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APS-PV-Series 1500 V_{DC}

Outdoor PV hybrid inverters, with output power ranging from 1000 up to 4560 kVA.

The APS-Series 1500 V_{DC} outdoor PV central inverter is the most cost-effective solution for large scale PV installations.

The APS is a turnkey solution made for the most demanding environments.

- ✓ **Ready for 1500 V_{DC} systems** – Breakthrough technology for the newest PV installations.
- ✓ **IP65 outdoor cabinet** – Hermetically sealed against heavy dust, sand and rain.
- ✓ **Two redundant cooling systems** ensuring energy production up to 60 °C ambient.
- ✓ **Low maintenance heat exchangers** – Automatic cleaning function of the water-to-air heat exchanger. Easy to clean air-to-air heat exchanger with no filter mats.
- ✓ Internal maintenance free **patented air dryer** to avoid condensation.
- ✓ **AC circuit breaker** built-in.
- ✓ **Fuse protected DC combiner**.
- ✓ **DC-coupling** in case of an inverter module fault.
- ✓ **Modbus TCP or Real-Time Ethernet** communication interfaces.
- ✓ **Configurable hybrid system** for solar, storage applications (connect PV and batteries to different inverter modules) and STATCOM function.



DATASHEET - INTRODUCTION

	1 Cabinet	2 Cabinets
Cabinets options		
Number of Apparent Power Units (APU)	1 / 2	3 / 4
Rated grid voltage ($U_{N(AC)}$) options	550 V / 575 v / 600 V / 630 V	
Maximum AC-power (S_{max}) options	From 1000 kVA up to 2280 kVA	From 3000 kVA up to 4560 kVA
Maximum DC-voltage ($U_{max(DC)}$)	1500 V	

APS-PV-Series models (1500 V_{DC})

	550 V _{AC}	575 V _{AC}	600 V _{AC}	630 V _{AC}
1 Cabinet & 1 APU	APS 1000-PV	APS 1045-PV	APS 1090-PV	APS 1140-PV
1 Cabinet & 2 APUs	APS 2000-PV	APS 2090-PV	APS 2180-PV	APS 2280-PV
2 Cabinets & 3 APUs	APS 3000-PV	APS 3135-PV	APS 3270-PV	APS 3420-PV
2 Cabinets & 4 APUs	APS 4000-PV	APS 4180-PV	APS 4360-PV	APS 4560-PV

(I) TECHNICAL DATA

	APS 1000-PV	APS 2000-PV	APS 3000-PV	APS 4000-PV	COMMENTS
GRID SIDE					
Maximum AC-power (S_{max})	1000 kVA	2000 kVA	3000 kVA	4000 kVA	At rated grid voltage
Rated AC-power ($P_{N(AC)}$)	1000 kW	2000 kW	3000 kW	4000 kW	At ($\cos \phi$) = 1.0
Number of Apparent Power Units (APU)	1	2	3	4	
Number of independent grids	1		2		
Rated grid voltage ($U_{N(AC)}$)	550 V				3~, phase-to-phase
Grid Voltage range	+/- 10% of $U_{N(AC)}$				
Rated grid frequency (f)	50 Hz				60 Hz option available
Network configuration	IT-grid				
Maximum AC-current per APU ($I_{max(AC), APU}$)	1050 A				
Maximum AC-current – APS ($I_{max(AC), APS}$)	1050 A	2 x 1050 A	3 x 1050 A	4 x 1050 A	
Maximum short circuit level ($I_{SC(AC), APS}$)	50 kA				
Power factor (cos ϕ)	> 0.98				At > 20 % of rated power
AC-current distortion (THD)	< 3 %				
DC SIDE					
Independent DC sources	1		2		Depending on configuration
Nominal DC-voltage ($U_{N(DC)}$)	1000 V				
Maximum DC-voltage ($U_{max(DC)}$)	1500 V				Depending on application
Minimum DC-voltage ($U_{min(DC)}$)	836 V / 920 V				At 100 % / 110 % nominal grid voltage
Maximum DC-current ($I_{max(DC)}$)	1220 A	2 x 1220 A	3 x 1220 A	4 x 1220 A	
Maximum short circuit level ($I_{SC(DC), APS}$)	6.4 kA / 30 kA				Without / With DC-fuses
Rated DC-power ($P_{N(DC)}$)	1016 kW	2033 kW	3049 kW	4065 kW	
Maximum capacity against earthing	2000 μ F				For each IT-grid

