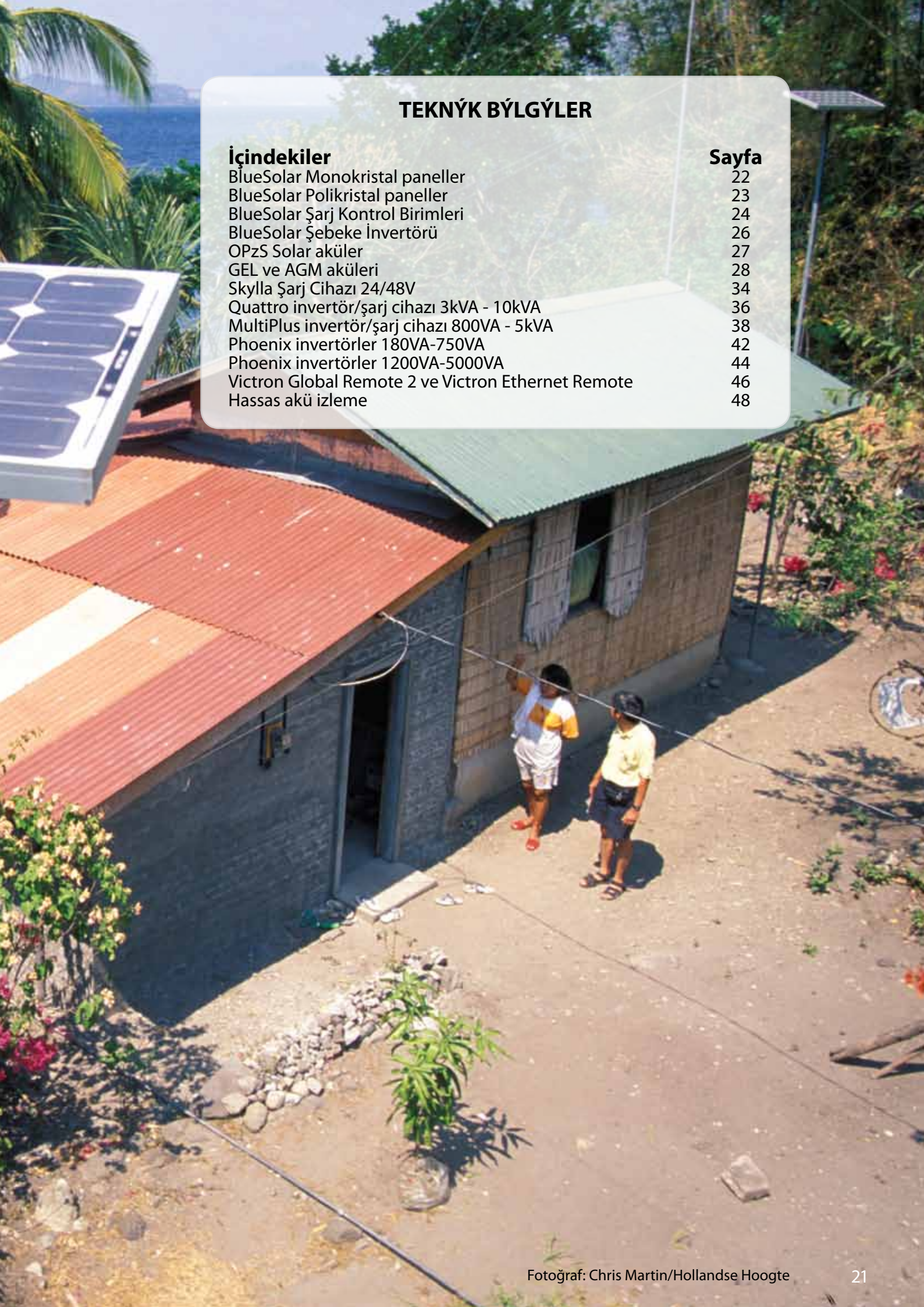
Energyhouse 'de Mirre', Hollanda

Energy House'un çatısına monte edilmiş 28 solar panel vasıtasıyla, elektrik üretilir. Üretilen bu elektrik 48 aküde saklanır, böylelikle elektrik her zaman için mevcuttur. Geceleri ve kış aylarında, elektrik üretmek için çok az veya hiç güneş olmaz, akülerde saklanan enerji kullanılır. Aküler tamamen şarj edildiğinde, eve bir aylık gerekli enerji sağlanabilir. Aküler 300 kWh sak lama kapasitesine sahiptir, tesisat yıllık 4200 kWh üretir.

UYGULAMA ÖRNEKLERİ



Energyhouse-'de Mirre'deki tesisata genel şematik bakış



TEKNÝK BÝLGÝLER

Fotoğraf: Chris Martin/Hollandse Hoogte

BLUE SOLAR MONOCRYSTALLINE PANELS

BlueSolar Monocrystalline 280W

- Low voltage-temperature coefficient enhances high-temperature operation.
- Exceptional low-light performance and high sensitivity to light across the entire solar spectrum.
- 25-year limited warranty on power output and performance.
- 2-year Limited warranty on materials and workmanship.
- Sealed, waterproof, multi-functional junction box gives high level of safety.
- High performance bypass diodes minimize the power drop caused by shade.
- Advanced EVA (Ethylene Vinyl Acetate) encapsulation system with triple-layer back sheet meets the most stringent safety requirements for high-voltage operation.
- A sturdy, anodized aluminum frame allows modules to be easily roof-mounted with a variety of standard mounting systems.
- Highest quality, high-transmission tempered glass provides enhanced stiffness and impact resistance.
- Pre wired quick-connect system with MC4 (PV-ST01) connectors. (Except for the 30W panel)

MC4 connectors

Type	Module Size	Glass size	Weight	Electrical data under STC (1)				
				Nominal Power	Max-Power Voltage	Max-Power Current	Open-Circuit Voltage	Short-circuit Current
				P_{MPP}	V_{MPP}	I_{MPP}	Voc	Isc
Module	mm	mm	Kg	W	V	A	V	A
SPM30-12	450 x 540 x 25	445 x 535	2.5	30	18	1.67	22.5	2
SPM50-12	760 x 540 x 35	755 x 535	5.5	50	18	2.78	22.2	3.16
SPM80-12	1110 x 540 x 35	1105 x 535	8.2	80	18	4.58	22.25	4.98
SPM100-12	963 x 805 x 35	958 x 800	10.5	100	18	5.56	22.4	6.53
SPM130-12	1220 x 808 x 35	1214 x 802	13	130	18	7.23	21.6	7.94
SPM180-24	1580 x 808 x 35	1574 x 802	14.5	180	36	5.01	44.9	5.50
SPM280-24	1956 x 992 x 50	1950 x 986	20	280	36	7.89	44.25	8.76

Module	SPM30-12	SPM50-12	SPM80-12	SPM100-12	SPM130-12	SPM180-24	SPM280-24
Nominal Power (±3% tolerance)	30W	50W	80W	100W	130W	180W	280W
Cell type	Monocrystalline						
Number of cells in series	36					72	
Maximum system voltage (V)	1000V						
Temperature coefficient of P_{MPP} (%)	-0.48/°C	-0.48/°C	-0.48/°C	-0.48/°C	-0.48/°C	-0.48/°C	-0.48/°C
Temperature coefficient of Voc (%)	-0.34/°C	-0.34/°C	-0.34/°C	-0.34/°C	-0.34/°C	-0.34/°C	-0.34/°C
Temperature coefficient of Isc (%)	+0.037/°C	+0.037/°C	+0.037/°C	+0.037/°C	+0.05/°C	+0.037/°C	+0.037/°C
Temperature Range	-40°C to +80°C						
Surface Maximum Load Capacity	200kg/m²						
Allowable Hail Load	23m/s, 7.53g						
Junction Box Type	PV-JH03-2	PV-JH02	PV-JH02	PV-JH02	PV-RH0301	PV-JH03	PV-JH200
Connector Type	No connector	MC4	MC4	MC4	MC4	MC4	MC4
Length of Cables	450mm	750mm	900mm	900mm	900mm	900mm	1000mm
Output tolerance	+/-3%						
Frame	Aluminium						
Product warranty	2 years						
Warranty on electrical performance	10 years 90% + 25 years 80% of power output						
Smallest packaging unit	1 panel						
Quantity per pallet	40 panels	40 panels	20 panels	20 panels	20 panels	20 panels	20 panels

1) STC (Standard Test Conditions): 1000W/m², 25ºC, AM (Air Mass) 1.5

BLUE SOLAR POLYCRYSTALLINE PANELS

BlueSolar Polycrystalline 130W

- Low voltage-temperature coefficient enhances high-temperature operation.
- Exceptional low-light performance and high sensitivity to light across the entire solar spectrum.
- 25-year limited warranty on power output and performance.
- 2-year Limited warranty on materials and workmanship.
- Sealed, waterproof, multi-functional junction box gives high level of safety.
- High performance bypass diodes minimize the power drop caused by shade.
- Advanced EVA (Ethylene Vinyl Acetate) encapsulation system with triple-layer back sheet meets the most stringent safety requirements for high-voltage operation.
- A sturdy, anodized aluminum frame allows modules to be easily roof-mounted with a variety of standard mounting systems.
- Highest quality, high-transmission tempered glass provides enhanced stiffness and impact resistance.
- Pre wired quick-connect system with MC4 (PV-ST01) connectors.

MC4 connectors

Type	Module Size	Glass size	Weight	Electrical data under STC (1)				
				Nominal Power	Max-Power Voltage	Max-Power Current	Open-Circuit Voltage	Short-circuit Current
				P_{MPP}	V_{MPP}	I_{MPP}	Voc	Isc
Module	mm	mm	Kg	W	V	A	V	A
SPP30-12	735x350x25	730x345	3.5	30	18	1.66	21.6	1.83
SPP50-12	778x679x35	772x672	6.5	50	18	2.78	21.6	3.05
SPP80-12	950x670x35	945x665	8.2	80	18	4.58	22.25	4.98
SPP100-12	1150x670x35	1145x665	11.8	100	18	5.72	22.36	6.12
SPP130-24	1482x676x50	1476x670	13	130	18	7.23	21.6	7.94
SPP280-24	1956x992x50	1950x986	24	280	36	7.89	44.25	8.76

Module	SPP30-12	SPP50-12	SPP80-12	SPP100-12	SPP130-12	SPP280-24
Nominal Power (±3% tolerance)	30W	50W	80W	100W	130W	280W
Cell type	Polycrystalline					
Number of cells in series	36					72
Maximum system voltage (V)	1000V					
Temperature coefficient of PMPP (%)	-0.47/°C	-0.47/°C	-0.47/°C	-0.47/°C	-0.47/°C	-0.47/°C
Temperature coefficient of Voc (%)	-0.35/°C	-0.35/°C	-0.34/°C	-0.34/°C	-0.35/°C	-0.35/°C
Temperature coefficient of Isc (%)	+0.05/°C	+0.05/°C	+0.045/°C	+0.045/°C	+0.05/°C	+0.045/°C
Temperature Range	-40°C to +80°C					
Surface Maximum Load Capacity	200kg/m²					
Allowable Hail Load	23m/s, 7.53g					
Junction Box Type	PV-JH03-2	PV-RH0301	PV-JH02	PV-JH02	PV-RH0301	PV-JH200
Connector Type	No connector	MC4				
Length of Cables	450mm	900mm				1000mm
Output tolerance	+/-3%					
Frame	Aluminium					
Product warranty	2 years					
Warranty on electrical performance	10 years 90% + 25 years 80% of power output					
Smallest packaging unit	1 panel					
Quantity per pallet	40 panels	40 panels	20 panels	20 panels	20 panels	20 panels

1) STC (Standard Test Conditions): 1000W/m², 25°C, AM (Air Mass) 1.5

BLUESOLAR CHARGE CONTROLLERS

BlueSolar 12/24-10

BlueSolar 12/24-PWM **Three models: 5A, 10A or 20A at 12V or 24V ***

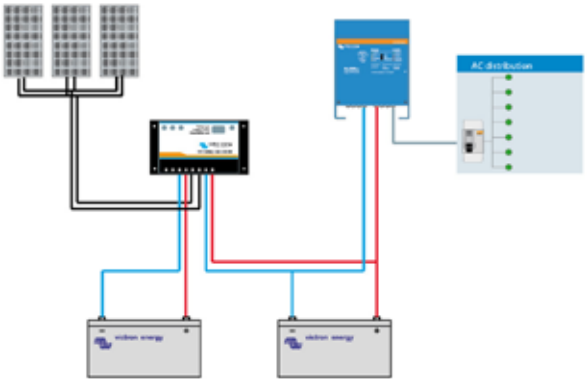
- Low cost PWM controller.
- Internal temperature sensor.
- Three stage battery charging (bulk, absorption, float).
- Protected against over current.
- Protected against short circuit.
- Protected against reverse polarity connection of the solar panels and/or battery.
- With low voltage load disconnect output.
- Optional remote display (20A model only)

BlueSolar DUO 12/24-20

BlueSolar DUO 12/24-20 **20A at 12V or 24V ***

- PWM controller.
- Charges two separate batteries. For example the starter battery and the service battery of a boat or mobile home.
- Programmable charge current ratio (standard setting: equal current to both batteries).
- Charge voltage settings for three battery types (Gel, AGM and Flooded).
- Internal temperature sensor and optional remote temperature sensor.
- Protected against over current.
- Protected against short circuit.
- Protected against reverse polarity connection of the solar panels and/or battery.

