

SOLAR ENERJİ TEKNOLOJİLERİ & UYGULAMA ALANLARI

İdris ÜNAL
Bireysel Çözümler Satış Takım Lideri

FORM ELEKTRİK 2000 yılında Elektrik Mühendisleri tarafından Ankara'da kurulmuş, 9 farklı ülkede 1500'den fazla müşteriye elektrik mühendisliği çözümleri sunan bir şirkettir.

Bugün 7323 m² kapalı alana sahip fabrikasında satış, satış sonrası teknik destek ve yazılım çözümlerini 40 kişilik uzman ekibiyle sunmaya devam etmektedir.



OG KORUMA ÇÖZÜMLERİ



- *OG koruma cihazlarının satışı ve teknik servisi*
- *Scada projeleri ve scada adaptasyon*
- *Saha testleri ve raporlanması*
- *Kullanıcılar için eğitim ve sertifika hizmeti sağlamak.*



NOJA POWER®



E-MOBİLİTE ÇÖZÜMLERİ



- *E-Mobilite Servis Sağlayıcısı(EMSP)*
- *Şarj Operatörlüğü(CPO)*
- *AC ve DC şarj istasyonları satış ve kurulumu*
- *Proje ve dizayn hizmetleri*

EPSSIS
eMobility Power System

GROWATT

DEPOLAMA ÇÖZÜMLERİ



- *Proje ve Dizayn Hizmetleri*
- *Satış ve satış sonrası teknik servis hizmeti*
- *Süpervizörlük*



SOLAR ÇÖZÜMLER



- *Inverter satış ve teknik desteęi*
- *Özel izleme yazılımı tasarımı*
- *Proje dizaynı (küçük depolama vb.)*
- *Kullanıcılar için eğitim ve sertifika hizmeti sağlamak.*