(II) TECHNICAL DATA

	APS 1000-PV	APS 2000-PV	APS 3000-PV	APS 4000-PV	COMMENTS
DC SIDE					
Number of MPPTs	1		2		
MPP-range ($U_{DC, mpp}$)	From 836 V up to 1500 V				At rated DC-power
Maximum DC-power	No limit				
GENERAL					
Control strategy	MPPT				
Efficiency	(98.0 98.6 98.6 98.5 98.4) %	(98.0 98.6 98.6 98.5 98.4) %	(98.0 98.6 98.6 98.5 98.4) %	(98.0 98.6 98.6 98.5 98.4) %	At (10 30 50 75 100) % power
EU efficiency	98.5 %				Including all inverter losses
Feed-in starting at ($P_{DC, th}$)	200 W	200 W	400 W	400 W	
Standby losses	80 W	90 W	140 W	150 W	
Maximum auxiliary power	< 3500 W		< 7000 W		Excluding optional heating

(I) TECHNICAL DATA

	APS 1045-PV		APS 2090-PV	APS 3135-PV		APS 4180-PV		COMMENTS	
GRID SIDE									
Maximum AC-power (S_{max})	1045 kVA		2090 kVA		3135 kVA		4180 kVA		At rated grid voltage
Rated AC-power ($P_{N(AC)}$)	1045 kW		2090 kW		3135 kW		4180 kW		At ($\cos \phi$) = 1.0
Number of Apparent Power Units (APU)	1		2		3		4		
Number of independent grids	1			2					
Rated grid voltage ($U_{N(AC)}$)	575 V								3~, phase-to-phase
Grid Voltage range	+/- 10% of $U_{N(AC)}$								
Rated grid frequency (f)	50 Hz								60 Hz option available
Network configuration	IT-grid								
Maximum AC-current per APU ($I_{max(AC), APU}$)	1050 A								
Maximum AC-current – APS ($I_{max(AC), APS}$)	1050 A		2 x 1050 A		3 x 1050 A		4 x 1050 A		
Maximum short circuit level ($I_{SC(AC), APS}$)	50 kA								
Power factor (cos ϕ)	> 0.98								At > 20 % of rated power
AC-current distortion (THD)	< 3 %								
DC SIDE									
Independent DC sources	1			2					Depending on configuration
Nominal DC-voltage ($U_{N(DC)}$)	1000 V								
Maximum DC-voltage ($U_{max(DC)}$)	1500 V								Depending on application
Minimum DC-voltage ($U_{min(DC)}$)	874 V / 962 V								At 100 % / 110 % nominal grid voltage
Maximum DC-current ($I_{max(DC)}$)	1220 A		2 x 1220 A		3 x 1220 A		4 x 1220 A		
Maximum short circuit level ($I_{SC(DC), APS}$)	6.4 kA / 30 kA								Without / With DC-fuses
Rated DC-power ($P_{N(DC)}$)	1062 kW		2124 kW		3186 kW		4248 kW		
Maximum capacity against earthing	2000 μ F								For each IT-grid

(II) TECHNICAL DATA

	APS 1045-PV	APS 2090-PV	APS 3135-PV	APS 4180-PV	COMMENTS
DC SIDE					
Number of MPPTs	1		2		
MPP-range ($U_{DC, mpp}$)	From 874 V up to 1500 V				At rated DC-power
Maximum DC-power	No limit				
GENERAL					
Control strategy	MPPT				
Feed-in starting at ($P_{DC, th}$)	200 W	200 W	400 W	400 W	
Standby losses	80 W	90 W	140 W	150 W	
Maximum auxiliary power	< 3500 W		< 7000 W		Excluding optional heating

