

# AfriSun500-Photovoltaic Grid-Tied Inverter

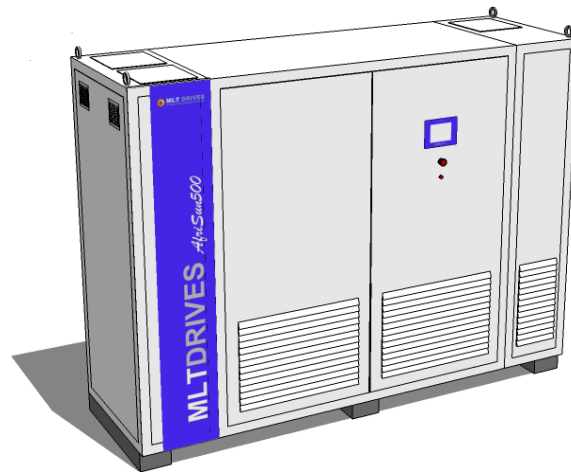
Technical Data

# MLT DRIVES

**Powerful**  
Designed for large PV Power Plants

**Efficient**  
High efficiency up to 97.8%

**Robust**  
High tolerance to surges and high temperatures



These 500 kVA inverters from MLT DRIVES are 3-phase DC to AC inverters for large grid-tied or off-grid PV power plants. The AfriSun inverter offers a reliable and affordable system that can be used with thinfilm, polycrystalline or monocrystalline photovoltaic solar panels. To maximize power harvested from the PV array the inverter has intelligent features ensuring reliable and balanced power export at all times. Easy integration is made possible through versatility: Various types of PV configurations can be connected as the system has a wide input operating voltage range. The comprehensive monitoring system accounts for every Watt harvested from the sun, so that an accurate return on investment can be presented.

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## Specifications

<b>Output side (AC)</b>	<b>Unit</b>	<b>AfriSun500</b>
Rated voltage	V	3AC 320 + Neutral for voltage sensing
Voltage range	%	+/-7%
Rated frequency	Hz	50
Frequency range	Hz	47.5 ... 52.5 (Adjustable)
Rated output power	kVA	500
Rated output current per phase	A	905
Maximum output current	A	1000
Displacement power factor	PF	-0.5 ... 0.5 (Adjustable)
THD I (at rated power)	%	< 2.5
Surge protection		Yes
Short circuit protection		Yes
Phase rotation protection		Yes
MCCB load break switch	A	1200 (external trip contact input provided)

<b>Input side (Photovoltaic [PV])</b>	<b>Unit</b>	<b>AfriSun500</b>
MPP voltage range	V	500 ...820
Start-up input voltage	V	600 ...850 (Adjustable)
Maximum input current	A	1050
Rated power	kW	513
Maximum input voltage	V	900
Number of DC inputs		5
Maximum current per PV input	A	210
Surge Protection		Yes
Short Circuit Protection		Yes
DC polarity swap protection		Yes
Ground Fault Detection		Yes - Differential
Input isolation contactor		2 per input, 10 in total

<b>System</b>	<b>Unit</b>	<b>AfriSun500</b>
Efficiency	%	Up to 98.1
Efficiency ( 100% loading)	%	Up to 97.0
Tare losses no load	W	<50 (at night)

<b>Dimensions and weight</b>	<b>Unit</b>	<b>AfriSun500</b>
Width	mm	2700
Height	mm	2000
Depth	mm	800
Weight	kg	1700

<b>General technical specifications</b>	<b>Unit</b>	<b>AfriSun500</b>
Noise Level	dB(A)	<80
Installation		Suitable for indoor installation only
Mounting method		Floor mounting
Cooling method		Forced air ventilation Air intake at lower front, sides Air discharge through the cabinet roof
Cooling air requirement	m3/h	7200
Enclosure		IP42 (Prevents entry of insects)
Colour		RAL 7035 (grey)