Remote display for BlueSolar 12/24-20

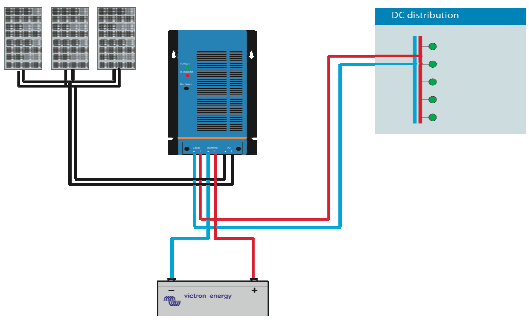


Starter battery Service battery

BlueSolar MPPT 12/24-40

BlueSolar MPPT 12/24-40 **40A at 12V or 24V ***

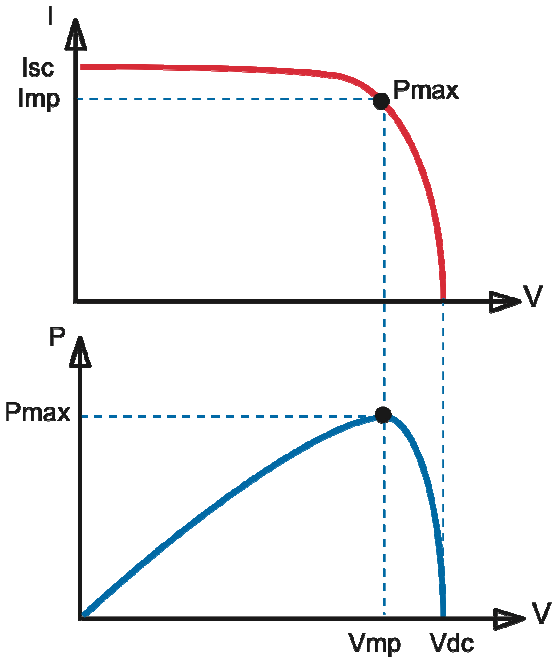
- Maximum Power Point Tracking (MPPT) controller. Increases charge current by up to 30% compared to a PWM controller.
- Charge voltage settings for eight battery types, plus two equalize settings.
- Remote temperature sensor.
- Protected against over current.
- Protected against short circuit.
- Protected against reverse polarity connection of the solar panels and/or battery.
- With low voltage load disconnect output.



BLUESOLAR CHARGE CONTROLLERS

BlueSolar	BlueSolar 12/24-5 BlueSolar 12/24-10 BlueSolar 12/24-20		BlueSolar DUO 12/24-20		BlueSolar MPPT 12/24-40	
	12V	24V	12V	24V	12V	24V
Battery Voltage	12/24V Auto Select (2)		12/24V Auto Select (2)		12/24V Auto Select (2)	
Rated charge current	5/10/20A		20A		40A	
MPPT Tracking	No		No		Yes	
Second battery output	No		Yes		No	
Automatic load disconnect	Yes (maximum load 10/10/20A)		n. a.		Yes (maximum load 15A)	
Maximum solar voltage	28/55V (2)		28/55V (2)		28/55V (2)	
Self-consumption	6mA		4mA		10mA	
Default settings						
Absorption charge (1)	14.4V	28.8V	14.4V	28.8V	14.4V	28.8V
Float charge (1)	13.7V	27.4V	13.7V	27.4V	13.7V	27.4V
Equalization charge	n. a.		n. a.		15.0V	30.0V
Over charge disconnect	n. a.		n. a.		14.8V	29.6V
Over charge recovery	n. a.		n. a.		13.6V	27.2V
Low voltage load disconnect	11.1V	22.2V	n. a.		10.8V	21.6V
Low voltage load reconnect	12,6V	25.2V	n. a.		12.3V	24.6V
Enclosure & Environmental						
Battery temperature sensor	Yes Internal sensor		Yes Internal sensor		Yes Remote sensor	
Temperature compensation	-30mV/°C	-60mV/°C	-30mV/°C	-60mV/°C	-30mV/°C	-60mV/°C
Operating temperature	-35°C to +55°C (full load)		-35°C to +55°C (full load)		0-40°C (full load) 40-60°C (derating)	
Cooling	Natural Convection		Natural Convection		Natural Convection	
Humidity (non condensing)	Max. 95%		Max. 95%		Max. 95%	
Protection class	IP20		IP20		IP20	
Terminal size	6mm² / AWG10		6mm² / AWG10		8mm² / AWG8	
Weight	160/160/180gr		180gr		1400gr	
Dimension (h x w x d)	70x133x34 mm 70x133x34 mm 76x153x37 mm		76x153x37 mm		202x66x140 mm	
Mounting	Vertical wall mount Indoor only		Vertical wall mount Indoor only		Vertical wall mount Indoor only	
Standards						
Safety	EN60335-1					
EMC	EN61000-6-1, EN61000-6-3					

1) BlueSolar 12/24-20, DUO 12/24-20 and BlueSolar MPPT 12/24-40: Other settings possible (see manual)
2) For 12V use 36 cell Solar panels
For 24V use 72 cell Solar panels



Maximum Power Point Tracking

Upper curve:
Output current (I) of a solar panel as function of output voltage (V).
The maximum power point (MPP) is the point P_{max} along the curve where the product I x V reaches its peak.

Lower curve:
Output power P = I x V as function of output voltage.
When using a PWM (not MPPT) controller the output voltage of the solar panel will be nearly equal to the voltage of the battery, and will be lower than V_{MP}.

BLUESOLAR GRID INVERTER

BlueSolar Grid Inverter	1500	2000	2800	4000	5000
GRID OUTPUT (AC)					
Nominal output power	1500W	2000W	2800W	4000W	5000W
Maximum output power	1650W	2200W	3000W	4400W	5500W
Nominal output current	6.52A	8.7A	12A	17.5A	22A
Maximum output current	7.2A	9.5A	13A	19A	24A
Maximum fuse protection	16A	16A	16A	25A	25A
Harmonic distortion of output current	<3% at nominal power <5% at 50% power				
Nominal AC output voltage	220V - 230V - 240V				
Power factor	>0,99% at nominal power				
Operating AC voltage range	190-260V				
Nominal AC frequency	50Hz				
Operating AC frequency range	45.5-54.5Hz				
Internal consumption at night	<0,1W				
Short circuit proof	Yes				
SOLAR INPUT (DC)					
Maximum Input voltage	450V	500V	500V	550V	550V
Input Voltage MPPT range	110-430V	110-480V	110-480V	110-530V	110-530V
Maximum input current	9A	10A	13A	18A	20A
Maximum input power	1750W	2280W	3160W	4500W	5200W
Number of MPPT trackers	1	1	1	1	1
Number of strings	1	1	2	4	4
Start-up power	7W	7W	7W	10W	10W
Ground fault monitoring	RCMU (residual current monitoring unit)				
Reverse polarity protection	Yes, with short circuit diode				
EFFICIENCY					
Maximum efficiency	95.5%	96.4%	96.4%	97.6%	97.8%
European standard efficiency	94.5%	95.4%	95.5%	96.7%	96.9%
GENERAL					
Topology	Transformerless				
Communication port	RS232				
Operating temperature range	-20°C to 60°C (automatic power limit in case of internal over temperature)				
Nominal power temperature range	-20°C to 55°C				
Storage temperature range	-20°C to 70°C				
Maximum operating altitude	2000 m (5% derating at 4000 m)				
Cooling method	Natural convection				
Relative humidity	Max 95%				
ENCLOSURE					
Protection degree	IP54				
DC connectors	MC4 (Multi Contact 4mm)				
Weight (kg)	14.8 kg	14.8 kg	14.8 kg	20.7 kg	20.7 kg
Dimensions (hxwxd, mm))	376x415x125	376x415x125	376x415x125	368x475x195	368x475x195
STANDARDS					
Safety	EN 50178				
EMC, Emission	EN 61000-6-3				
EMC, Immunity	EN 61000-6-2				
EMC, Harmonics and Flicker	EN 61000-3-2, EN 61000-3-3				
Automatic Grid Disconnection	VDE 0126-1-1 (2006)				

OPZS SOLAR BATTERIES

Battery OPzS Solar

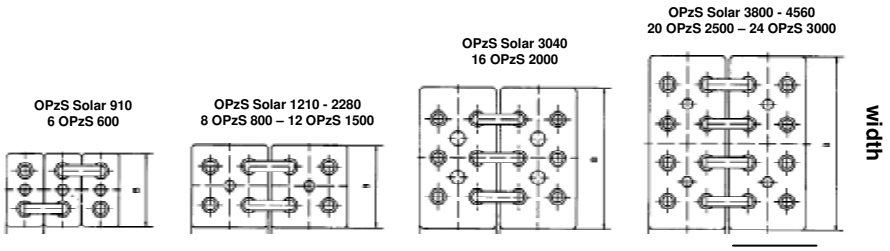
Long life flooded tubular plate batteries
Design life: >20 years at 20ºC, >10 years at 30ºC, >5 years at 40ºC.
Cycling expectancy of up to 1500 cycles at 80% depth of discharge.
Manufactured according to DIN 40736, EN 60896 and IEC 896-1.

Low maintenance
Under normal operating conditions and 20ºC, distilled water has to be added every 2 – 3 years.

Dry-charged or ready for use electrolyte filled
The batteries are available filled with electrolyte or dry-charged (for long term stocking, container transport or air transport). Dry charged batteries have to be filled with diluted sulphuric acid (density 1,24kg/l @ 20ºC).
The electrolyte may be stronger for cold- or weaker for hot climates.

Learn more about batteries and battery charging
To learn more about batteries and charging batteries, please refer to our book 'Energy Unlimited' (available free of charge from Victron Energy and downloadable from www.victronenergy.com).