(I) TECHNICAL DATA

	APS 1090-PV		APS 2180-PV	APS 3270-PV	APS 4360-PV	COMMENTS
GRID SIDE						
Maximum AC-power (S_{max})	1090 kVA		2180 kVA	3270 kVA	4360 kVA	At rated grid voltage
Rated AC-power ($P_{N(AC)}$)	1090 kW		2180 kW	3270 kW	4360 kW	At ($\cos \phi$) = 1.0
Number of Apparent Power Units (APU)	1		2	3	4	
Number of independent grids	1			2		
Rated grid voltage ($U_{N(AC)}$)	600 V					3~, phase-to-phase
Grid Voltage range	+/- 10% of $U_{N(AC)}$					
Rated grid frequency (f)	50 Hz					60 Hz option available
Network configuration	IT-grid					
Maximum AC-current per APU ($I_{max(AC), APU}$)	1050 A					
Maximum AC-current – APS ($I_{max(AC), APS}$)	1050 A	2 x 1050 A	3 x 1050 A	4 x 1050 A		
Maximum short circuit level ($I_{SC(AC), APS}$)	50 kA					
Power factor (cos ϕ)	> 0.98					At > 20 % of rated power
AC-current distortion (THD)	< 3 %					
DC SIDE						
Independent DC sources	1			2		Depending on configuration
Nominal DC-voltage ($U_{N(DC)}$)	1000 V					
Maximum DC-voltage ($U_{max(DC)}$)	1500 V					Depending on application
Minimum DC-voltage ($U_{min(DC)}$)	912 V / 1004 V					At 100 % / 110 % nominal grid voltage
Maximum DC-current ($I_{max(DC)}$)	1220 A	2 x 1220 A	3 x 1220 A	4 x 1220 A		
Maximum short circuit level ($I_{SC(DC), APS}$)	6.4 kA / 30 kA					Without / With DC-fuses
Rated DC-power ($P_{N(DC)}$)	1108 kW	2215 kW	3323 kW	4431 kW		
Maximum capacity against earthing	2000 μ F					For each IT-grid

(II) TECHNICAL DATA

	APS 1090-PV	APS 2180-PV	APS 3270-PV	APS 4360-PV	COMMENTS
DC SIDE					
Number of MPPTs	1		2		
MPP-range ($U_{DC, mpp}$)	From 912 V up to 1500 V				At rated DC-power
Maximum DC-power	No limit				
GENERAL					
Control strategy	MPPT				
Feed-in starting at ($P_{DC, th}$)	200 W	200 W	400 W	400 W	
Standby losses	80 W	90 W	140 W	150 W	
Maximum auxiliary power	< 3500 W		< 7000 W		Excluding optional heating