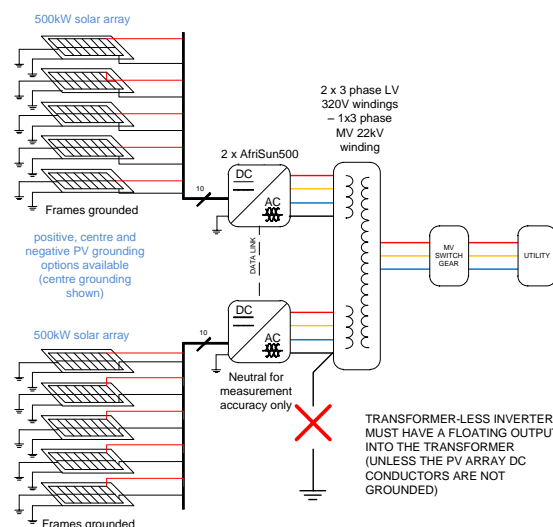
Climatic conditions		
Climatic conditions	Unit	AfriSun500
Ambient temperature	°C	-5 ... 45
Ambient temperature for transport	°C	-25 ... 70
Maximum ambient for rated power	°C	40
Relative humidity	%	5 ... 85
Maximum altitude above sea level for rated power at rated temperature	m	1900
Connectors		
Input DC (Photovoltaic)		AfriSun500 Cable terminal for 10 x 70mm <sup>2</sup> wires per pole (positive and negative)
Output AC		AfriSun500 Cable terminal for up to four parallel 150mm <sup>2</sup> wires per phase (within SANS 1507), copper earth bar provided
Voltage Free Relay	Fault Output Relay	Terminals for 1mm <sup>2</sup> wire
Analogue Inputs	Solar Radiation / PV Module Temperature / Ambient Temperature	Terminals for 1mm <sup>2</sup> wire (4 to 20mA)/(0 to 10V)
Communications		
Antenna		RS232/RS422 Modbus Slave GSM or GPRS remote access Sub Miniature version A
MCCB output position		Voltage free terminals from the auxiliary isolator
MCCB trip signal		Terminals for 1mm <sup>2</sup> wire, 24V DC supplied externally
Operator panel		
Display Type		AfriSun500 Touch screen LCD, screen saver enabled, Power export, KWH summations, energy exported previous day/week, trending graphs
Remote control		Secure remote control of system, and access to event and data logs is available using either Ethernet connection, GSM or GPRS

The AfriSun inverter from MLT DRIVES is a compact PV inverter for high power photovoltaic power plants. The inverter is tailored for grid-tied or off-grid mini-grid integration.

The incorporated MPPT control algorithm maximizes the use of the sun by adjusting the input DC voltage and current for optimal power output from the PV array. High export power quality is maintained by exporting steady balanced and clean power. The AfriSun inverter can be adjusted to export power at unity power factor, or if power factor adjustments need to be done the export power factor is adjustable.

Substantially raised voltages on unloaded phases are compensated for by reducing export power on that phase. This aids in stabilizing the supply voltage. The inverter meets over-voltage protection according to the IEC60364 standard and power quality according to the IEC61727 standard, "Photovoltaic systems – Characteristics of utility

interface" in terms of total harmonic distortion, flicker and current injection



**AfriSun inverter in multi string configuration for higher output power**



Systems such as the AfriSun inverter range offer higher efficiency compared to transformer based systems. These powerful highly efficient units will thus truly maximize the power harvested from the sun.

The selectable stack control system incorporated allows efficient operation during low irradiance levels by switching the AfriSun into a low power state.

### 1 or 2 MVA Configuration Example

Multiple AfriSun inverters can be connected onto a single three phase supply in a modular configuration. This is ideal for large-scale PV projects. Two or four AfriSun500s can be connected to one low voltage to medium voltage transformer for example. The transformer can have multiple primary windings and one medium

Protection of the AfriSun inverter is comprehensive and includes islanding detection, electronic overload, short circuit, over-temperature, frequency out of range, over and under voltage protection. Temperature topping is activated by throttling the output power in excessively high ambient temperatures. This allows the unit to continue exporting power instead of tripping during these conditions. A warning (via voltage free relay) or a fault message can be sent via SMS to the operator(s).

voltage secondary winding. If the PV array is grounded electrically anywhere then no part of the power windings of the primary side of the transformer may be grounded. Each inverter operates independently and thus tracks the maximum power point of each 500kW PV array.

### RMCI – Remote Monitoring and Control Interface

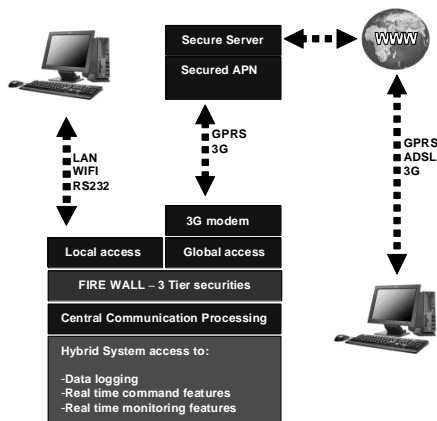
The RMCI included in the AfriSun gives versatile access to the entire power system for monitoring and control purposes. Access is local (on site) or global (from any PC in the world).