GROWATT

Dyness
ENERGY STORAGE SYSTEM

IMPETUS
view



**Yıllık Üretim Kapasitesi 30
GW**



1600+ İstihdam



400+ AR-GE Mühendisi



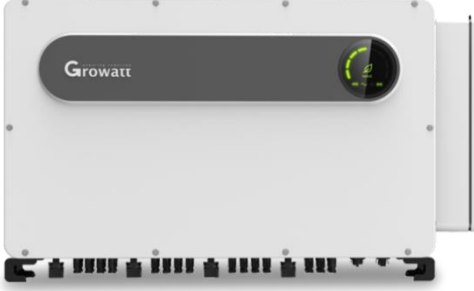
110+ Patent



**TUV, INTERTEK onaylı
Laboratuvar**



ON GRID ÇÖZÜMLER



- 750W – 253kWe
- 1P – 3P
- Öz Tüketim

OFF GRID ÇÖZÜMLER



- 2kW – 30kWe
- 1P – 3P
- LiFePO4

HİBRİT ÇÖZÜMLER



- 3kW – 30kWe
- 1P – 3P
- LiFePO4
- Öz Tüketim

İZLEME ÇÖZÜMLERİ



- Uzaktan Kontrol
- Servis Yönetimi
- Ürün Takibi



MIC750 – 3300TL-X
1P 1 MPPT



MIN2500 – 6000TL-X
1P 2 MPPT



MOD3 – 15KTL3-X
3P 2 MPPT



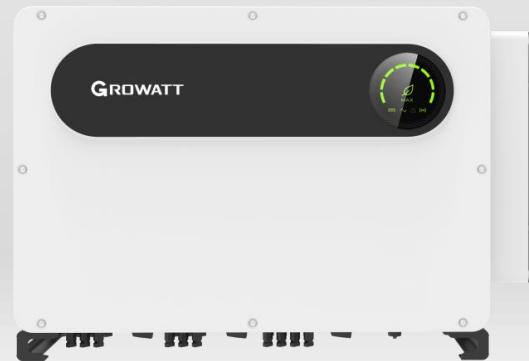
MID15 – 50KTL3-X
3P 2-4 MPPT



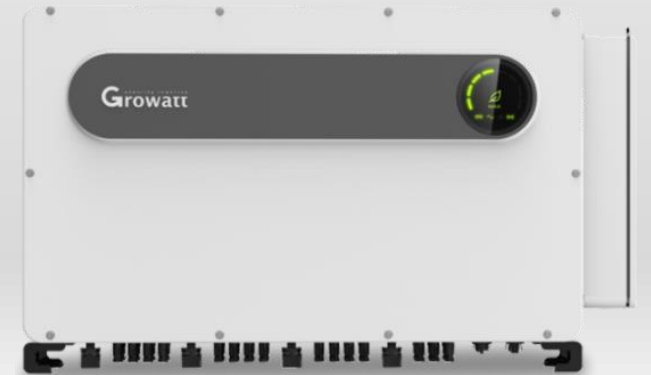
MAC30 – 60KTL3-X LV
3P 3 MPPT



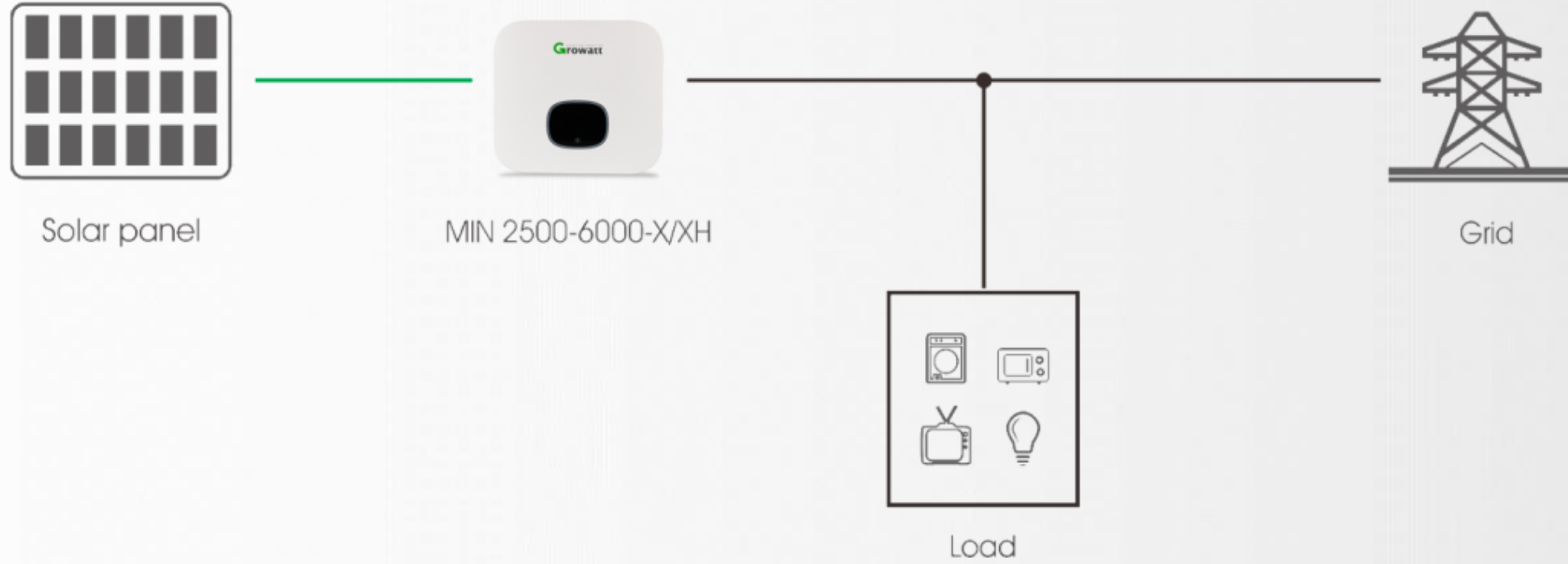
MAX50 – 80KTL3-X LV
3P 6-7 MPPT



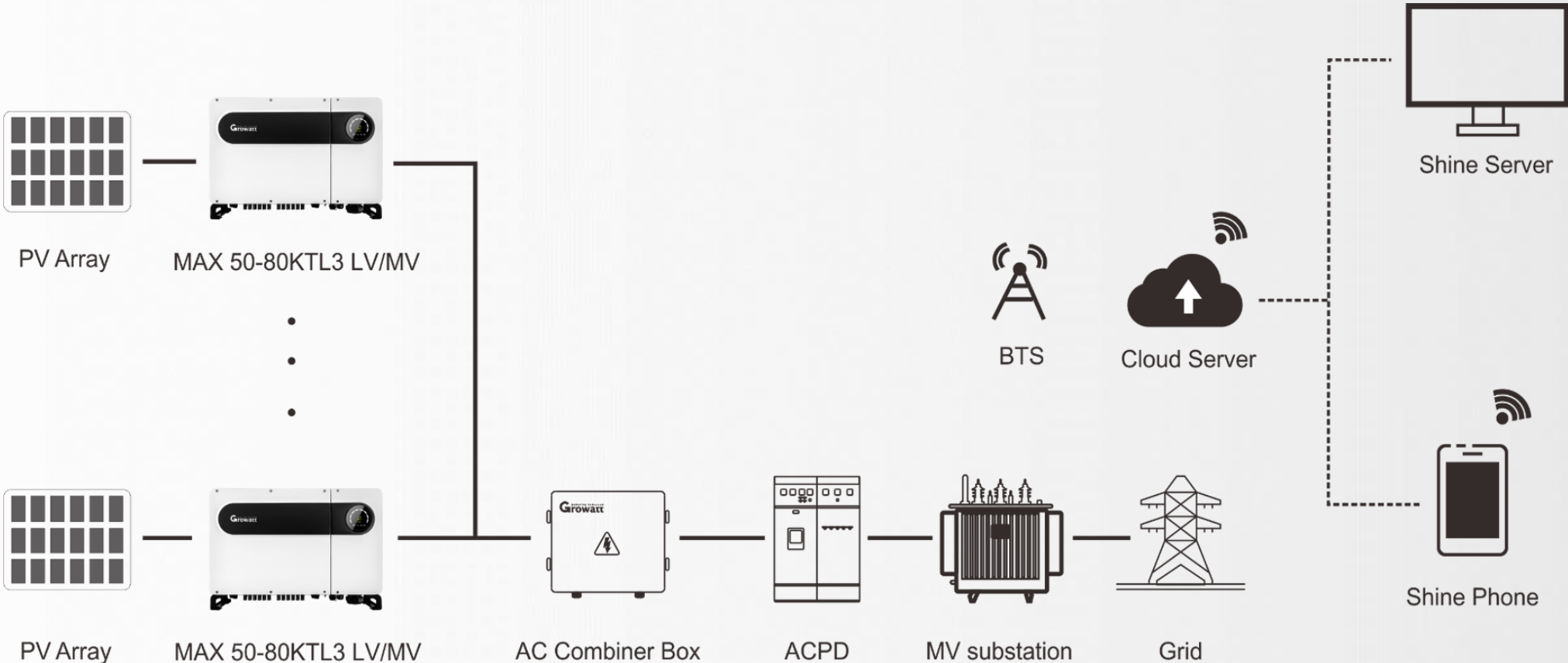
MAX100 – 125KTL3-X LV
3P 10 MPPT



MAX185 – 253KTL3-X HV
3P 10-15 MPPT



On Grid Çözümler





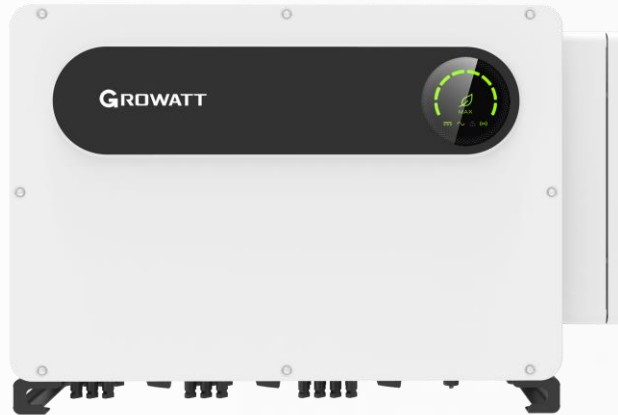
MIN2500 – 6000TL-X
1P 2 MPPT

Datasheet	MIN 2500TL-X	MIN 3000TL-X	MIN 3600TL-X	MIN 4200TL-X	MIN 4600TL-X	MIN 5000TL-X	MIN 6000TL-X
Input Data (DC)							
Max. recommended PV power (for module STC)	3500W	4200W	5040W	5880W	6440W	7000W	8100W
Max. DC voltage	500V	500V	550V	550V	550V	550V	550V
Start voltage				100V			
Nominal voltage				360V			
MPP voltage range	80V-500V	80V-500V	80V-550V	80V-550V	80V-550V	80V-550V	80V-550V
No. of MPP trackers				2			
No. of PV strings per MPP tracker				1			
Max. input current per MPP tracker				13.5A*			
Max. short-circuit current per MPP tracker				16.9A			
Output data (AC)							
AC nominal power	2500W	3000W	3600W	4200W	4600W	5000W	6000W
Max. AC apparent power	2500VA	3000VA	3600VA	4200VA	4600VA	5000VA	6000VA
Nominal AC voltage (range*)	230V (180-280V)						
AC grid frequency (range*)	50/60 Hz (45-55Hz/55-65 Hz)						
Max. output current	11.3A	13.6A	16A	19A	20.9A	22.7A	27.2A
Adjustable power factor	0.8leading...0.8lagging						
THDI	<3%						
AC grid connection type	Single phase						
Efficiency							
Max. efficiency	98.2%	98.2%	98.2%	98.4%	98.4%	98.4%	98.4%
European efficiency	97.1%	97.1%	97.2%	97.5%	97.5%	97.5%	97.5%
MPPT efficiency	99.9%						
Protection Devices							
DC reverse polarity protection				yes			
DC switch				yes			
AC/DC surge protection				Type III / Type II			
Insulation resistance monitoring				yes			
AC short-circuit protection				yes			
Ground fault monitoring				yes			
Grid monitoring				yes			
Anti-islanding protection				yes			
Residual-current monitoring unit				yes			
AFCI protection				Optional			



MID15 – 25KTL3-X
3P 2-4 MPPT

Datasheet	MID 15KTL3-X	MID 17KTL3-X	MID 20KTL3-X	MID 22KTL3-X	MID 25KTL3-X
Input data (DC)					
Max. recommended PV power (for module STC)	22500W	25500W	30000W	33000W	37500W
Max. DC voltage	1100V				
Start Voltage	250V				
Nominal voltage	580V				
MPPT voltage range	160V-1000V				
No. of MPPT trackers	2				
No. of PV strings per MPPT tracker	2	2	2	2	2/3
Max. input current per MPPT tracker*	27A	27A	27A	27A	27A/40.5A
Max. short circuit current per MPPT	33.8A	33.8A	33.8A	33.8A	33.8A/50.7A
Output data (AC)					
Rated AC output power	15000W	17000W	20000W	22000W	25000W
Max. AC apparent power	16600VA	18800VA	22000VA	24400VA	27700VA
Nominal AC voltage(range*)	220V/380V, 230V/400V (340-440V)				
AC grid frequency(range*)	50/60 Hz (45-55Hz/55-65 Hz)				
Max. output current	24.2A	27.4A	31.9A	35.5A	40.2A
Adjustable power factor	0.8leading...0.8lagging				
THDi	<3%				
AC grid connection type	3W+ N+PE				
Efficiency					
Max. efficiency	98.75%				
European efficiency	98.6%				
MPPT efficiency	99.9%				
Protection devices					
DC reverse polarity protection	Yes				
DC Switch	Yes				
AC/DC surge protection	TypeII/Type II				
Insulation resistance monitoring	Yes				
AC short-circuit protection	Yes				
Ground fault monitoring	Yes				
Grid monitoring	Yes				
Anti-islanding protection	Yes				
Residual-current monitoring unit	Yes				
String monitoring	Yes				
AFCI protection	Optional				



MAX100 – 125KTL3-X LV
3P 10 MPPT

Datasheet	MAX 100KTL3-X LV	MAX 110KTL3-X LV	MAX 120KTL3-X LV	MAX 125KTL3-X LV
Input data (DC)				
Max. DC voltage			1100V	
Start voltage			200V	
Nominal voltage			600V	
MPP voltage range			200V-1000V	
No. of MPP trackers			10	
No. of PV strings per MPP tracker			2	
Max. input current per MPP tracker			30A	
Max. short-circuit current per MPP tracker			40A	
Output data (AC)				
AC nominal power	100000W	110000W	120000W	125000W
Max. AC apparent power	110000VA	121000VA	132000VA	143000VA
Nominal AC voltage(range*)	230V/400V(340-440VAC)			
AC grid frequency (range*)	50/60 Hz(45--55Hz/55-65 Hz)			
Max. output current	144.3A	158.8A	173.2A	180.4A
Adjustable power factor	0.8leading ...0.8lagging			
THDI	<3%			
AC grid connection type	3W/N/PE			
Efficiency				
Max. efficiency			98.70%	
European efficiency	98.40%	98.50%	98.50%	98.50%
MPPT efficiency	99.90%			
Protection devices				
DC reverse polarity protection	Yes			
DC switch	Yes			
AC/DC surge protection	Type II / Type II			
Insulation resistance monitoring	Yes			
AC short-circuit protection	Yes			
Ground fault monitoring	Yes			
String detection	Yes			
Anti PID function	Opt			
Arc fault detection (AFCI)	Opt			