(I) TECHNICAL DATA

	APS 1140-PV		APS 2280-PV	APS 3420-PV	APS 4560-PV	COMMENTS
GRID SIDE						
Maximum AC-power (S_{max})	1140 kVA		2280 kVA	3420 kVA	4560 kVA	At rated grid voltage
Rated AC-power ($P_{N(AC)}$)	1140 kW		2280 kW	3420 kW	4560 kW	At ($\cos \phi$) = 1.0
Number of Apparent Power Units (APU)	1		2	3	4	
Number of independent grids	1			2		
Rated grid voltage ($U_{N(AC)}$)	630 V					3~, phase-to-phase
Grid Voltage range	+/- 10% of $U_{N(AC)}$					
Rated grid frequency (f)	50 Hz					60 Hz option available
Network configuration	IT-grid					
Maximum AC-current per APU ($I_{max(AC), APU}$)	1050 A					
Maximum AC-current – APS ($I_{max(AC), APS}$)	1050 A	2 x 1050 A	3 x 1050 A	4 x 1050 A		
Maximum short circuit level ($I_{SC(AC), APS}$)	50 kA					
Power factor (cos ϕ)	> 0.98					At > 20 % of rated power
AC-current distortion (THD)	< 3 %					
DC SIDE						
Independent DC sources	1			2		Depending on configuration
Nominal DC-voltage ($U_{N(DC)}$)	1000 V					
Maximum DC-voltage ($U_{max(DC)}$)	1500 V					Depending on application
Minimum DC-voltage ($U_{min(DC)}$)	958 V / 1054 V					At 100 % / 110 % nominal grid voltage
Maximum DC-current ($I_{max(DC)}$)	1220 A	2 x 1220 A	3 x 1220 A	4 x 1220 A		
Maximum short circuit level ($I_{SC(DC), APS}$)	6.4 kA / 30 kA					Without / With DC-fuses
Rated DC-power ($P_{N(DC)}$)	1159 kW	2317 kW	3476 kW	4634 kW		
Maximum capacity against earthing	2000 μ F					For each IT-grid

(II) TECHNICAL DATA

	APS 1140-PV	APS 2280-PV	APS 3420-PV	APS 4560-PV	COMMENTS
DC SIDE					
Number of MPPTs	1		2		
MPP-range ($U_{DC, mpp}$)	From 958 V up to 1500 V				At rated DC-power
Maximum DC-power	No limit				
GENERAL					
Control strategy	MPPT				
Feed-in starting at ($P_{DC, th}$)	200 W	200 W	400 W	400 W	
Standby losses	80 W	90 W	140 W	150 W	
Maximum auxiliary power	< 3500 W		< 7000 W		Excluding optional heating

APS-PV-Series 1500 V_{DC} – 550, 575, 600, 630 V_{AC}

1000 ... 4560 kVA

(I) GENERAL DATA / CODE NAME

	1 Cabinet & 1 APU (model list below)	1 Cabinet & 2 APUs (model list below)	2 Cabinets & 3 APUs (model list below)	2 Cabinets & 4 APUs (model list below)	COMMENTS
Ambient temperature	From -10°C up to 60°C (From 14°F up to 140°F)				Others on request
Ambient storage temperature	From -40°C up to 60°C (From -40°F up to 140°F)				
Maximum altitude	1500 m above sea level				Without power derating
Cooling type	Forced air and water cooling				
Protection class	IP65				
Dimensions (L × W × H)	1860 × 1142 × 3645		3503 × 1142 × 3645		Dimensions in millimeters
Weight	< 1525 kg	< 2150 kg	< 3275 kg	< 3900 kg	
Shelter surface	Painted				
Colour	RAL7035				Others on request
EMI	Complies EN61000-6-2, EN61000-6-4				
Medium voltage directive	BDEW				
CE-conformity	Complies				

APS-PV-Series models (1500 V_{DC})

	550 V _{AC}	575 V _{AC}	600 V _{AC}	630 V _{AC}
1 Cabinet & 1 APU	APS 1000-PV	APS 1045-PV	APS 1090-PV	APS 1140-PV
1 Cabinet & 2 APUs	APS 2000-PV	APS 2090-PV	APS 2180-PV	APS 2280-PV
2 Cabinets & 3 APUs	APS 3000-PV	APS 3135-PV	APS 3270-PV	APS 3420-PV
2 Cabinets & 4 APUs	APS 4000-PV	APS 4180-PV	APS 4360-PV	APS 4560-PV

(I) FEATURES & OPTIONS – APS - PV APPLICATION

	1 Cabinet & 1 APU / 1 Cabinet & 2 APUs / 2 Cabinets & 3 APUs / 2 Cabinets & 4 APUs / (model list below)	COMMENTS
IP65 outdoor cabinet made for desert installations	F	
Insulation monitor	F	
Monitored surge arresters on AC-side	F	
Status displays in the shelter	F	
Air dehumidifier inside the shelter	F	
External heat exchanger for dusty/moist ambient and extreme climatic conditions	F	
Low voltage ride trough (LVRT) handling	F	
Modbus TCP communication interface	F	
Powerlink Communication Interface (Real time Ethernet)	O	
Internal datalogger	F	
Service access via VNC	F	
FTP-Server for log log data	F	