OPzS Solar type	OPzS Solar 910	OPzS Solar 1210	OPzS Solar 1520	OPzS Solar 1830	OPzS Solar 2280	OPzS Solar 3040	OPzS Solar 3800	OPzS Solar 4560
Nominal capacity (120 hr / 20ºC)	910 Ah	1210 Ah	1520 Ah	1830 Ah	2280 Ah	3040 Ah	3800 Ah	4560 Ah
Capacity (10 hr / 20ºC)	640 Ah	853 Ah	1065 Ah	1278 Ah	1613 Ah	2143 Ah	2675 Ah	3208 Ah
Capacity 2 / 5 / 10 hours (% of 10hr capacity)	60 / 85 / 100 (@ 68ºF/20ºC, end of discharge 1,8 Volt per cell)							
Capacity 20 / 24 / 48 / 72 hours (% of 120hr capacity)	77 / 80 / 89 / 95 (@ 68ºF/20ºC, end of discharge 1,85 Volt per cell)							
Capacity 100 / 120 / 240 hours (% of 120hr capacity)	99 / 100 / 104 (@ 68ºF/20ºC, end of discharge 1,85 Volt per cell)							
Self-discharge @ 70ºF/20ºC	3% per month							
Absorption voltage (V) @ 70ºF/20ºC	2,35 to 2,50 V/cell (28,2 to 30,0 V for a 24 Volt battery)							
Float voltage (V) @ 70ºF/20ºC	2,23 to 2,30 V/cell (26,8 to 27,6 V for a 24 Volt battery)							
Storage voltage (V) @ 70ºF/20ºC	2,18 to 2,22 V/cell (26,2 to 26,6 V for a 24 Volt battery)							
Float design life @ 70ºF/20ºC	20 years							
Cycle design life @ 80% discharge	1500							
Cycle design life @ 50% discharge	2500							
Cycle design life @ 30% discharge	4000							
Dimensions (lxwxh, mm)	147 x 208 x 666	191 x 210 x 666	233 x 210 x 666	275 x 210 x 666	275 x 210 x 821	397 x 212 x 797	487 x 212 x 797	576 x 212 x 797
Dimensions (lxwxh, inches)	5,8 x 8,2 x 26,3	7,5 x 8,2 x 26,3	9,2 x 8,2 x 26,3	10,8 x 8,2 x 26,3	10,8 x 8,2 x 32,4	15,7 x 8,4 x 31,4	19,2 x 8,4 x 31,4	22,7 x 8,4 x 31,4
Weight without acid (kg / pounds)	35 / 77	46 / 101	57 / 126	66 / 146	88 / 194	115 / 254	145 / 320	170 / 375
Weight with acid (kg / pounds)	50 / 110	65 / 143	80 / 177	93 / 205	119 / 262	160 / 253	200 / 441	240 / 530



Cell interconnection

GEL AND AGM BATTERIES

1. VRLA technology

VRLA stands for Valve Regulated Lead Acid, which means the batteries are sealed. Gas will escape through the safety valves only in case of overcharging or cell failure.
VRLA batteries have exceptional leak resistance, and can be used in any position.
VRLA batteries are maintenance free for life.

2. Sealed (VRLA) AGM batteries

AGM stands for Absorbent Glass Mat. In these batteries the electrolyte is absorbed into a glass-fibre mat between the plates by capillary action. As explained in our book 'Energy Unlimited', AGM batteries are more suitable for short-time delivery of very high currents (engine starting) than gel batteries.

3. Sealed (VRLA) Gel batteries

Here the electrolyte is immobilized as gel. Gel batteries in
general have a longer service life and better cycle capacity than AGM batteries.

4. Low Self-discharge

Because of the use of lead calcium grids and high purity materials, Victron VRLA batteries can be stored during long periods of time without recharge. The rate of self-discharge is less than 2% per month at 20°C. The self discharge doubles for every increase in temperature with 10°C.
Victron VRLA batteries can therefore be stored during up to a year without recharging, if kept under cool conditions.

5. Exceptional Deep Discharge Recovery

Victron VRLA batteries have exceptional discharge recovery, even after deep or prolonged discharge.
It should however be stressed that repetitive deep discharge and prolonged discharge have a very negative influence on the service life of all lead acid batteries, Victron batteries are no exception.

6. Battery discharging characteristics

The rated capacity of Victron AGM and Gel Deep Cycle batteries refers to 20 hour discharge, in other words: a discharge current of 0,05 C.
The rated capacity of Victron Tubular Plate Long Life batteries refers to 10 hours discharge.
The effective capacity decreases with increasing discharge current (see table 1). Please note that the capacity reduction will be even faster in case of a constant power load, such as an inverter.

Discharg time (constant current)	End Voltage V	AGM 'Deep Cycle' %	Gel 'Deep Cycle' %	Gel 'Long Life' %
20 hours	10,8	100	100	112
10 hours	10,8	92	87	100
5 hours	10,8	85	80	94
3 hours	10,8	78	73	79
1 hour	9,6	65	61	63
30 min.	9,6	55	51	45
15 min.	9,6	42	38	29
10 min.	9,6	38	34	21
5 min.	9,6	27	24	
5 seconds		8 C	7 C	

Table 1: Effective capacity as a function of discharge time
(the lowest row gives the maximum allowable 5 seconds discharge current)

Our AGM deep cycle batteries have excellent high current performance and are therefore recommended for high current applications such as engine starting. Due to their construction, Gel batteries have a lower effective capacity at high discharge currents. On the other hand, Gel batteries have a longer service life, both under float and cycling conditions.

7. Effect of temperature on service life

High temperature has a very negative effect on service life. The service life of Victron batteries as a function of temperature is shown in table 2.

Average Temperature	AGM Deep Cycle years	Gel Deep Cycle years	Gel Long Life years
20°C / 68°F	7 - 10	12	20
30°C / 86°F	4	6	10
40°C / 104°F	2	3	5

Table 2: Design service life of Victron batteries under float service

8. Effect of temperature on capacity

As is shown by the graph below, capacity reduces sharply at low temperatures.

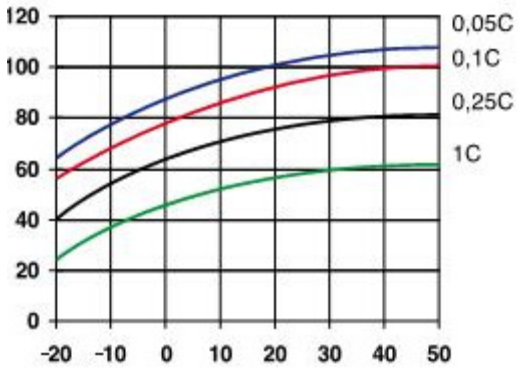


Fig. 1: Effect of temperature on capacity

9. Cycle life of Victron batteries

Batteries age due to discharging and recharging. The number of cycles depends on the depth of discharge, as is shown in figure 2.

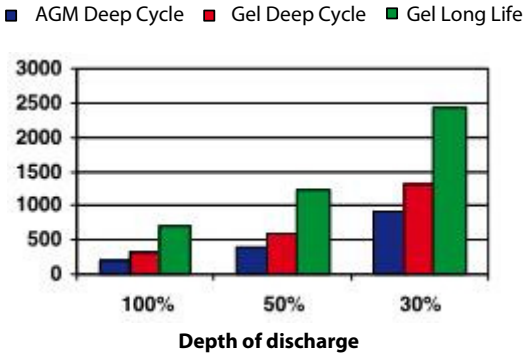


Fig. 2: Cycle life

10. Battery charging in case of cycle use: the 3-step charge characteristic

The most common charge curve used to charge VRLA batteries in case of cyclic use is the 3-step charge characteristic, whereby a constant current phase (the bulk phase) is followed by two constant voltage phases (absorption and float), see fig. 3.

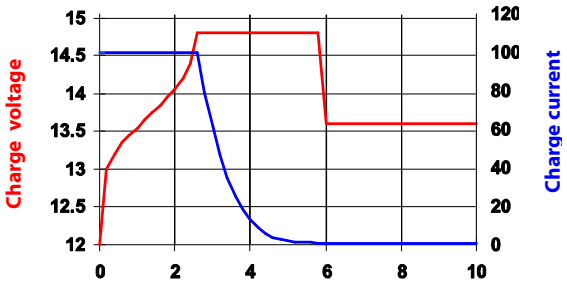


Fig. 3: Three step charge curve

During the absorption phase the charge voltage is kept at a relatively high level in order to fully recharge the battery within reasonable time. The third and last phase is the float phase: the voltage is lowered to standby level, sufficient to compensate for self discharge.

Disadvantages of the traditional 3-step charge characteristic:

- During the bulk phase the current is kept at a constant and often high level, even after the gassing voltage (14,34 V for a 12 V battery) has been exceeded. This can lead to excessive gas pressure in the battery. Some gas will escape trough the safety valves, reducing service life.
- Thereafter the absorption voltage is applied during a fixed period of time, irrespective of how deep the battery has been discharged previously. A full absorption period after a shallow discharge will overcharge the battery, again reducing service life. (a. o. due to accelerated corrosion of the positive plates)
- Research has shown that battery life can be increased by decreasing float voltage to an even lower level when the battery is not in use.

11. Battery charging: longer battery life with Victron 4-step adaptive charging

Victron developed the adaptive charge characteristic. The 4-step adaptive chare curve is the result of years of research and testing.

The Victron adaptive charge curve solves the 3 main problems of the 3 step curve:

- Battery Safe mode
  In order to prevent excessive gassing, Victron has invented the 'Battery Safe Mode'. The battery Safe Mode will limit the rate of voltage increase once the gassing voltage has been reached. Research has shown that this will reduce internal gassing to a safe level.
- Variable absorption time
  Based on the duration of the bulk stage, the charger calculates how long the absorption time should be in order to fully charge the battery. If the bulk time is short, this means the battery was already charged and the resulting absorption time will also be short, whereas a longer bulk time will also result in a longer absorption time.
- Storage mode
  After completion of the absorption period the battery should be fully charged, and the voltage is lowered to the float or standby level. If no discharge occurs during the next 24 hours, the voltage is reduced even further and the battery goes into storage mode. The lower storage voltage reduces corrosion of the positive plates.
  Once every week the charge voltage is increased to the absorption level for a short period to compensate for self discharge (Battery Refresh mode).

12. Battery charging in case of standby use: constant voltage float charging

When a battery is not frequently deeply discharged, a 2-step charge curve can be used. During the first phase the battery is charged with a limited current (the bulk phase). Once a preset voltage has been reached the battery is kept at that voltage (the float phase).
This charge method is used for starter batteries in vehicles, and in uninterruptible power supplies (UPS).

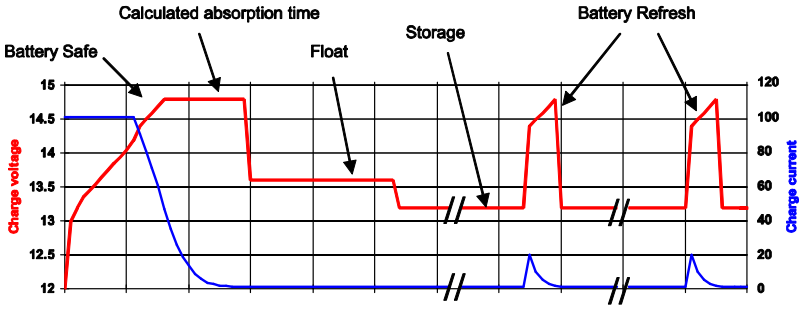


Fig. 4: Four-step adaptive charge curve

13. Optimum charge voltage of Victron VRLA batteries

The recommended charge voltage settings for a 12 V battery are shown in table 3.

14. Effect of temperature on charging voltage

The charge voltage should be reduced with increased temperature. Temperature compensation is required when the temperature of the battery is expected to be less than 10°C / 50°F or more than 30°C / 85°F during long periods of time.
The recommended temperature compensation for Victron VRLA batteries is -4 mV / Cell (-24 mV /°C for a 12 V battery).
The centre point for temperature compensation is 20°C / 70°F.