Ark Koruma

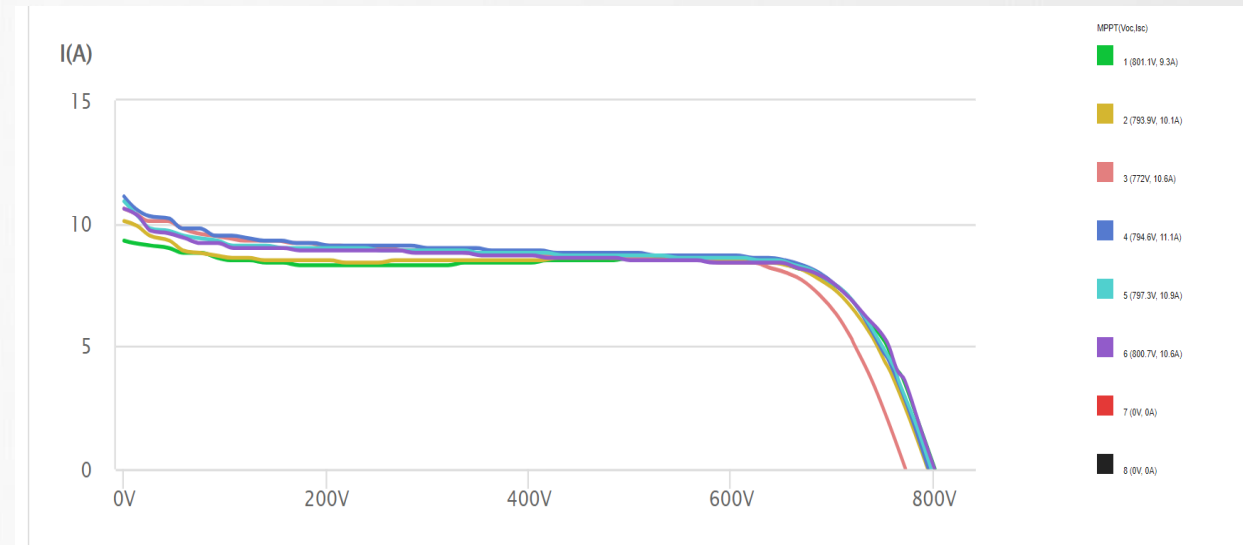
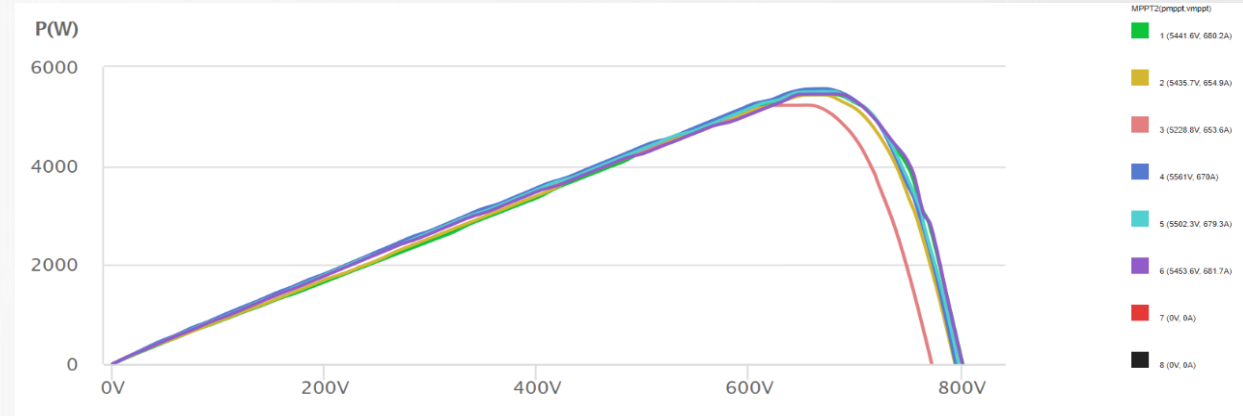


Yanlış ürün seçimi, montaj hataları veya yaşlanmaya bağlı izolasyon kayıpları, ark oluşumuna neden olabilmektedir. DC hatta oluşabilecek ark hataları, yangın riskine teshir edebilecek en önemli faktörlerdendir.

Growatt, **Ark Koruma Özelliği (AFCI)** ile ihtiyacınız olan güvenliği sağlamaktadır. UL1699B Standartına göre Ark Hatası 2.5 saniyenin altında tespit edilmelidir. Growatt, bu testleri **0,75** saniye ortalaması ile geçerek en hızlı tepkime süresine sahip solar inverter unvanını almıştır.

I-V Analizi

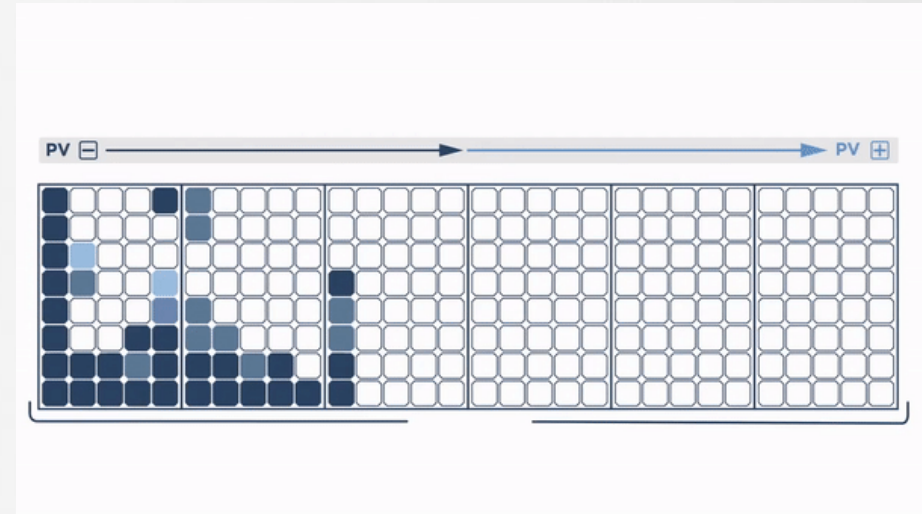
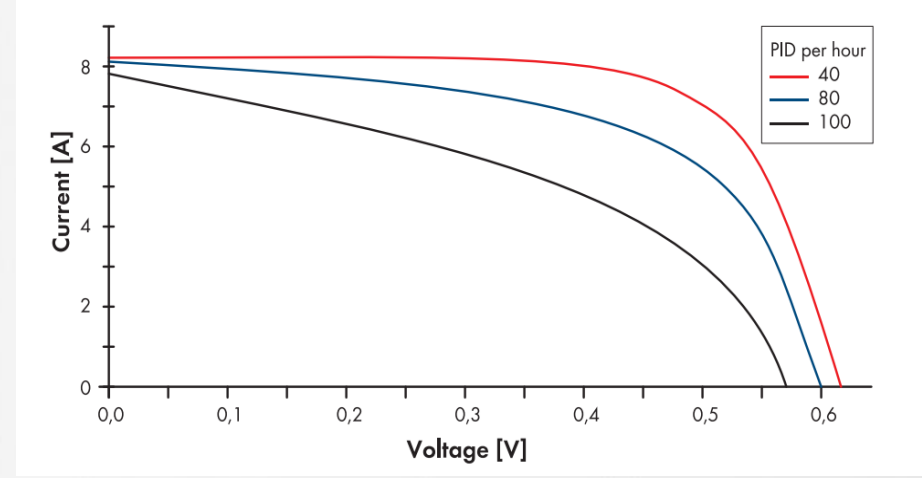
I-V, P-V Grafikleri ile her bir MPPT'ye bağlı Panellere ait performansı analiz edebilirsiniz.



Anti PID

Potansiyel Kaynaklı Bozulma: Tüm fotovoltaik sistemlerde, bir modülün çerçeveleri ve güneş gözeleri arasında gerilim farkları meydana gelir. Özellikle nemli hava ve yüksek sıcaklık koşullarında, panellerin performansını etkileyerek %20 veya daha fazla üretim kayıplarına yol açabilecek istenmeyen kaçak akımlara neden olabilir.

Bu etki “Potansiyel Kaynaklı Bozulma” olarak adlandırılmış ve “PID” olarak kısaltılmıştır.