(O) – Optional (F) – Feature

APS-PV-Series models (1500 V_{DC})

	550 V _{AC}	575 V _{AC}	600 V _{AC}	630 V _{AC}
1 Cabinet & 1 APU	APS 1000-PV	APS 1045-PV	APS 1090-PV	APS 1140-PV
1 Cabinet & 2 APUs	APS 2000-PV	APS 2090-PV	APS 2180-PV	APS 2280-PV
2 Cabinets & 3 APUs	APS 3000-PV	APS 3135-PV	APS 3270-PV	APS 3420-PV
2 Cabinets & 4 APUs	APS 4000-PV	APS 4180-PV	APS 4360-PV	APS 4560-PV

(II) FEATURES & OPTIONS – APS - PV APPLICATION

	1 Cabinet & 1 APU / 1 Cabinet & 2 APUs / 2 Cabinets & 3 APUs / 2 Cabinets & 4 APUs / (model list below)	COMMENTS
Network Interface: fiber optic multi-mode	F	
Network Interface: fiber optic single-mode	O	
Heating	O	
Positive earthing of PV fields	O	
Negative earthing of PV fields	O	
Alternative grid voltage range (+/- xx %)	O	Only with external control voltage supply
Grid frequency 60 Hz	O	
Area for customer's installations (H x W X D) 400 x 500 x 200 mm	F	Including: 1-phase, 230V, TN, 500 VA, network connection

(O) – Optional (F) – Feature

APS-PV-Series models (1500 V_{DC})

	550 V _{AC}	575 V _{AC}	600 V _{AC}	630 V _{AC}
1 Cabinet & 1 APU	APS 1000-PV	APS 1045-PV	APS 1090-PV	APS 1140-PV
1 Cabinet & 2 APUs	APS 2000-PV	APS 2090-PV	APS 2180-PV	APS 2280-PV
2 Cabinets & 3 APUs	APS 3000-PV	APS 3135-PV	APS 3270-PV	APS 3420-PV
2 Cabinets & 4 APUs	APS 4000-PV	APS 4180-PV	APS 4360-PV	APS 4560-PV