GEL AND AGM BATTERIES

15. Charge current

The charge current should preferably not exceed 0,2 C (20 A for a 100 Ah battery).The temperature of a battery will increase by more than 10°C if the charge current exceeds 0,2 C. Therefore temperature compensation is required if the charge current exceeds 0,2 C

	Float service	Cycle service Normal	Cycle service Fastest recharge
Victron AGM "Deep Cycle"			
Absorbtion		14,2 - 14,6	14,6 - 14,9
Float	13,5 - 13,8	13,5 - 13,8	13,5 - 13,8
Storage	13,2 - 13,5	13,2 - 13,5	13,2 - 13,5
Victron Gel "Deep Cycle"			
Absorbtion		14,1 - 14,4	
Float	13,5 - 13,8	13,5 - 13,8	
Storage	13,2 - 13,5	13,2 - 13,5	
Victron Gel "Long Life"			
Absorbtion		14,0 - 14,2	
Float	13,5 - 13,8	13,5 - 13,8	
Storage	13,2 - 13,5	13,2 - 13,5	

Table 3: Recommended charge voltage

12 Volt Deep Cycle AGM							General Specification
Article number	Ah	V	l x w x h mm	Weight kg	CCA @0°F	RES CAP @80°F	Technology: flat plate AGM Terminals: copper
BAT406225080	**240**	6	320x176x247	31	1500	480	Rated capacity: 20 hr discharge at 25°C Float design life: 7-10 years at 20 °C Cycle design life: 200 cycles at 100% discharge* 400 cycles at 50% discharge 900 cycles at 30% discharge
BAT212070080	**8**	12	151x65x101	2,5			
BAT212120080	**14**	12	151x98x101	4,1			
BAT212200080	**22**	12	181x77x167	5,8			
BAT412350080	**38**	12	197x165x170	12,5			
BAT412550080	**60**	12	229x138x227	20	450	90	
BAT412600080	**66**	12	258x166x235	24	520	100	
BAT412800080	**90**	12	350x167x183	27	600	145	
BAT412101080	**110**	12	330x171x220	32	800	190	
BAT412121080	**130**	12	410x176x227	38	1000	230	
BAT412151080	**165**	12	485x172x240	47	1200	320	
BAT412201080	**220**	12	522x238x240	65	1400	440	

12 Volt Deep Cycle GEL							General Specification
Article number	Ah	V	l x w x h mm	Weight kg	CCA @0°F	RES CAP @80°F	Technology: flat plate GEL Terminals: copper
BAT412550100	**60**	12	229x138x227	20	300	80	Rated capacity: 20 hr discharge at 25 °C Float design life: 12 years at 20 °C Cycle design life: 300 cycles at 100% discharge * 600 cycles at 50% discharge 1300 cycles at 30% discharge
BAT412600100	**66**	12	258x166x235	24	360	90	
BAT412800100	**90**	12	350x167x183	26	420	130	
BAT412101100	**110**	12	330x171x220	33	550	180	
BAT412121100	**130**	12	410x176x227	38	700	230	
BAT412151100	**165**	12	485x172x240	48	850	320	
BAT412201100	**220**	12	522x238x240	66	1100	440	

2 Volt Long Life GEL					General Specification
Article number	Ah	V	l x b x h mm	Weight kg	Technology: tubular plate GEL Terminals: copper
BAT702601260	**600**	2	149x208x710	48	Rated capacity: 10 hr discharge at 25 °C Float design life: 20 years at 20 °C Cycle design life: 1200 cycles at 100% discharge * 1200 cycles at 50% discharge 2400 cycles at 30% discharge
BAT702801260	**800**	2	215x193x710	68	
BAT702102260	**1000**	2	215x235x710	82	
BAT702122260	**1200**	2	215x277x710	94	
BAT702152260	**1500**	2	215x277x855	120	
BAT702202260	**2000**	2	215x400x815	160	
BAT702252260	**2500**	2	215x490x815	200	
BAT702302260	**3000**	2	215x580x815	240	

Other capacities and terminal types: at request

* End of discharge voltage: 10,8 V for a 12 V battery

Fotoğraf: Abbie Trayler-Smith/PANOS/Hollandse Hoogte

SKYLLA CHARGER 24/48V

Skylla TG 24 50

Skylla TG 24 50 3 phase

Skylla TG 24 100

Perfect chargers for any type of battery
Charge voltage can be precisely adjusted to suit any sealed or unsealed battery system.
In particular, sealed maintenance free batteries must be charged correctly in order to ensure a long service life.
Overvoltage will result in excessive gassing and venting of a sealed battery. The battery will dry out and fail.

Suitable for AC and DC supply (AC-DC and DC-DC operation)
Except for the 3 phase input models, the chargers also accept a DC supply.

Controlled charging
Every TG charger has a microprocessor, which accurately controls the charging in three steps. The charging process takes place in accordance with the IUoUo characteristic and charges more rapidly than other processes.

Use of TG chargers as a power supply
As a result of the perfectly stabilized output voltage, a TG charger can be used as a power supply if batteries or large buffer capacitors are not available.

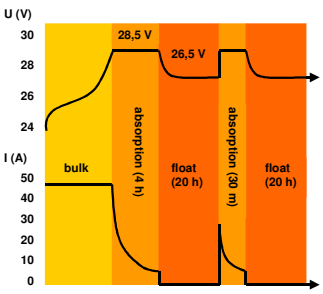
Two outputs to charge 2 battery banks
The TG chargers feature 2 isolated outputs. The second output, limited to approximately 4 A and with a slightly lower output voltage, is intended to top up a starter battery.

To increase battery life: temperature compensation
Every Skylla TG charger comes with a battery temperature sensor. When connected, charge voltage will automatically decrease with increasing battery temperature. This feature is especially recommended for sealed batteries which otherwise might be overcharged and dry out due to venting.

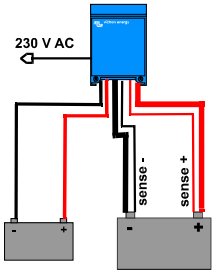
Battery voltage sense
In order to compensate for voltage loss due to cable resistance, TG chargers are provided with a voltage sense facility so that the battery always receives the correct charge voltage.

Learn more about batteries and battery charging
To learn more about batteries and charging batteries, please refer to our book 'Energy Unlimited' (available free of charge from Victron Energy and downloadable from www.victronenergy.com).

Charge curve



Application example



SKYLLA CHARGER 24/48V

Skylla	24/30 TG 24/50 TG	24/50 TG 3 phase	24/80 TG	24/100 TG	24/100 TG 3 phase	48/25 TG	48/50 TG
Input voltage (V AC)	230	3 x 400	230	230	3 x 400	230	230
Input voltage range (V AC)	185-264	320-450	185-264	185-264	320-450	185-264	185-264
Input voltage range (V DC)	180-400	n. a.	180-400	180-400	n. a.	180-400	180-400
Frequency (Hz)	45-65						
Power factor	1						
Charge voltage 'absorption' (V DC)	28,5	28,5	28,5	28,5	28,5	57	57
Charge voltage 'float' (V DC)	26,5	26,5	26,5	26,5	26,5	53	53
Charge current house batt. (A) (2)	30 / 50	50	80	100	100	25	50
Charge current starter batt. (A)	4	4	4	4	4	n. a.	n. a.
Charge characteristic	IUoUo (three step)						
Battery capacity (Ah)	150-500	250-500	400-800	500-1000	500-1000	125-250	250-500
Temperature sensor	√						
Can be used as power supply	√						
Remote alarm	Potential free contacts 60V / 1A (1x NO and 1x NC)						
Forced cooling	√						
Protection (1)	a,b,c,d						
Operating temp. range	-20 to 60°C (0 - 140°F)						
Humidity (non condensing)	max 95%						
ENCLOSURE							
Material & Colour	aluminium (blue RAL 5012)						
Battery-connection	M8 studs						
230 V AC-connection	screw-clamp 2,5 mm² (AWG 6)						
Protection category	IP 21						
Weight kg (lbs)	5,5 (12.1)	13 (28)	10 (22)	10 (22)	23 (48)	5,5 (12.1)	10 (12.1)
Dimensions hxwxd in mm (hxwxd in inches)	365x250x147 (14.4x9.9x5.8)	365x250x257 (14.4x9.9x10.1)	365x250x257 (14.4x9.9x10.1)	365x250x257 (14.4x9.9x10.1)	515x260x265 (20x10.2x10.4)	365x250x147 (14.4x9.9x5.8)	365x250x257 (14.4x9.9x10.1)
STANDARDS							
Safety	EN 60335-1, EN 60335-2-29						
Emission	EN 55014-1, EN 61000-3-2						
Immunity	EN 55014-2, EN 61000-3-3						

1) Protection
   a. Output short circuit
   b. Battery reverse polarity detection
   c. Battery voltage too high
   d. Temperature too high
2) Up to 40°C (100°F) ambient

BMV Battery Monitor
The BMV Battery Monitor features an advanced microprocessor control system combined with high resolution measuring systems for battery voltage and charge/discharge current. Besides this, the software includes complex calculation algorithms, like Peukert's formula, to exactly determine the state of charge of the battery. The BMV selectively displays battery voltage, current, consumed Ah or time to go.

Skylla Control
The Skylla Control allows you to alter the charge current and see the system status. Altering the charge current is useful if the shore power fuse is limited: the AC current drawn by the battery charger can be controlled by limiting the maximum output current, thereby preventing the shore power fuse from blowing.

Charger Switch
A remote on-off switch

Battery Alarm
An excessively high or low battery voltage is indicated by an audible and visual alarm.

QUATTRO INVERTER/ CHARGER 3kVA - 10kVA

Quattro
48/5000/70-50/30

Quattro
24/3000/70-50/30

Two AC inputs with integrated transfer switch
The Quattro can be connected to two independent AC sources, for example shore-side power and a generator, or two generators. The Quattro will automatically connect to the active source.

Two AC Outputs
The main output has no-break functionality. The Quattro takes over the supply to the connected loads in the event of a grid failure or when shore/generator power is disconnected. This happens so fast (less than 20 milliseconds) that computers and other electronic equipment will continue to operate without disruption.
The second output is live only when AC is available on one of the inputs of the Quattro. Loads that should not discharge the battery, like a water heater for example, can be connected to this output.

Virtually unlimited power thanks to parallel operation
Up to 10 Quattro units can operate in parallel. Ten units 48/10000/140, for example, will provide 90kW / 100kVA output power and 1400 Amps charging capacity.

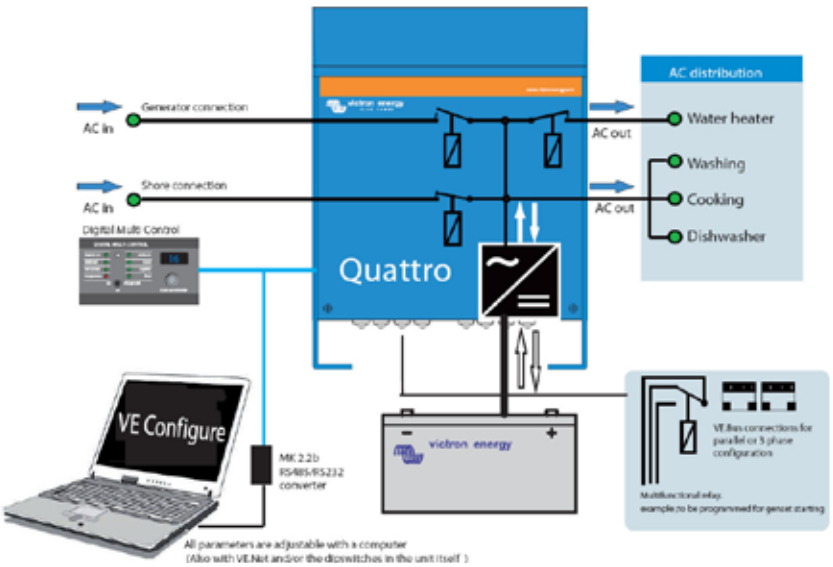
Three phase capability
Three units can be configured for three-phase output. But that's not all: up to 10 sets of three units can be parallel connected to provide 270kW / 300kVA inverter power and more than 4000A charging capacity.

PowerControl – Dealing with limited generator, shore-side or grid power
The Quattro is a very powerful battery charger. It will therefore draw a lot of current from the generator or shore side supply (16A per 5kVA Quattro at 230VAC). A current limit can be set on each AC input. The Quattro will then take account of other AC loads and use whatever is spare for charging, thus preventing the generator or shore supply from being overloaded.

PowerAssist – Boosting shore or generator power
This feature takes the principle of PowerControl to a further dimension allowing the Quattro to supplement the capacity of the alternative source. Where peak power is so often required only for a limited period, the Quattro will make sure that insufficient shore or generator power is immediately compensated for by power from the battery. When the load reduces, the spare power is used to recharge the battery.

Solar energy: AC power available even during a grid failure
The Quattro can be used in off grid as well as grid connected PV and other alternative energy systems.