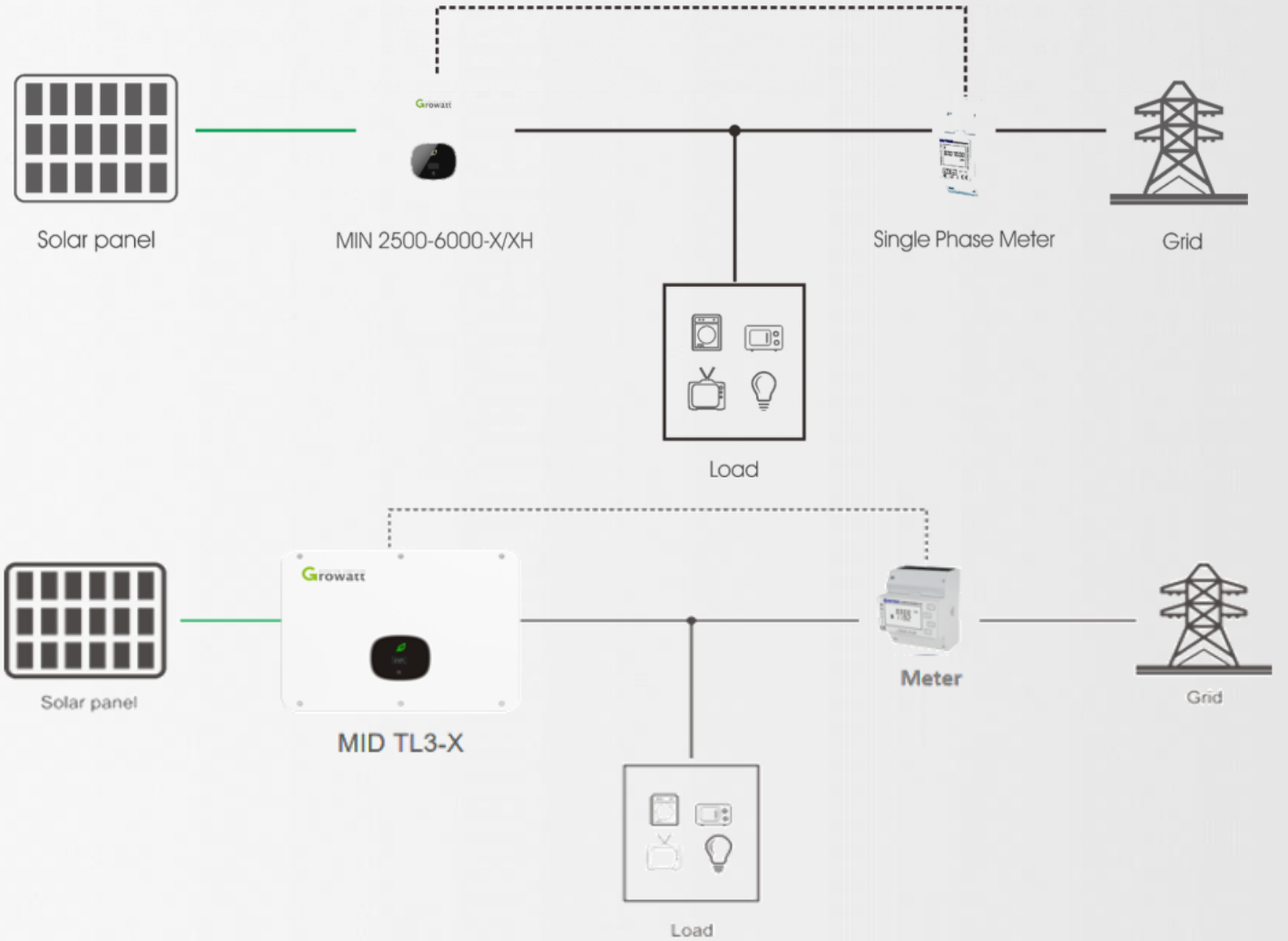




SMART METER

Öztüketim Uygulamaları İçin Enerji Analizörü

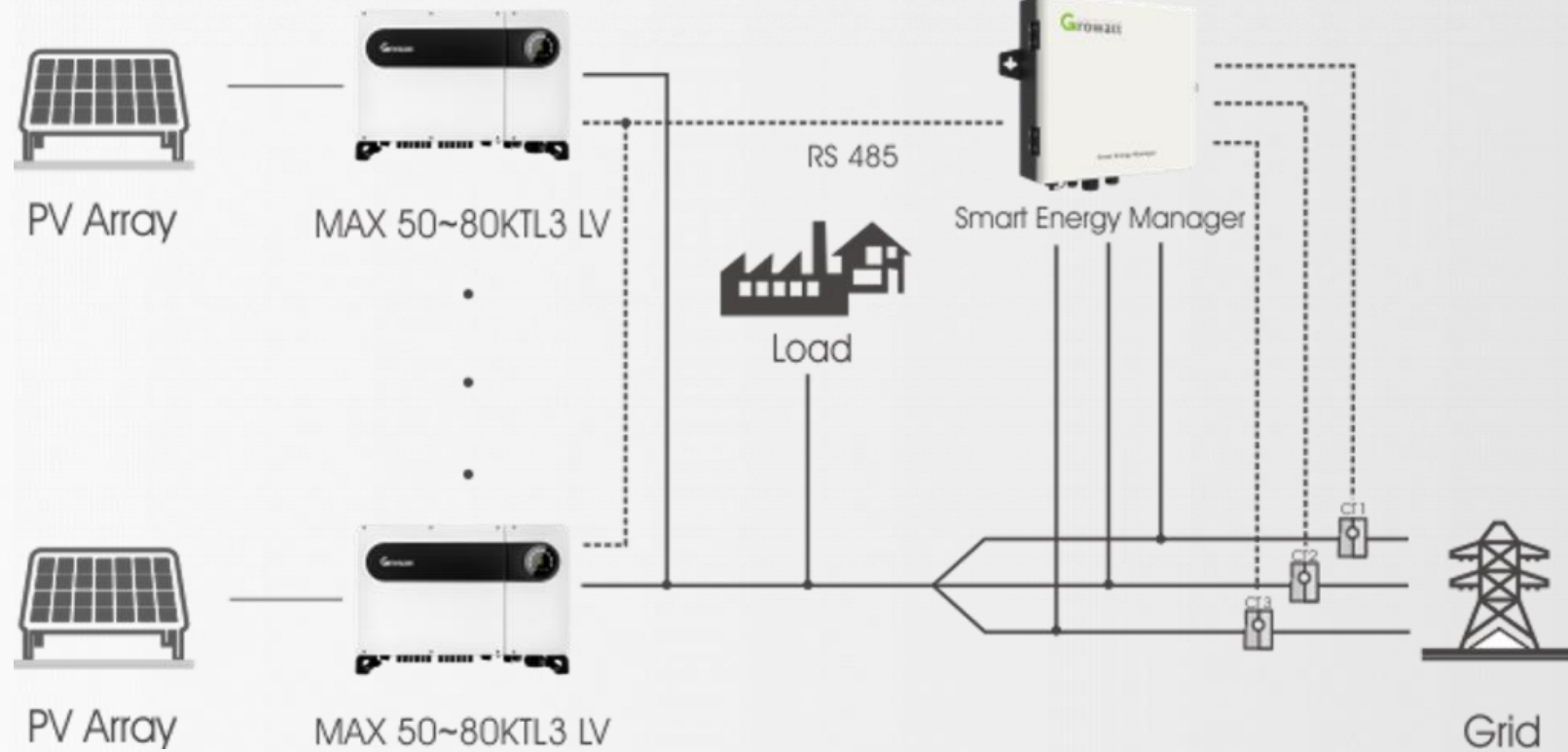
- Tek İnvertörlü Öztüketim Projeleri için uygundur
- Direk veya Akım Tr. Bağlantı
- RS485 Haberleşme
- Monofaze/Trifaze





SMART ENERGY MANAGER Öztüketim Uygulamaları İçin Enerji Analizörü

- Çoklu İnvertörlü Öztüketim Projeleri için uygundur
- Kompakt Tasarım
- Akım Tr. Bağlantı
- Dahili Shine Master
- RS485 Haberleşme