APS-PV-Series 1500 V_{DC} – 550, 575, 600, 630 V_{AC}

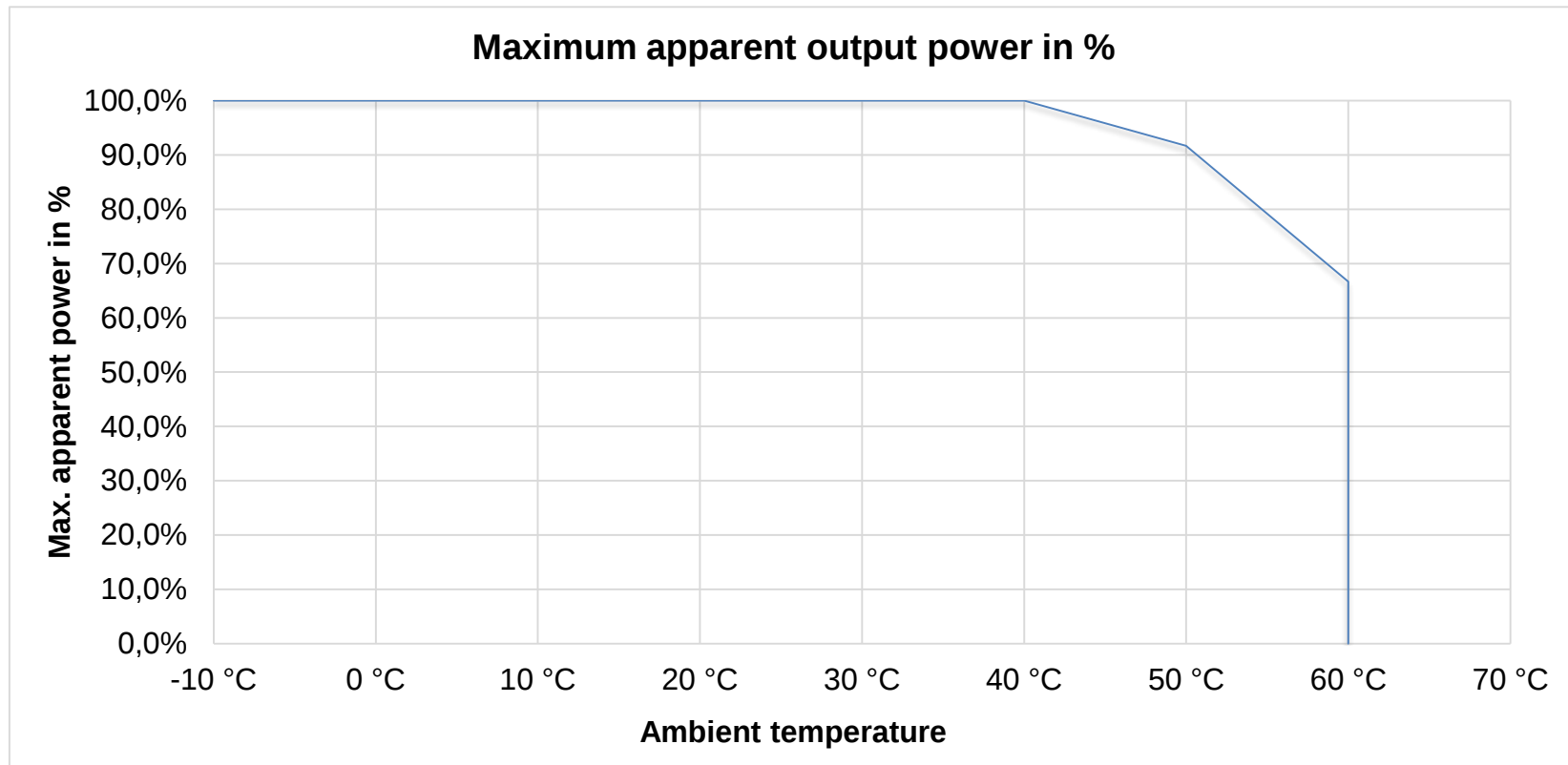
1000, 1045, 1090, 1140 kVA

FEATURES & OPTIONS – APU - PV APPLICATION

Apparent Power Unit (APU) – PV Application		COMMENTS
DC-charge circuit	- / F	
AC-charge circuit	O	
Operating mode CC-CV	-	
Operating mode STATCOM	O	
Operating mode MPPT	F	
Fuse protected DC Inputs NH02 250A	O (1 up to 8)	
Fuse protected DC Inputs NH03 400A	O (1 up to 7)	
DC-current monitoring	O	
DC-disconnector	F	
Monitored surge arresters on DC-side	F	
AC circuit-breaker	F	

(O) – Optional (F) – Feature (-) – Not available

POWER DERATING



APS-PV-Series 1500 V_{DC} – 550, 575, 600, 630 V_{AC}

1000 ... 4560 kVA

(I) MECHANICAL DRAWINGS

APS-PV-Series 1500 V_{DC}

APS 1000-PV / APS 1045-PV / APS 1090-PV /
APS 1140-PV / APS 2000-PV / APS 2090-PV /
APS 2180-PV / APS 2280-PV

APS 3000-PV / APS 3135-PV / APS 3270-PV / APS 3420-PV /
APS 4000-PV / APS 4180-PV / APS 4360-PV / APS 4560-PV



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