System configuring has never been easier
After installation, the Quattro is ready to go.
If settings have to be changed, this can be done in a matter of minutes with a new DIP switch setting procedure.
Even parallel and 3-phase operation can be programmed with DIP switches: no computer needed!
Alternatively, VE.Net can be used instead of the DIP switches.
And sophisticated software (VE.Bus Quick Configure and VE.Bus System Configurator) is available to configure several new, advanced, features.



QUATTRO INVERTER/ CHARGER 3kVA - 10kVA

Quattro	12/3000/120 24/3000/70	12/5000/200 24/5000/120 48/5000/70	24/8000/200 48/8000/110	48/10000/140
PowerControl / PowerAssist	Yes			
Integrated Transfer switch	Yes			
AC inputs (2x)	Input voltage range: 187-265 VAC Input frequency: 45 – 65 Hz Power factor: 1			
Maximum feed through current (A)	50 / 30	2x100	2x100	2x100
INVERTER				
Input voltage range (V DC)	9,5 – 17V 19 – 33V 38 – 66V			
Output (1)	Output voltage: 230 VAC ± 2% Frequency: 50 Hz ± 0,1%			
Cont. output power at 25 °C (VA) (3)	3000	5000	8000	10000
Cont. output power at 25 °C (W)	2500	4500	7000	9000
Cont. output power at 40 °C (W)	2200	4000	6300	8000
Peak power (W)	6000	10000	16000	20000
Maximum efficiency (%)	93 / 94	94 / 94 / 95	96	96
Zero-load power (W)	15 / 15	25 / 25 / 25	35	35
Zero load power in AES mode (W)	10 / 10	20 / 20 / 20	30	30
Zero load power in Search mode (W)	4 / 5	5 / 5 / 6	10	10
CHARGER				
Charge voltage 'absorption' (V DC)	14,4 / 28,8	14,4 / 28,8 / 57,6	57,6	57,6
Charge voltage 'float' (V DC)	13,8 / 27,6	13,8 / 27,6 / 55,2	55,2	55,2
Storage mode (V DC)	13,2 / 26,4	13,2 / 26,4 / 52,8	52,8	52,8
Charge current house battery (A) (4)	120 / 70	200 / 120 / 70	110	140
Charge current starter battery (A)	4 (12V and 24V models only)			
Battery temperature sensor	Yes			
GENERAL				
Auxiliary output (A) (5)	25	50	50	50
Programmable relay (6)	1x	3x	3x	3x
Protection (2)	a-g			
VE.Bus communication port	For parallel and three phase operation, remote monitoring and system integration			
General purpose com. port (7)	1x	2x	2x	2x
Common Characteristics	Operating temp.: -40 to +50 °C Humidity (non condensing): max. 95%			
ENCLOSURE				
Common Characteristics	Material & Colour: aluminium (blue RAL 5012) Protection category: IP 21			
Battery-connection	Four M8 bolts (2 plus and 2 minus connections)			
230 V AC-connection	Screw terminals 13 mm² (6 AWG)	Bolts M6	Bolts M6	Bolts M6
Weight (kg)	19	34 / 30 / 30	45/41	45
Dimensions (hxwxd in mm)	362 x 258 x 218	470 x 350 x 280 444 x 328 x 240 444 x 328 x 240	470 x 350 x 280	470 x 350 x 280
STANDARDS				
Safety	EN 60335-1, EN 60335-2-29			
Emission, Immunity	EN55014-1, EN 55014-2, EN 61000-3-3, EN 61000-6-3, EN 61000-6-2, EN 61000-6-1			

1) Can be adjusted to 60 HZ; 120 V 60 Hz on request
2) Protection key:
a) output short circuit
b) overload
c) battery voltage too high
d) battery voltage too low
e) temperature too high
f) 230 VAC on inverter output
g) input voltage ripple too high
3) Non linear load, crest factor 3:1
4) At 25 ˚C ambient
5) Switches off when no external AC source available
6) Programmable relay that can a. o. be set for general alarm, DC undervoltage or genset start/stop function
AC rating: 230V/4A
DC rating: 4A up to 35VDC, 1A up to 60VDC
7) A. o. to communicate with a Lithium Ion battery BMS

Digital Multi Control Panel

A convenient and low cost solution for remote monitoring, with a rotary knob to set Power Control and Power Assist levels.

Blue Power Panel

Connects to a Multi or Quattro and all VE.Net devices, in particular the VE.Net Battery Controller.
Graphic display of currents and voltages.

Computer controlled operation and monitoring

Several interfaces are available:

- **MK2.2 VE.Bus to RS232 converter**
  Connects to the RS232 port of a computer (see 'A guide to VEConfigure')
- **MK2-USB VE.Bus to USB converter**
  Connects to a USB port (see 'A guide to VEConfigure')
- **VE.Net to VE.Bus converter**
  Interface to VE.Net (see VE.Net documentation)
- **VE.Bus to E-PLEX converter**
  Interface to the E-PLEX System. The world's most advanced and field proven digital switching and monitoring system.
- **Victron Global Remote**
  The Global Remote is a modem which sends alarms, warnings and system status reports to cellular phones via text messages (SMS). It can also log data from Victron Battery Monitors, Multi's, Quattro's and Inverters to a website through a GPRS connection. Access to this website is free of charge.
- **Victron Ethernet Remote**
  To connect to Ethernet.

BMV Battery Monitor

The BMV Battery Monitor features an advanced microprocessor control system combined with high resolution measuring systems for battery voltage and charge/discharge current. Besides this, the software includes complex calculation algorithms, like Peukert's formula, to exactly determine the state of charge of the battery. The BMV selectively displays battery voltage, current, consumed Ah or time to go. The monitor also stores a host of data regarding performance and use of the battery.
Several models available (see battery monitor documentation).

MULTIPLUS INVERTER/ CHARGER 800VA - 5kVA

MultiPlus 24/3000/70

MultiPlus Compact 12/2000/80

Multi-functional, with intelligent power management

The MultiPlus is a powerful true sine wave inverter, a sophisticated battery charger that features adaptive charge technology, and a high-speed AC transfer switch in a single compact enclosure. Next to these primary functions, the MultiPlus has several advanced features, as outlined below.

Two AC Outputs

The main output has no-break functionality. The MultiPlus takes over the supply to the connected loads in the event of a grid failure or when shore/generator power is disconnected. This happens so fast (less than 20 milliseconds) that computers and other electronic equipment will continue to operate without disruption. The second output is live only when AC is available on one of the inputs of the MultiPlus. Loads that should not discharge the battery, like a water heater for example, can be connected to this output (second output available on models rated at 3kVA and more).

Virtually unlimited power thanks to parallel operation

Up to 6 Multi's can operate in parallel to achieve higher power output. Six 24/5000/120 units, for example, will provide 25 kW / 30 kVA output power with 720 Amps charging capacity.

Three phase capability

In addition to parallel connection, three units of the same model can be configured for three-phase output. But that's not all: up to 6 sets of three units can be parallel connected for a huge 75 kW / 90 kVA inverter and more than 2000 Amps charging capacity.

PowerControl - Dealing with limited generator, shore side or grid power

The MultiPlus is a very powerful battery charger. It will therefore draw a lot of current from the generator or shore side supply (nearly 10A per 5kVA Multi at 230VAC). With the Multi Control Panel a maximum generator or shore current can be set. The MultiPlus will then take account of other AC loads and use whatever is extra for charging, thus preventing the generator or shore supply from being overloaded.

PowerAssist - Boosting the capacity of shore or generator power

This feature takes the principle of PowerControl to a further dimension. It allows the MultiPlus to supplement the capacity of the alternative source. Where peak power is so often required only for a limited period, the MultiPlus will make sure that insufficient shore or generator power is immediately compensated for by power from the battery. When the load reduces, the spare power is used to recharge the battery.

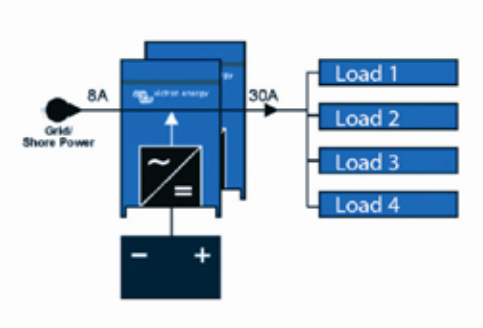
Four stage adaptive charger and dual bank battery charging

The main output provides a powerful charge to the battery system by means of advanced 'adaptive charge' software. The software fine-tunes the three stage automatic process to suit the condition of the battery, and adds a fourth stage for long periods of float charging. The adaptive charge process is described in more detail on the Phoenix Charger datasheet and on our website, under Technical Information. In addition to this, the MultiPlus will charge a second battery using an independent trickle charge output intended for a main engine or generator starter battery (trickle charge output available on 12V and 24V models only).

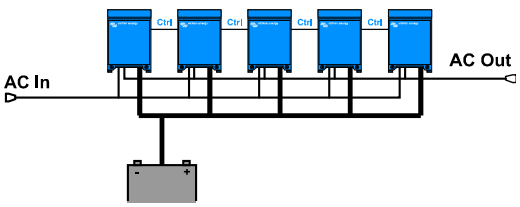
System configuring has never been easier

After installation, the MultiPlus is ready to go.
If settings have to be changed, this can be done in a matter of minutes with a new DIP switch setting procedure.
Even parallel and 3-phase operation can be programmed with DIP switches: no computer needed!
Alternatively, VE.Net can be used instead of the DIP switches.
And sophisticated software (VE.Bus Quick Configure and VE.Bus System Configurator) is available to configure several new, advanced, features.

PowerAssist with 2x MultiPlus in parallel



Five parallel units: output power 25 kVA



MULTIPLUS INVERTER/ CHARGER 800VA - 5kVA

MultiPlus 12 Volt / 24 Volt / 48 Volt	C 12/800/35 C 24/ 800/16	C 12/1200/50 C 24/1200/25	C 12/1600/70 C 24/1600/40	C 12/2000/80 C 24/2000/50	12/3000/120 24/3000/70 48/3000/35	24/5000/120 48/5000/70
PowerControl	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
PowerAssist	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
Transfer switch (A)	**16**	**16**	**16**	**30**	**16 or 50**	**50**
Parallel and 3-phase operation	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**	**Yes**
INVERTER						
Input voltage range (V DC)	9,5 – 17 V		19 – 33 V		38 – 66 V	
Output	Output voltage: 230 VAC ± 2%			Frequency: 50 Hz ± 0,1% (1)		
Cont. output power at 25 °C (VA) (3)	800	1200	1600	2000	3000	5000
Cont. output power at 25 °C (W)	700	1000	1300	1600	2500	4500
Cont. output power at 40 °C (W)	650	900	1200	1450	2200	4000
Peak power (W)	1600	2400	3000	4000	6000	10.000
Maximum efficiency (%)	92 / 94	93 / 94	93 / 94	93 / 94	93 / 94 / 95	94 / 95
Zero-load power (W)	8 / 10	8 / 10	8 / 10	9 / 11	15 / 15 / 16	25 / 25
Zero load power in AES mode (W)	5 / 8	5 / 8	5 / 8	7 / 9	10 / 10 / 12	20 / 20
Zero load power in Search mode (W)	2 / 3	2 / 3	2 / 3	3 / 4	4 / 5 / 5	5 / 6
CHARGER						
AC Input	Input voltage range: 187-265 VAC			Input frequency: 45 – 65 Hz	Power factor: 1	
Charge voltage 'absorption' (V DC)	14,4 / 28,8 / 57,6					
Charge voltage 'float' (V DC)	13,8 / 27,6 / 55,2					
Storage mode (V DC)	13,2 / 26,4 / 52,8					
Charge current house battery (A) (4)	35 / 16	50 / 25	70 / 40	80 / 50	120 / 70 / 35	120 / 70
Charge current starter battery (A)	4 (12V and 24V models only)					
Battery temperature sensor	yes					
GENERAL						
Auxiliary output (5)	n. a.	n. a.	n. a.	n. a.	Yes (16A)	Yes (25A)
Programmable relay (6)	Yes					
Protection (2)	a - g					
VE.Bus communication port	For parallel and three phase operation, remote monitoring and system integration					
General purpose com. port (7)	n. a.	n. a.	n. a.	n. a.	Yes (8)	Yes
Common Characteristics	Operating temp. range: -40 to +50°C (fan assisted cooling) Humidity (non condensing): max 95%					
ENCLOSURE						
Common Characteristics	Material & Colour: aluminium (blue RAL 5012)			Protection category: IP 21		
Battery-connection	battery cables of 1.5 meter			M8 bolts	Four M8 bolts (2 plus and 2 minus connections)	
230 V AC-connection	G-ST18i connector			Spring-clamp	Screw terminals 13 mm² (6 AWG)	
Weight (kg)	10	10	10	12	18	30
Dimensions (hxwxd in mm)	375x214x110			520x255x125	362x258x218	444x328x240
STANDARDS						
Safety	EN 60335-1, EN 60335-2-29					
Emission, Immunity	EN55014-1, EN 55014-2, EN 61000-3-3					
Automotive Directive	2004/104/EC					