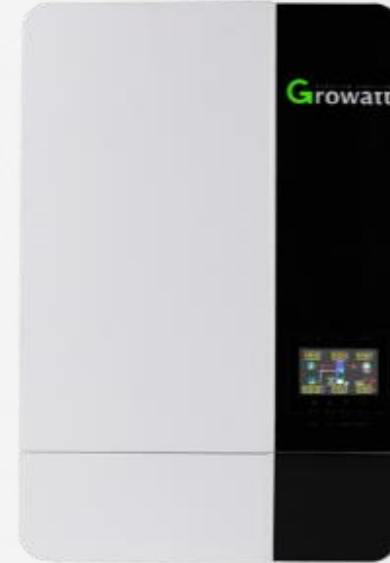


SPF2000 – 5000 HVM Serisi

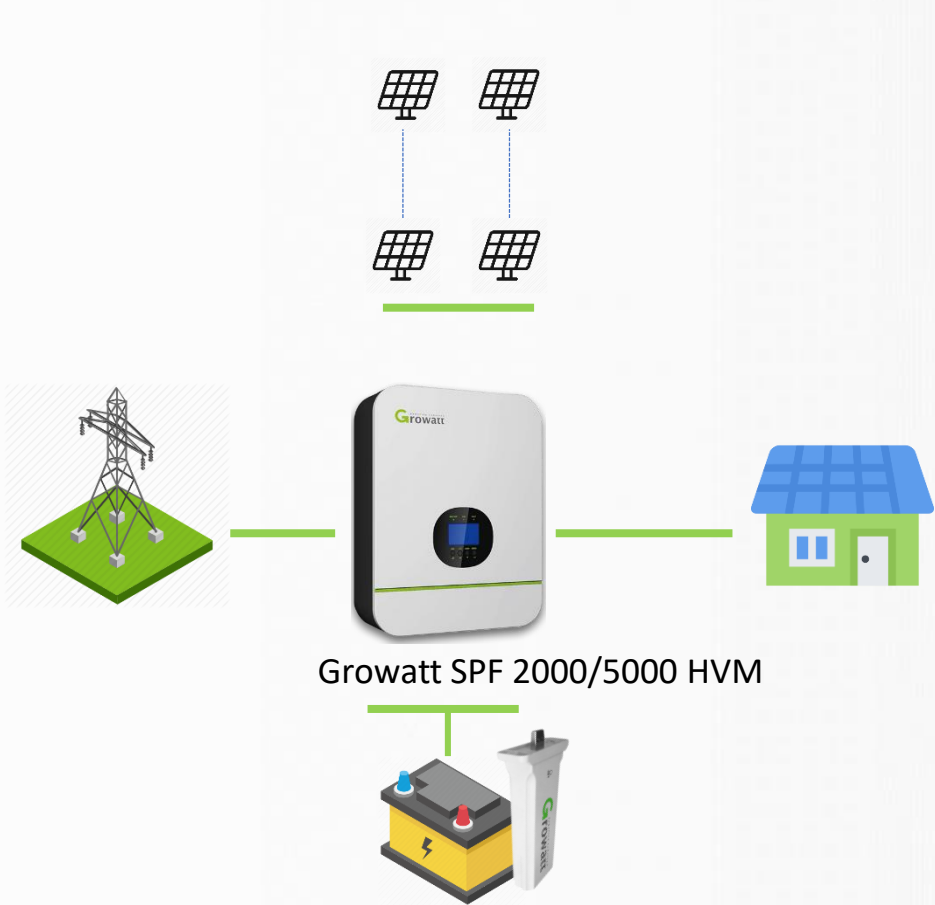


24V – 48V Batarya Giriş Gerilimi
Lityum Batarya Desteđi
Uzaktan Kontrol ve Takip
Sistemi

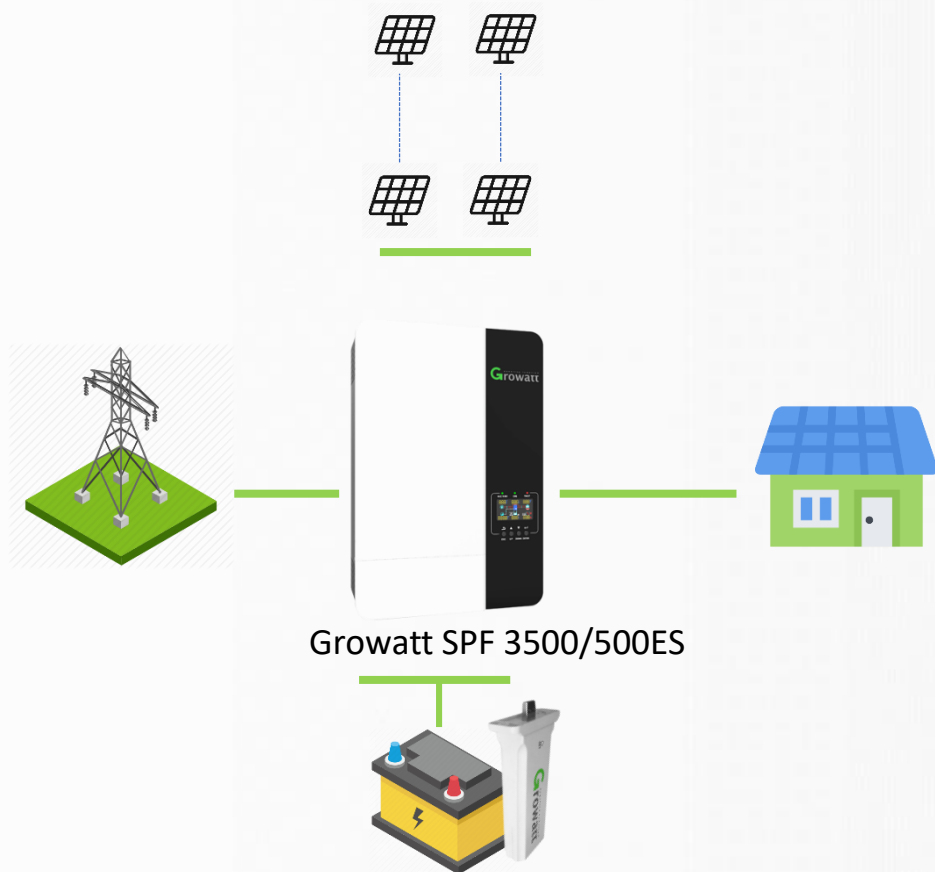
SPF3500 – 5000ES



48V Batarya Giriş Gerilimi
Lityum Batarya Desteđi
Uzaktan Kontrol ve Takip
Sistemi



Datasheet	SPF 2000TL HVM-24	SPF 3000TL HVM-24	SPF 2000TL HVM-48	SPF 3000TL HVM-48	SPF 5000TL HVM/HVM-P
Battery Voltage	24VDC		48VDC		
Battery Type	Lithium/Lead-acid				
INVERTER OUTPUT					
Rated Power	2000VA/ 2000W	3000VA/ 3000W	2000VA/ 2000W	3000VA/ 3000W	5000VA/ 5000W
Parallel Capability	No				Na/ Yes, 6 units maximum
AC Voltage Regulation (Battery Mode)	230VAC \pm 5% @ 50/60Hz				
Surge Power	4000VA	6000VA	4000VA	6000VA	10000VA
Efficiency (Peak)	93%				
Waveform	Pure sine wave				
Transfer Time	10ms typical, 20ms Max				
SOLAR CHARGER					
Maximum PV Array Power	1500W		1800W		4500W
MPPT Range @ Operating Voltage	30VDC ~ 80VDC		60VDC ~ 115VDC		
Maximum PV Array Open Circuit Voltage	102VDC		145VDC		
Number of Independent MPP Trackers/ Strings Per MPP Tracker			1/1		
Maximum Solar Charge Current	50A		30A		80A
Maximum Efficiency	98%				
AC CHARGER					
Charge Current	30A		15A		60A
AC Input Voltage	230 VAC				
Selectable Voltage Range	170-280 VAC (For Personal Computers) ; 90-280 VAC (For Home Appliances)				
Frequency Range	50Hz/60Hz (Auto sensing)				

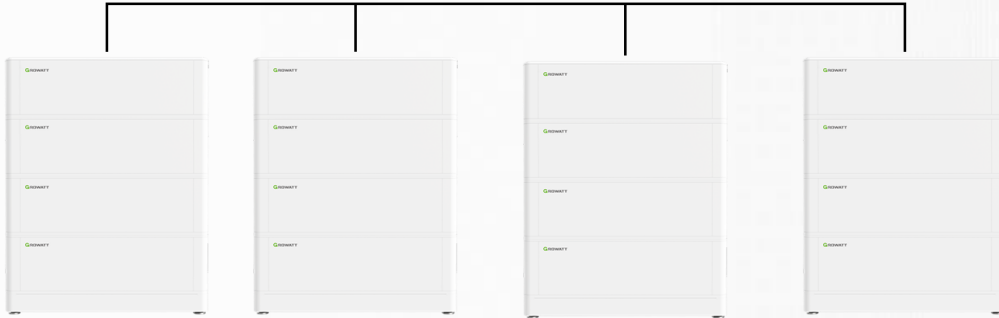
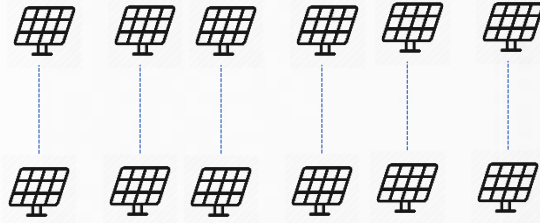


Datasheet	SPF 3500 ES	SPF 5000 ES
Battery Voltage	48VDC	
Battery Type	Lithium/Lead-acid	
INVERTER OUTPUT		
Rated Power	3500VA/ 3500W	5000VA/ 5000W
Parallel Capability	Yes, 6 units maximum	
AC Voltage Regulation (Battery Mode)	230VAC \pm 5% @ 50/60Hz	
Surge Power	7000VA	10000VA
Efficiency (Peak)	93%	
Waveform	Pure sine wave	
Transfer Time	10ms typical, 20ms Max	
SOLAR CHARGER		
Maximum PV Array Power	4500W	6000W
MPPT Range @ Operating Voltage	120VDC ~ 430VDC	
Number of Independent MPP Trackers/ Strings Per MPP Tracker	1/1	
Maximum PV Array Open Circuit Voltage	450VDC	
Maximum Solar Charge Current	80A	100A
AC CHARGER		
Charge Current	60A	80A
AC Input Voltage	230 VAC	
Selectable Voltage Range	170-280 VAC (For Personal Computers) ; 90-280 VAC (For Home Appliances)	
Frequency Range	50Hz/60Hz (Auto sensing)	