Local access is via Ethernet/RS232/RS422. Secure remote control of the system, and access to event and data logs, is available using either GSM or GPRS. Authorised personnel can be given levels of access ensuring all critical processes are tamper proof without appropriate clearance.

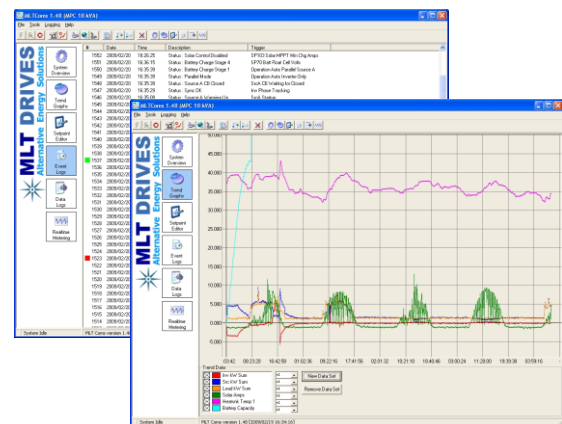
A firewall will manage the security level access. This ensures that no “backdoor access” is available either locally or globally. Visual SCADA interfaces offer a real-time overview of the system with minimal data delay.

All events and faults (minor and critical) are logged. Real-time alarms via cellular SMS and email are immediately sent to appropriate parties on a particular event or fault. These features are essential for safety, security and maintenance.

All voltage, current and power channels are periodically logged and available for advanced analysis using a variety of graphing and data mapping tools. Data can be exported to a .csv file for refined analysis in MS Excel or alternative spreadsheet software.



Remote Network Communications Structure

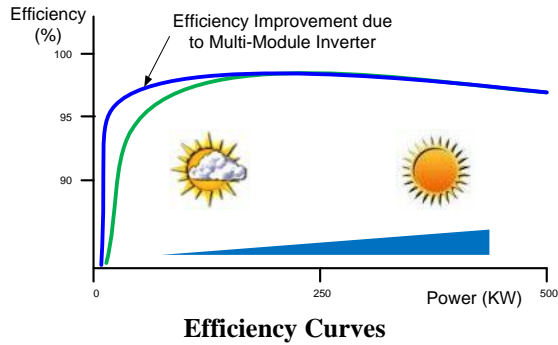


Logging and remote control interface



## Enhanced efficiency and availability

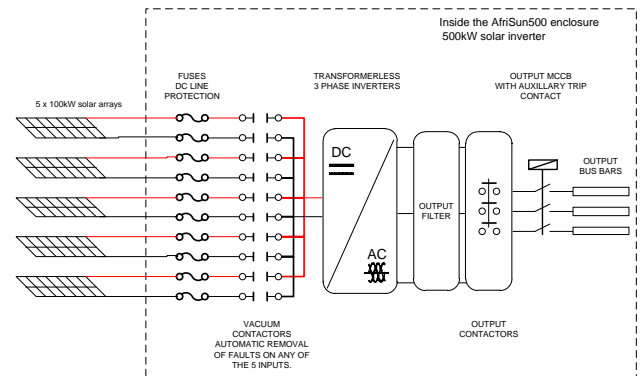
For much improved efficiencies the AfriSun has multiple power modules which can be turned off under low irradiation conditions. This means that the AfriSun will harness maximum power and will deliver peak efficiency from sunrise till sunset.



Five PV arrays can be wired in to the inverter. Each array input is protected via double fusing and double vacuum contactors. This necessary protection allows isolation of fault conditions within the PV plant and allowing the good circuits to still operate. The output isolator MCCB can be

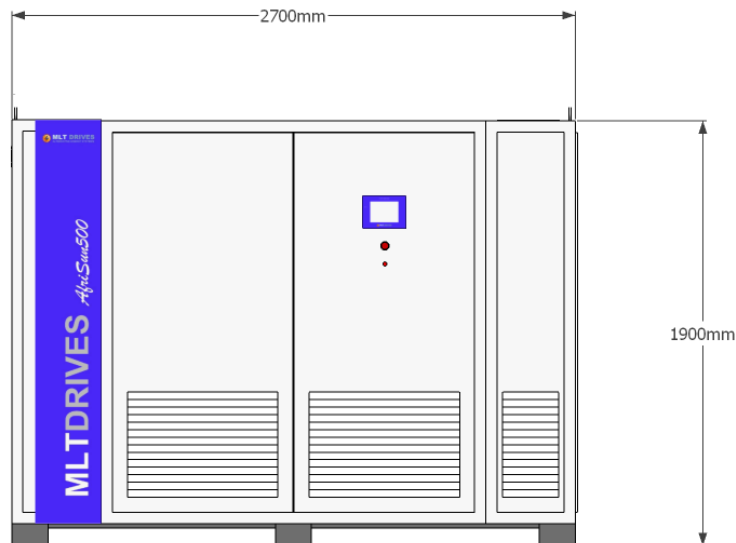
triggered to open by the application of an external 24V source.