1) Can be adjusted to 60 HZ; 120 V 60 Hz on request
2) Protection key:
   a) output short circuit
   b) overload
   c) battery voltage too high
   d) battery voltage too low
   e) temperature too high
   f) 230 VAC on inverter output
   g) input voltage ripple too high
3) Non linear load, crest factor 3:1
4) At 25 °C ambient
5) Switches off when no external AC source available
6) Programmable relay that can a. o. be set for general alarm,
   DC undervoltage or genset start/stop function
   AC rating: 230V/4A
   DC rating: 4A up to 35VDC, 1A up to 60VDC
7) A. o. to communicate with a Lithium Ion battery BMS
8) Models with 16A transfer switch only

Digital Multi Control

This panel is intended both for Multi's and Quattro's.
Allows PowerControl and PowerAssist current limit setting for two AC sources: a generator and shore-side current for example.
Setting range: up to 200 Amps.
The brightness of the LED's is automatically reduced during night time.

Computer controlled operation and monitoring

Several interfaces are available:

- **MK2.2 VE.Bus to RS232 converter**
  Connects to the RS232 port of a computer (see 'A guide to VEConfigure')
- **MK2-USB VE.Bus to USB converter**
  Connects to a USB port (see 'A guide to VEConfigure')
- **VE.Net to VE.Bus converter**
  Interface to VE.Net (see VE.Net documentation)
- **VE.Bus to E-PLEX converter**
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- **Victron Global Remote**
  The Global Remote is a modem which sends alarms, warnings and system status reports to cellular phones via text messages (SMS). It can also log data from Victron Battery Monitors, Multi's, Quattro's and Inverters to a website through a GPRS connection. Access to this website is free of charge.
- **Victron Ethernet Remote**

BMV Battery Monitor

The BMV Battery Monitor features an advanced microprocessor control system combined with high resolution measuring systems for battery voltage and charge/discharge current. Besides this, the software includes complex calculation algorithms, like Peukert's formula, to exactly determine the state of charge of the battery. The BMV selectively displays battery voltage, current, consumed Ah or time to go. The monitor also stores a host of data regarding performance and use of the battery.
Several models available (see battery monitor documentation).

Fotoğraf: David Buttow/Redux/Hollandse Hoogte

PHOENIX INVERTERS 180VA - 750VA

Phoenix Inverter 12/750

Phoenix Inverter 12/750

Phoenix Inverter 12/750 with Schuko socket

SinusMax – Superior engineering

Developed for professional duty, the Phoenix range of inverters is suitable for the widest range of applications. The design criteria have been to produce a true sine wave inverter with optimized efficiency but without compromise in performance. Employing hybrid HF technology, the result is a top quality product with compact dimensions, light in weight and capable of supplying power, problem-free, to any load.

Extra start-up power

A unique feature of the SinusMax technology is very high start-up power. Conventional high frequency technology does not offer such extreme performance. Phoenix inverters, however, are well suited to power up difficult loads such as computers and low power electric tools.

To transfer the load to another AC source: the automatic transfer switch

For our lower power models we recommend the use of our Filax Automatic Transfer Switch. The Filax features a very short switchover time (less than 20 miliseconds) so that computers and other electronic equipment will continue to operate without disruption.

LED diagnosis

Please see manual for a description.

Remote on/off switch

Connector for remote on off switch available on all models.

Remote control panel (750VA model only)

Connects to the inverter with a RJ12 UTP cable (length 3 meter, included).

DIP switch for 50/60Hz selection (750VA model only)

DIP switches for Power Saving Mode (750VA model only)

When operating in Power Saving Mode, the no-load current is reduced to 1/3 of nominal. In this mode the inverter is switched off in case of no load or very low load, and switches on every two seconds for a short period. I f the output current exceeds a set lever. The inverter will continue to operate. If not, the inverter will shut down again. The on/off level can be set from 15W to 85W with DIP switches.

Available with three different output sockets

Please see pictures below.

Phoenix Inverter 12/350 with IEC-320 sockets

Phoenix Inverter 12/180 with Schuko socket

Phoenix Inverter 12/180 with Nema 5-15R sockets

PHOENIX INVERTERS 180VA - 750VA

Phoenix Inverter 12 Volt / 24 Volt / 48 Volt	12/180 24/180	12/350 24/350 48/350	12/750 24/750 48/750
Cont. AC power at 25 °C (VA) (3)	180	350	750
Cont. power at 25 °C / 40 °C (W)	175 / 150	300 / 250	700 / 650
Peak power (W)	350	700	1400
Output AC voltage / frequency (4)	110VAC or 230VAC +/- 3% 50Hz or 60Hz +/- 0,1%		
Input voltage range (V DC)	10,5 - 15,5 / 21,0 - 31,0 / 42,0 - 62,0		
Low battery alarm (V DC)	11,0 / 22 / 44		
Low battery shut down (V DC)	10,5 / 21 / 42		
Low battery auto recovery (V DC)	12,5 / 25 / 50		
Max. efficiency 12 / 24 / 48 V (%)	87 / 88	89 / 89/ 90	91 / 93 / 94
Zero-load power 12 / 24 / 48 V (W)	2,6 / 3,8	3,1 / 5,0 / 6,0	14 / 14 / 13
Zero-load power in Power Saving mode	n. a.	n. a.	3 / 4 / 5
Protection (2)	a - e		
Operating temperature range	-20 to +50°C (fan assisted cooling)		
Humidity (non condensing)	max 95%		
ENCLOSURE			
Material & Colour	aluminium (blue Ral 5012)		
Battery-connection	1)	1)	Screw terminals
Standard AC outlets	IEC-320 (IEC-320 plug included), Schuko, or Nema 5-15R		
Other outlets (at request)	United Kingdom, Australia/New Zealand		
Protection category	IP 20		
Weight (kg / lbs)	2,7 / 5,4	3,5 / 7,7	2,7 / 5,4
Dimensions (hxwxd in mm) (hxwxd in inches)	72x132x200 2.8x5.2x7.9	72x155x237 2.8x6.1x9.3	72x180x295 2.8x7.1x11.6
ACCESSORIES			
Remote control panel	n. a.	n. a.	Optional
Remote on-off switch	Two pole connector		RJ12 plug
Automatic transfer switch	Filax		
STANDARDS			
Safety	EN 60335-1		
Emission Immunity	EN55014-1 / EN 55014-2		

1) Battery cables of 1.5 meter (12/180 with cigarette plug)
2) Protection key:
a) output short circuit
b) overload
c) battery voltage too high
d) battery voltage too low
e) temperature too high

3) Non linear load, crest factor 3:1
4) Frequency can be set by DIP switch (750VA models only)

Battery Alarm
An excessively high or low battery voltage is indicated by an audible and visual alarm, and a relay for remote signalling.

Remote Control Panel
(750VA models only)
RJ12 UTP cable to connect to the inverter is included (length: 3 meter).

BMV Battery Monitor
The BMV Battery Monitor features an advanced microprocessor control system combined with high resolution measuring systems for battery voltage and charge/discharge current. Besides this, the software includes complex calculation algorithms to exactly determine the state of charge of the battery. The BMV selectively displays battery voltage, current, consumed Ah or time to go. The monitor also stores a host of data regarding performance and use of the battery.

PHOENIX INVERTERS 1200VA - 5000VA

Phoenix Inverter 24/5000

Phoenix Inverter Compact 24/1600

SinusMax - Superior engineering

Developed for professional duty, the Phoenix range of inverters is suitable for the widest range of applications. The design criteria have been to produce a true sine wave inverter with optimised efficiency but without compromise in performance. Employing hybrid HF technology, the result is a top quality product with compact dimensions, light in weight and capable of supplying power, problem-free, to any load.

Extra start-up power

A unique feature of the SinusMax technology is very high start-up power. Conventional high frequency technology does not offer such extreme performance. Phoenix inverters, however, are well suited to power up difficult loads such as refrigeration compressors, electric motors and similar appliances.

Virtually unlimited power thanks to parallel and 3-phase operation capability

Up to 6 units inverters can operate in parallel to achieve higher power output. Six 24/5000 units, for example, will provide 24kW / 30kVA output power. Operation in 3-phase configuration is also possible.

To transfer the load to another AC source: the automatic transfer switch

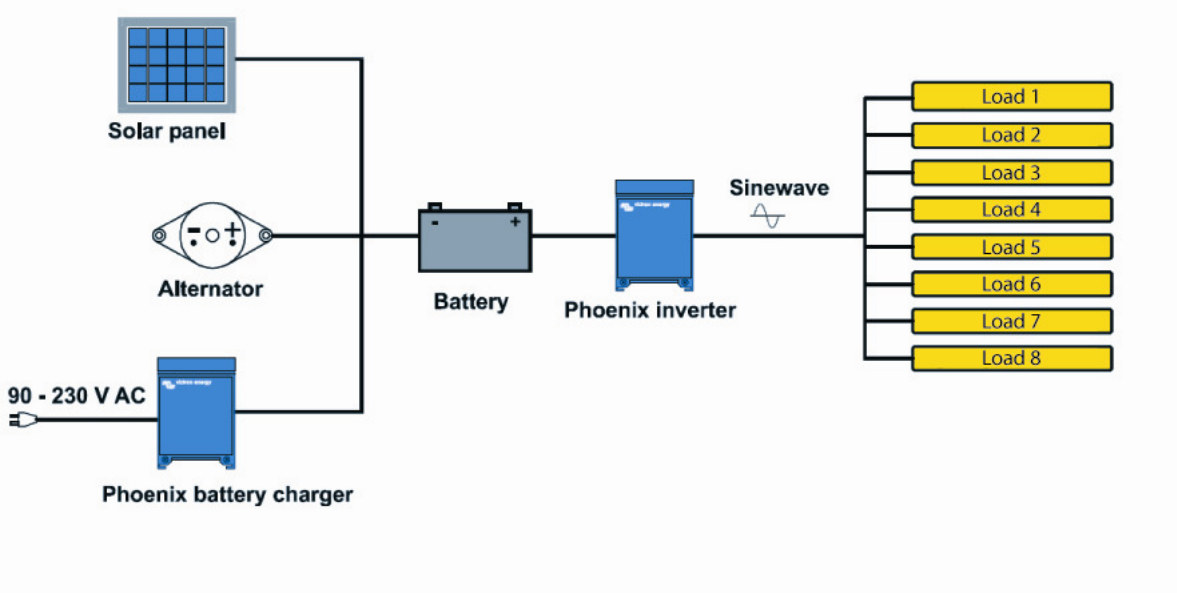
If an automatic transfer switch is required we recommend using the MultiPlus inverter/charger instead. The switch is included in these products and the charger function of the MultiPlus can be disabled. Computers and other electronic equipment will continue to operate without disruption because the MultiPlus features a very short switchover time (less than 20 milliseconds).

Computer interface

All models have a RS-485 port. All you need to connect to your PC is our MK2 interface (see under accessories). This interface takes care of galvanic isolation between the inverter and the computer, and converts from RS-485 to RS-232. A RS-232 to USB conversion cable is also available. Together with our VEConfigure software, which can be downloaded free of charge from our website, all parameters of the inverters can be customised. This includes output voltage and frequency, over and under voltage settings and programming the relay. This relay can for example be used to signal several alarm conditions, or to start a generator. The inverters can also be connected to VENet, the new power control network of Victron Energy, or to other computerised monitoring and control systems.