Teknik Özellikler	ARK LV
Batarya Gerilimi	51,2Vdc
Batarya Tipi	Lithium Iron Phosphate (LiFePO4)
Depolama	2,56 ~64 kWh
Back Up	2~50 kW@230VAC
Kullanılabilir Kapasite	2,30 kWh~57,5 kWh
Şarj / Desarj Gerilimi	47,2 ~56,8 Vdc
Şarj / Desarj (A)	25A / 25A
Döngü	>6000
Garanti	5 Yıl
OSS/Shineserver /ShinePhone	✓

Off Grid Çözümler

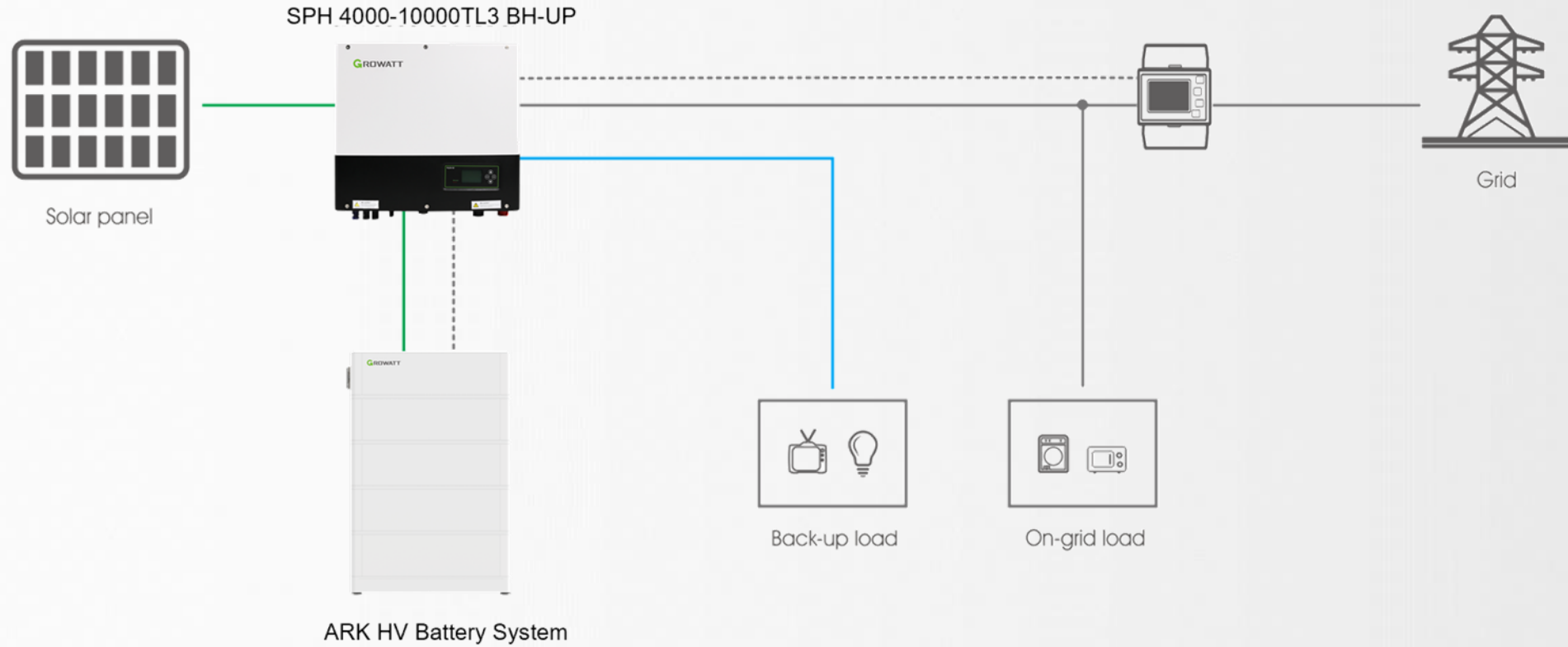


Teknik Özellikler	30 kW AC Şebeke Bağımsız
PV Gücü	48,6 kWp
AC Gücü	30 kW Mono & Trifaze
Batarya Gerilimi	48 Vdc
Depolama (ARK LV)	64kWh Lityum Batarya
OSS/Shineserver /ShinePhone	✓☐

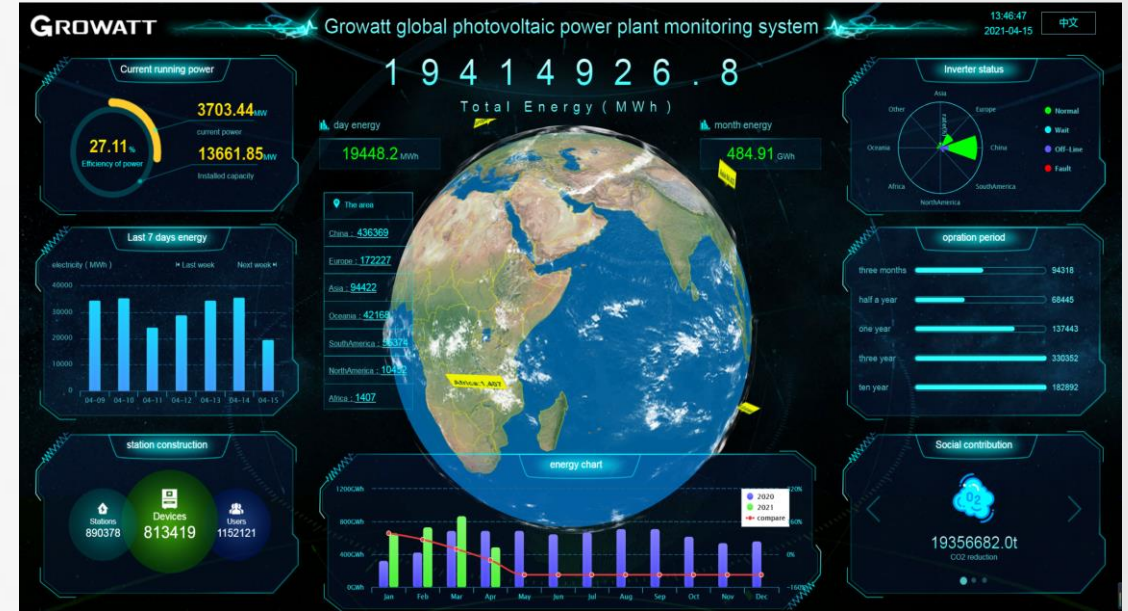


SPH4000-10000TL3BH UP 3P 2 MPPT

Datasheet	SPH 4000TL3 BH-UP	SPH 5000TL3 BH-UP	SPH 6000TL3 BH-UP	SPH 7000TL3 BH-UP	SPH 8000TL3 BH-UP	SPH 10000TL3 BH-UP
Input data(PV)						
Max. recommended PV power (for module STC)	6000W	7500W	9000W	10500W	12000W	15000W
Max. DC voltage	1000					
Start voltage	120V					
MPP voltage range	120V-1000V/600V					
No. of MPP trackers	2					
No. of PV strings per MPP tracker	1					
Max. input current per MPP tracker	13.5A					
Max. short-circuit current per MPP tracker	16.9A					
Output data(AC)						
AC nominal power	4000W	5000W	6000W	7000W	8000W	10000W
Max. AC apparent power	4000VA	5000VA	6000VA	7000VA	8000VA	10000VA
Nominal AC voltage (range*)	230V/400V (310~476V)					
AC grid frequency (range)	50Hz/60Hz (45Hz-55Hz/55Hz-65Hz)					
Max. output current	6.1A	7.6A	9.1A	10.6A	12.1A	15.2A
Adjustable power factor	0.8leading...0.8lagging					
THDi	< 3%					
AC grid connection type	3W+N+PE					
Battery data (DC)						
Battery voltage range	100~550V					
Max. charging and discharging current	25A					
Continuous charging and discharging power	4000W	5000W	6000W	7000W	8000W	10000W
Type of battery	lithium/lead-acid					
Backup power(AC)						
Max. AC output power	4000W	5000W	6000W	7000W	8000W	10000W
Max. AC apparent power	4000VA	5000VA	6000VA	7000VA	8000VA	10000VA
Max. output current	6.1A	7.6A	9.1A	10.6A	12.1A	15.2A
Nominal AC output voltage	230V/400V					
Nominal AC output frequency	50/60Hz					
THDv	<3%					
Switch time	<10ms					
Efficiency						
MAX. efficiency	97.6%	97.8%	98.0%	98.2%	98.2%	98.2%
European efficiency	97.0%	97.2%	97.3%	97.4%	97.4%	97.5%
Euro battery discharge efficiency	97.4%					
MPPT efficiency	99.9%					