In the event of any inverter module trip, the system automatically reconfigures to continue generating with up to 60% of full load capacity. The active and standby duty is rotated so that generating capacity is shared and inverter life is extended.

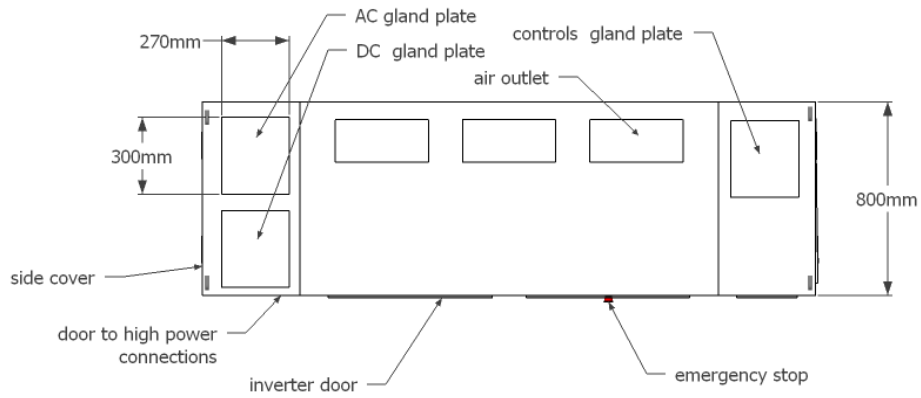


**Internal operation of AfriSun inverter**

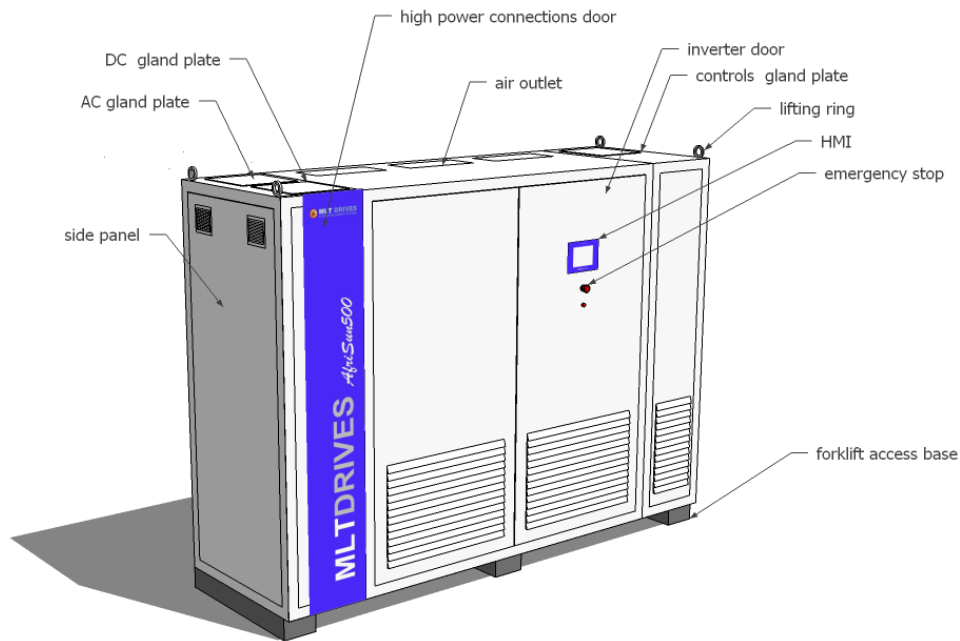
## AfriSun500 Dimensions



**Front view**



**Top view**



**Isometric View**

## Transport and Installation

The AfriSun500 is transported as one unit with forklift access in the base. At less than two tonnes the AfriSun can also be moved using a pallet jack. The

AfriSun also has four detachable lifting rings to ease placement and transport when using a crane.