New applications of high power inverters

The possibilities of paralleled high power inverters are truly amazing. For ideas, examples and battery capacity calculations please refer to our book “Energy Unlimited” (available free of charge from Victron Energy and downloadable from www.victronenergy.com).



PHOENIX INVERTER 1200VA - 5000VA

Phoenix Inverter	C12/1200 C24/1200	C12/1600 C24/1600	C12/2000 C24/2000	12/3000 24/3000 48/3000	24/5000 48/5000
Parallel and 3-phase operation	Yes				
INVERTER					
Input voltage range (V DC)	9,5 – 17V 19 – 33V 38 – 66V				
Output	Output voltage: 230 VAC ±2% Frequency: 50 Hz ± 0,1% (1)				
Cont. output power at 25 ºC (VA) (2)	1200	1600	2000	3000	5000
Cont. output power at 25 ºC (W)	1000	1300	1600	2500	4500
Cont. output power at 40 ºC (W)	900	1200	1450	2200	4000
Peak power (W)	2400	3000	4000	6000	10000
Max. efficiency 12/ 24 /48 V (%)	92 / 94	92 / 94	92 / 92	93 / 94 / 95	94 / 95
Zero-load power 12 / 24 / 48 V (W)	8 / 10	8 / 10	9 / 11	15 / 15 / 16	25 / 25
Zero-load power in AES mode (W)	5 / 8	5 / 8	7 / 9	10 / 10 / 12	20 / 20
Zero-load power in Search mode (W)	2 / 3	2 / 3	3 / 4	4 / 5 / 5	5 / 6
GENERAL					
Programmable relay (3)	Yes				
Protection (4)	a - g				
VE.Bus communication port	For parallel and three phase operation, remote monitoring and system integration				
Common Characteristics	Operating temperature range: -40 to +50 ºC (fan assisted cooling) Humidity (non condensing): max 95%				
ENCLOSURE					
Common Characteristics	Material & Colour: aluminum (blue RAL 5012) Protection category: IP 21				
Battery-connection	battery cables of 1.5 meter included		M8 bolts	2+2 M8 bolts	
230 V AC-connection	G-ST18i plug		Spring-clamp	Screw terminals	
Weight (kg)	10		12	18	30
Dimensions (hxwhd in mm)	375x214x110		520x255x125	362x258x218	444x328x240
STANDARDS					
Safety	EN 60335-1				
Emission Immunity	EN 55014-1 / EN 55014-2				
Automotive Directive	2004/104/EC	2004/104/EC		2004/104/EC	

1) Can be adjusted to 60Hz and to 240V
2) Non linear load, crest factor 3:1
3) Programmable relay that can a.o. be set for general alarm, DC undervoltage or genset start/stop function.
AC rating: 230V/4A
DC rating: 4a up to 35VDC, 1A up to 60VDC

4) Protection key:
a) output short circuit
b) overload
c) battery voltage too high
d) battery voltage too low
e) temperature too high
f) 230 V AC on inverter output
g) input voltage ripple too high

Phoenix Inverter Control
This panel can also be used on a MultiPlus inverter/charger when an automatic transfer switch but no charger function is desired.
The brightness of the LEDs is automatically reduced during night time.

Computer controlled operation and monitoring
Several interfaces are available:
- **MK2.2 VE.Bus to RS232 converter**
  Connects to the RS232 port of a computer (see 'A guide to VEConfigure')
- **MK2-USB VE.Bus to USB converter**
  Connects to a USB port (see 'A guide to VEConfigure')
- **VE.Net to VE.Bus converter**
  Interface to VE.Net (see VE.Net documentation)
- **VE.Bus to E-PLEX converter**
  Interface to the E-PLEX System. The world's most advanced and field proven digital switching and monitoring system.
- **Victron Global Remote**
  The Global Remote is a modem which sends alarms, warnings and system status reports to cellular phones via text messages (SMS). It can also log data from Victron Battery Monitors, Multi's, Quattro's and Inverters to a website through a GPRS connection. Access to this website is free of charge.
- **Victron Ethernet Remote**
  To connect to Ethernet.

BMV Battery Monitor
The BMV Battery Monitor features an advanced microprocessor control system combined with high resolution measuring systems for battery voltage and charge / discharge current. Besides this, the software includes complex calculation algorithms, like Peukert's formula, to exactly determine the state of charge of the battery. The BMV selectively displays battery voltage, current, consumed Ah or time to go. The monitor also stores a host of data regarding performance and use of the battery.

Several models available (see battery monitor documentation).

VICTRON GLOBAL REMOTE 2 AND VICTRON ETHERNET REMOTE

Victron Global Remote 2

Victron Ethernet Remote

Victron Global Remote 2: A GSM/GPRS modem

The Global Remote is a modem which sends alarms, warnings and system status reports to cellular phones via text messages (SMS). It can also log data from Victron Battery Monitors, Multi's, Quattro's and Inverters to a website through a GPRS connection. The usage of this website is free of charge.

Victron Ethernet Remote: A GSM/GPRS modem with Ethernet connection

The Ethernet Remote has the same functions as the Global Remote. An extra function of the Ethernet Remote is that it can connect with LAN, due to a special cable. In this way, the Ethernet Remote can be connected to the internet without a SIM-card.

Simple and easy to use

The idea is simple: you can use it to get SMS alarms from a Multi, a Battery System, or both. When monitoring the usage of batteries, it can be extremely helpful to receive under and overvoltage alarms; whenever they occur. For this purpose, the Global Remote is perfect. A prepaid SIM-card (for example) in combination with the Global Remote is adequate for remotely monitoring your system.

Connections Global Remote

The Global Remote has two serial connections. The can be used to connect to a VE.Bus Multi/Quattro/Inverter unit or system. This connection needs a MK2 which is supplied with the VGR. The other connection is to connect a BMV-600S or BMV-602S Battery Monitor. To connect it to a BMV you will also need the connection kit accessory which needs to be purchased separately. The Global Remote also has a connection for an optional accessory, the VGR IO Extender.

Connections Ethernet Remote

The Ethernet Remote has one serial connection. This can be used to connect to a VE.Bus Multi/Quattro/Inverter unit or system, or a BMV Battery Monitor. To connect it to a BMV you will also need the connection kit accessory which needs to be purchased separately.

Advanced usage: Monitoring historic data

Taking it one step further, an internet browser and -connection is all you need to view all of the data online. You can simply create an account on the website and add your modem(s). Subsequently you can configure the GPRS connection, which will enable you to monitor the historic data of several basic properties such as system voltages, power levels and status information. All of this data is graphed. These graphs are available in daily, weekly and monthly timeframes.

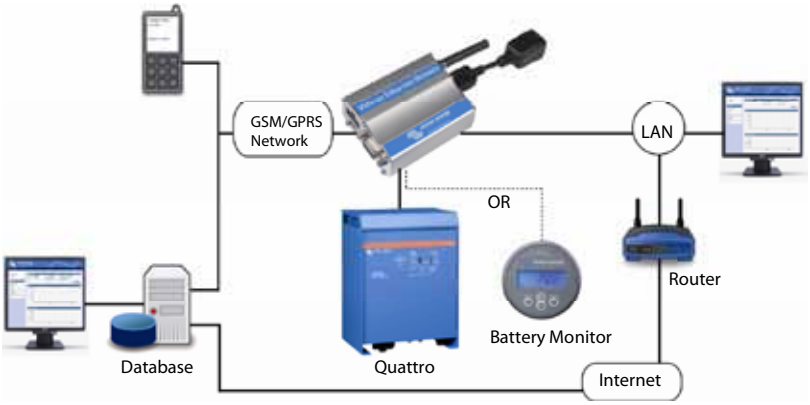
Victron Remote Management

Victron Remote Management is the name of the system which consists of the VGR and the monitoring website. To get a preview: please go to https://vrm.victronenergy.com, and login with below details.

Username: demo@victronenergy.com
Password: vrmdemo

Victron Global Remote 2

Victron Ethernet Remote



VICTRON GLOBAL REMOTE 2 AND VICTRON ETHERNET REMOTE

	Victron Global Remote 2	Victron Ethernet Remote
Serial connection (Mk2.2a – included)	Connect VE.Bus Multi/Quattro/Inverter unit/system	
Serial connection (BMV-602 Datalink – not included)	Connect BMV-602 Battery Monitor	
	GENERAL	
Power supply voltage range	5.5 to 32VDC	
Current draw (max.)	0.48A at 5.5VDC	
Current draw (connected to GSM network)	90mA at 12VDC and 50mA at 24 VDC	
Operating temperature range	-30° to 75° C. / -22° to 167° F.	
	ENCLOSURE	
Dimensions VGR Modem (hxwxd)	73 x 54.5 x 25.5 mm / 2.9 x 2.1 x 1 inch	
Weight VGR Modem	89 grams / 3.1 ounces	
Body	Aluminium	
Installation	Two aluminum mounting bridles	
	GSM / GPRS	
GPRS data usage	Depends on usage	
	INCLUDED ACCESSORIES	
GSM antenna	Included	Included
Ethernet attachment	n.a.	Included
Battery cable	With inline fuse	Included
Y-cable for serial and IO Extender connection	Included	Included
Male DB15 to female DB9 cable	Included	Included
MK2 interface	Included	Included
	OPTIONAL ACCESSORIES (NOT INCLUDED, TO BE ORDERED SEPARATELY)	
Global Remote to BMV-60xS conn. kit	Compatible	Compatible
VGR IO Extender	Compatible	Not compatible

BMV-600S and 602S
The BMV-600S and 602S are our newest high precision battery monitors. The essential function of a battery monitor is to calculate ampere-hours consumed as well as the state of charge of a battery. Ampere-hours consumed are calculated by integrating the current flowing in or out of the battery.

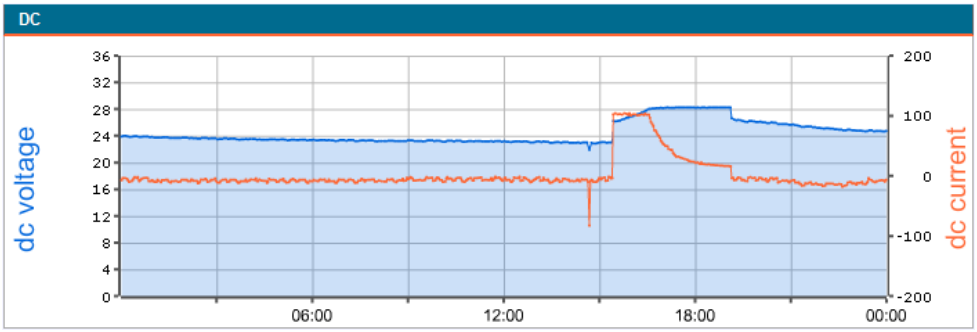
Global Remote to BMV-60xS conn. kit
Cable kit required to connect the BMV-60xS and the Victron Global Remote. BMV 60xS Data Link included.

MultiPlus Inverter/Charger
The MultiPlus is a powerful true sine wave inverter, a sophisticated battery charger that features adaptive charge technology, and a high-speed AC transfer switch in a single compact enclosure.

Phoenix Inverter
Pure sinwave output, high peak power and high efficiency. Combined high frequency and line frequency technologies ensure the best of both worlds.

Quattro Inverter/Charger
The Quattro can be connected to two independent AC sources, for example shore-side power and a generator, or two generators. The Quattro will automatically connect to the active source.

Example of graph available on https://vrm.victronenergy.com



PRECISION BATTERY MONITORING

BMV 600S

BMV bezel square

BMV shunt 500A/50mV
With quick connect pcb

BMV 602S Black

VE.Net Battery Controller

Precision monitoring

The essential function of a battery monitor is to calculate ampere-hours consumed and the state of charge of a battery. Ampere-hours consumed is calculated by integrating the current flowing in or out of the battery. In case of a constant current, this integration is equivalent to current multiplied by time. A discharge current of 10A during 2 hours, for example, amounts to 20Ah consumed. All our battery monitors are based on a powerful microprocessor, programmed with the algorithms needed for precision monitoring.