İzleme Çözümleri



ShineWifi/GPRS - X



ShineLan- X

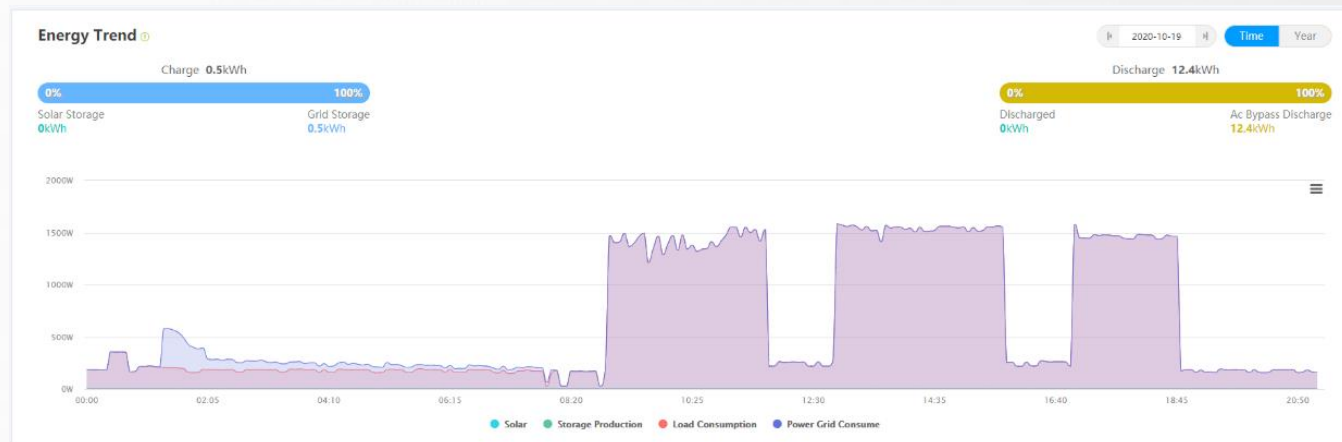


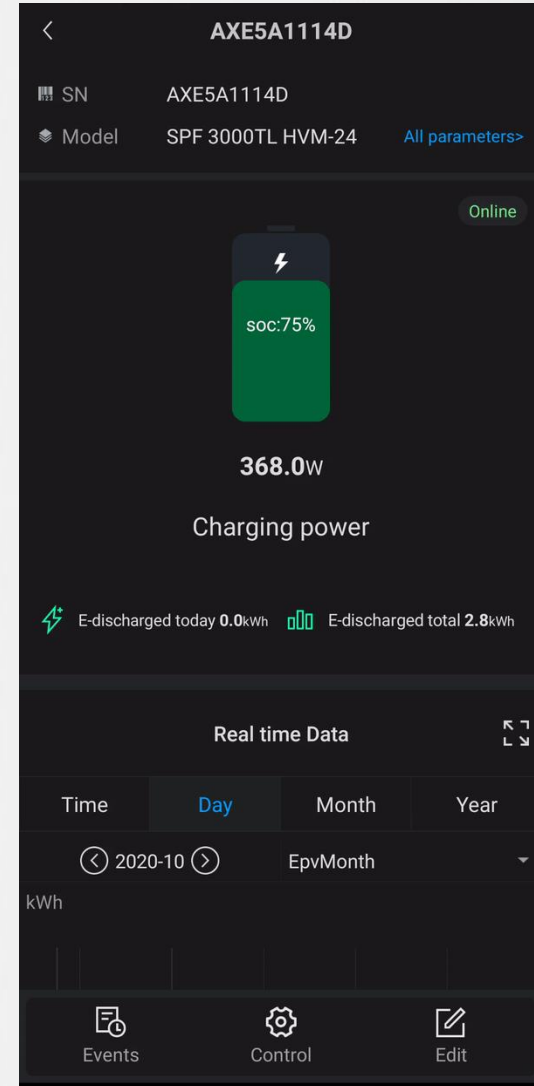
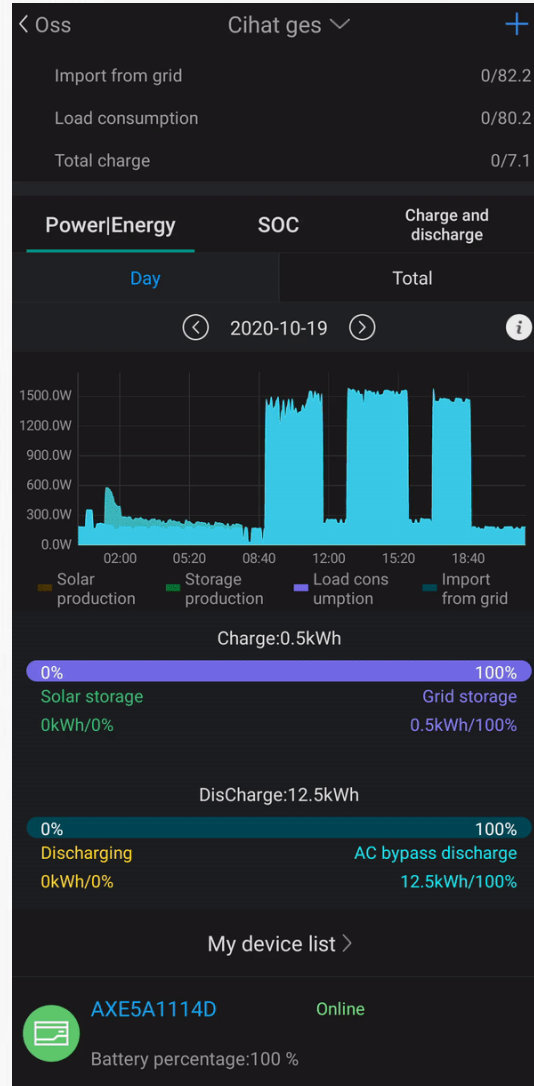
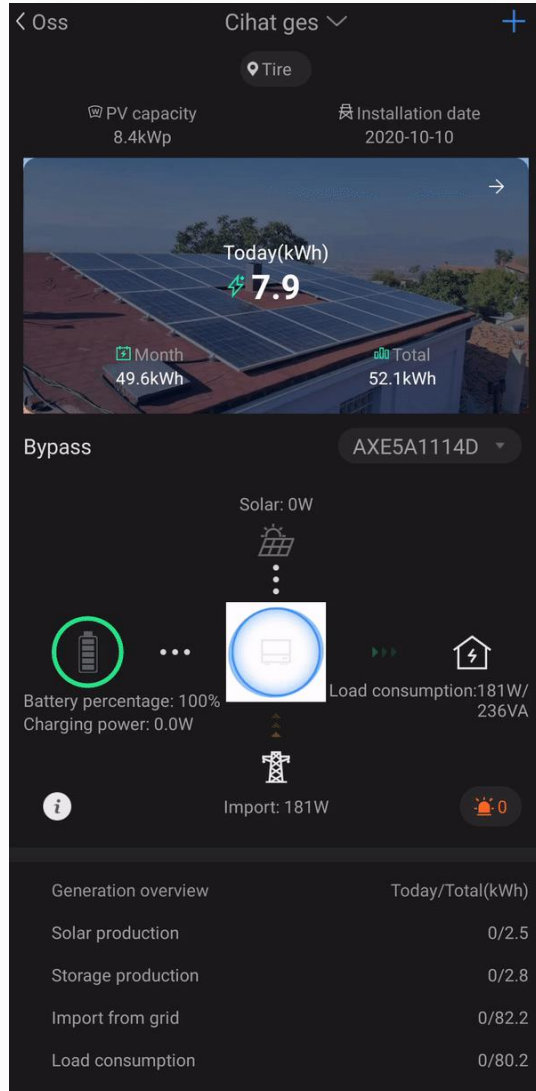
ShineWifi/GPRS - F

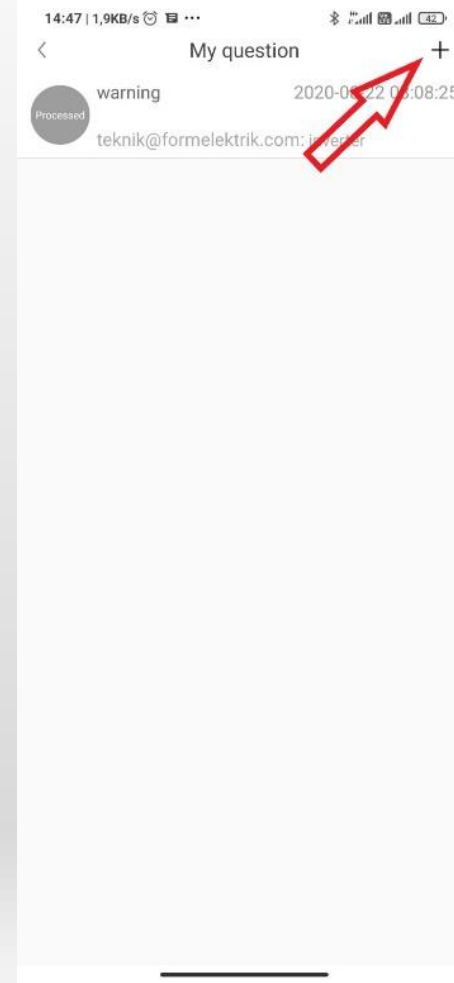
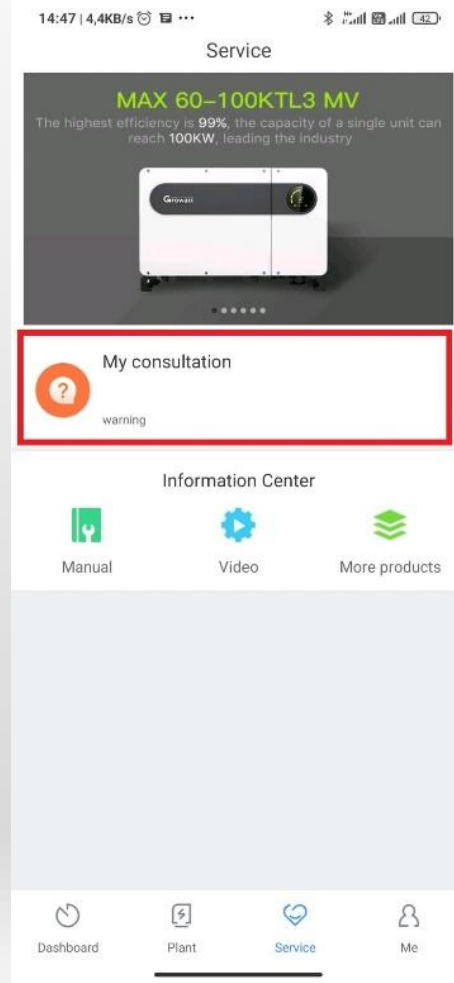
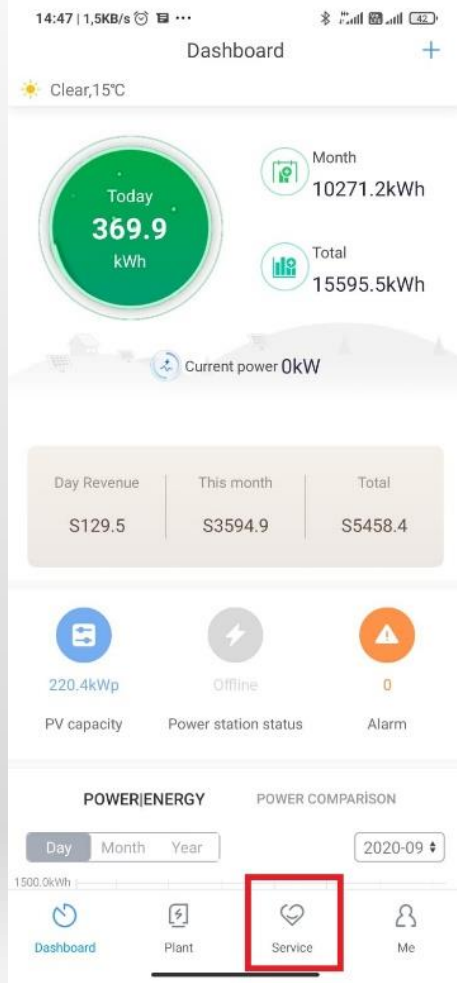


ShineMaster

İzleme Çözümleri







14:49 | 0,4KB/s

Cancel Submit questions Yes

Title: Konu Başlığını Yazınız

Type: Please select question type

Device SN: Cihaz seri numarasını giriniz Click for

Phone number: 5332804717

Konu ile ilgili soru veya talebinizi yazınız, var ise fotoğraf ekleyiniz

Dashboard Plant Service Me

MANİSA

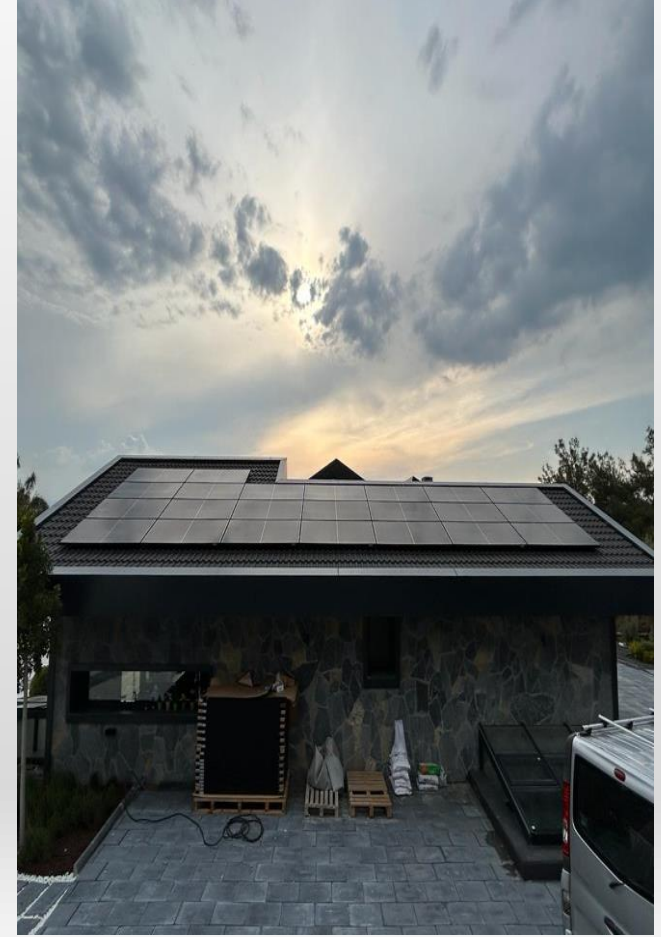
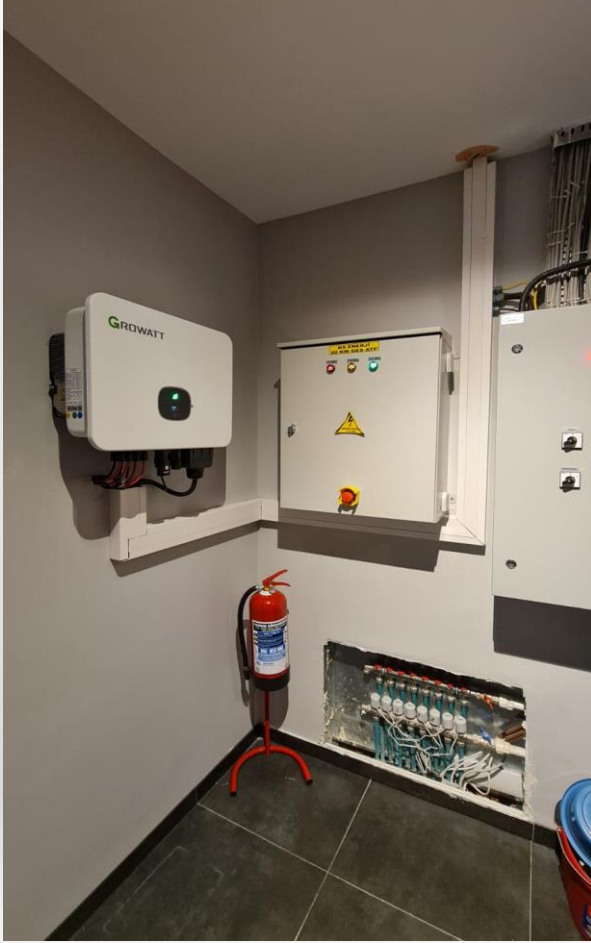


2.502,5kWp || 2.100,00kWe || MAX100KTL3-X LV



721,00kWp || 600,00kWe || MAX100KTL3-X LV

İZMİR



23,00kWp || 20,00kWe || MID20KTL3-X LV

ANTALYA



12,00kWp || 10,00kWe || 10,26kWh || SPH10000TL3-BH UP

MUĞLA



6,25kWp || 5,00kWe || 7,68kWh || SPH5000TL3-BH

ANTALYA



13,00kWp || 15,00kWe || SPF5000ES

ESKİŐEHİR



48,00kWp || 30,00kWe || 57,60kWh || SPF5000ES

İSTANBUL



4,4kWp || 3,50kWe || 4.8kWh || SPF3500ES

MUĞLA



4,4kWp || 5,0kWe || 6.6kWh
SPF3500ES

KARAVAN



850Wp || 3,0kWe ||
SPF3000HVM-24



TEŞEKKÜR EDERİZ

İdris ÜNAL
Bireysel Çözümler Satış Takım Lideri