Standard information and alarms

- Battery voltage (V).
- Battery charge/discharge current (A).
- Ampere-hours consumed (Ah).
- State of charge (%).
- Time to go at the current rate of discharge.
- Visual and audible alarm: over- and under voltage, and/or battery discharged.
- Programmable alarm or generator start relay.

BMV 600S: low cost ultra high resolution monitor

- Highest resolution: 10mA (0,01A) with 500A shunt.
- Can be used with 50, 60 or 100mV shunts, current rating from 100A to 1000A
- Lowest current consumption: 4mA @12V and 3mA @ 24V.
- Easiest to wire: the BMV 600S comes with shunt, 10 meter RJ 12 UTP cable and 2 meter battery cable with fuse; no other components needed.
- Easiest to install: separate front bezel for square or round appearance; ring for rear mounting and screws for front mounting.
- Broadest voltage range: 9.5 – 95 VDC without prescaler needed.
- Communication port (Isolated RS232 interface is needed to connect to a computer)

BMV 602S: two batteries

In addition to all the features of the BMV600S, the BMV602S can measure the voltage of a second battery. A version with a black front bezel (BMV 602S Black) is also available.

BMV 600HS: 70 to 350VDC voltage range

No prescaler needed. Note: suitable for systems with grounded minus only (battery monitor is not isolated from shunt).

Optional Isolated RS232 communication interface and software

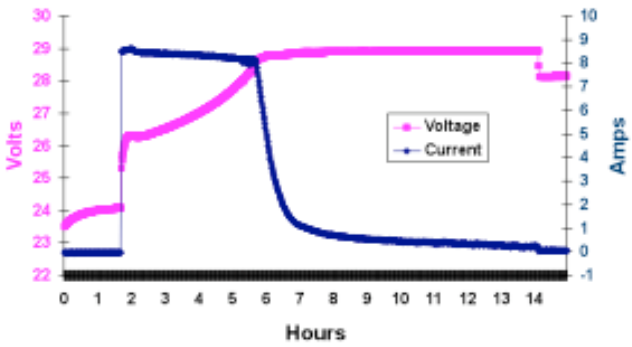
(for all BMV models) Displays all information on a computer and loads charge/discharge data in an Excel file for graphical display.

VE.Net Battery Controller: any number of batteries

- One VE.Net panel or Blue Power panel will connect to any number of battery controllers.
- Comes with 500A/50mV shunt and can be programmed for 50, 60 or 100mV shunts, current rating from 100A to 10.000A.
- With use, abuse and data memory.
- Temperature sensor and connection kit included.

High voltage VE.Net Battery Controller: 70 to 350VDC

No prescaler needed. Note: RJ45 connectors are galvanically isolated from Controller and shunt.



Example of a battery charge curve recorded with a BMV 602 and VEBat software

PRECISION BATTERY MONITORING

Battery monitor	BMV 600S	BMV 602S & BMV 602S BLACK	BMV 600HS	VE. Net Battery Controller	VE. Net High Voltage Battery Controller
Power supply voltage range	9.5 - 90 VDC	9.5 - 90 VDC	70 – 350 VDC	7 - 75 VDC	70 - 350 VDC[1]
Current draw, back light off	< 4 mA	< 4 mA	< 4 mA	< 5 mA	< 4 mA
Input voltage range (VDC)	9.5 - 95 VDC	9.5 - 95 VDC	70 – 350 VDC	0 - 75 VDC	0 – 350 VDC
Battery capacity (Ah)	20 – 9.999 Ah			20 - 60.000 Ah	
Operating temperature range	-20 +50°C (0 - 120°F)				
Measures voltage of second battery	No	Yes	Yes	Yes	
Communication port	Yes	Yes	Yes	Yes (VE.Net)	
Potential free contacts	60V/1A (N/O)				
RESOLUTION (with a 500 A shunt)					
Current	± 0,01 A			± 0,1 A	
Voltage	± 0,01 V				
Amp hours	± 0,1 Ah				
State of charge (0 – 100 %)	± 0,1 %				
Time to go	± 1 min				
Temperature (0 - 50°C or 30 - 120°F)	n. a.			± 1°C (± 1°F)	
Accuracy of current measurement	± 0,3 %				
Accuracy of voltage measurement	± 0,4 %				
INSTALLATION & DIMENSIONS					
Installation	Flush mount			DIN rail	
Front	63 mm diameter			22 X 75 mm (0.9 x 2.9 inch)	
Front bezel	69 x 69 mm (2.7 x 2.7 inch)			n. a.	
Body diameter	52mm (2.0 inch)			n. a.	
Body depth	31mm (1.2 inch)			105 mm (4,1 inch)	
ACCESSORIES					
Shunt (included)	500 A / 50 mV[2]			500 A / 50 mV[3]	
Cables (included)	10 meter 6 core UTP with RJ12 connectors, and cable with fuse for '+' connection			Supplied with 1 m cables	
Temperature sensor	n. a.			Supplied with 3 m cable	
Computer interface	optional			n.a.	
	1) 7 – 75 VDC needed for VE.Net network power supply 2) HV version with shunt in plastic enclosure 3) HV version with shunt + Controller in plastic enclosure				

Victron Global Remote
The Global Remote is a modem which sends alarms, warnings and system status reports to cellular phones via text messages (SMS). It can also log data from Victron Battery Monitors, MultiPlus units, Quattro's and Inverters to a website through a GPRS connection. Access to this website is free of charge.

Victron Global Remote to BMV 60xS Connection Kit
Cable kit required to connect the BMV and the Victon Global Remote. BMV Data Link included.

Blue Power panel
The VE.Net Blue Power Panel is the panel that connects to the VE.Net Battery Controller. The panel can show the information of multiple batteries on one display for simple and efficient monitoring of your battery systems. For our other VE.Net products please refer to our VE.Net datasheet.

1000A/50mV shunt
For ease of use with BMV series: quick connect pcb of standard 500A/50mV shunt can be mounted on this shunt.

2000A/50mV shunt
For ease of use with BMV series: quick connect pcb of standard 500A/50mV shunt can be mounted on this shunt.

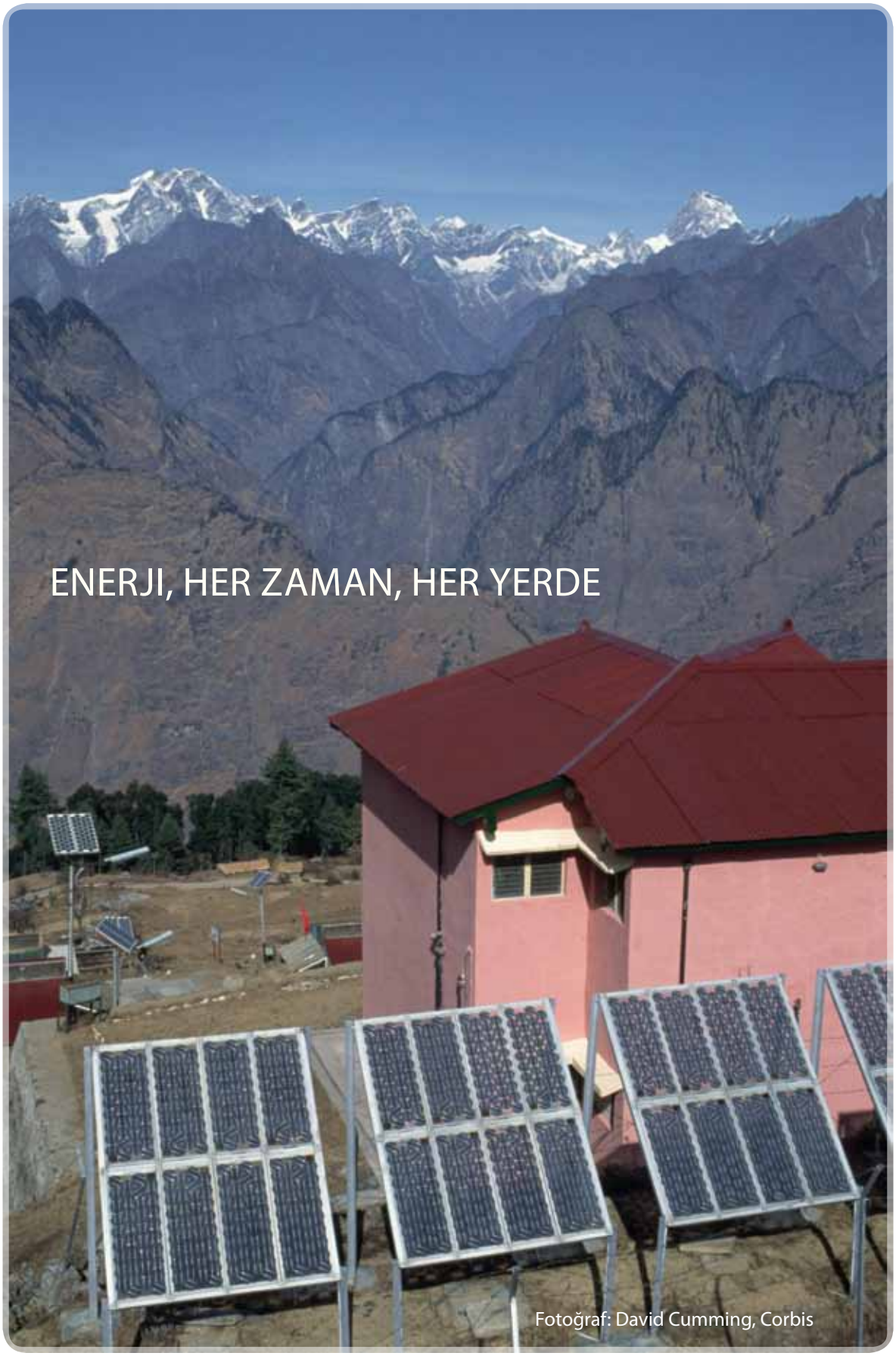
VICTRON ENERGY HAKKINDA

35 yıldan fazla tecrübeye sahip Victron Energy teknik inovasyon, güvenilirlik ve kalite konusunda rakipsiz bir üne sahip. Victron kendi kendini yeten elektrik gücü tedarikinde dünya lideridir. Ürünlerimiz, çeşitli zanaat, eğlence, ticaret faaliyetlerinde ve benzeri alanlarda karşılaşılan en zorlu durumların gereksinimlerini karşılayacak şekilde tasarlanmıştır. Victron'un özel şebekeden bağımsız sistem taleplerini karşılama becerisi benzersizdir. Ürün çeşitlerimiz arasında sinüs dalgalı invertörler, invertör/şarj cihazları, akü şarj cihazları, DC/DC konvertörler, aktarma anahtarları, Jel ve AGM aküler, alternatörler, akü monitörleri, güneş enerjili şarj regülatörleri, Solar Paneller, komple ağ çözümleri ve diğer birçok yenilikçi çözüm bulunmaktadır.

Dünya çapında servis ve destek
Hem ticari, hem de boş zaman deniz sektörlerine, bağımsız şebeke, araç ve sanayi piyasalarına 35 yıldır hizmet veren Victron'un bütün dünyada oturmuş bir satıcı ve bayi ağı mevcuttur. Müşteri tabanımız için anında ve yetkin yerel servis sağlamak çok önemlidir.

Bu durum da destek ağımızın kapasitelerinde kendisini gösterir. Servis desteğine olan esnek yaklaşımımız ve onarımlar için hızlı dönüşüme gösterdiğimiz gayret, piyasada lider konumdadır. En zorlu uygulamalarda onlarca yıldır güvenilir servis sağlayan Victron ürünlerinin sayısız örnekleri mevcuttur. Bu güvenilirlik seviyesiyle birlikte azami düzeyde teknik bilgi, Victron Energy güç sistemlerinin mevcut en iyi değeri sunduğunun bir göstergesidir.

Victron Energy solar ürünler


ENERJI, HER ZAMAN, HER YERDE
Fotoğraf: David Cumming, Corbis

victron energy
BLUE POWER

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