



# Airdra25

## Universal Bi-Directional Inverter/Converter

The Airdra25 offers bi-directional power conversion from any type of fuel-cell to the AC power grid. It can operate grid connected as well as stand alone, creating a local micro-grid. With its 19" form factor and galvanic isolation, multiple Airdra25s can be easily paralleled, interfacing fuel-cells up to 500kW. The module offers high efficiency (up to 97%) and is air cooled with a low noise speed-controlled fan tray. The module complies with the latest international Grid codes (E.g. RfG, IEEE1547) and can be accessed via a standardized Sunspec Modbus Ethernet interface.

### Features

- Fully Bi-Directional
- Parallelable up to 500kW
- SiC Technology
- Overvoltage, Overcurrent, Overtemperature Protected
- Short-circuit and Under voltage protected
- Three Phase Vac
- Air-Cooled; 19" Rack Unit
- Galvanic Isolation
- SunSpec Modbus Monitoring Interface
- 97% Efficiency
- UL & CE Certifications

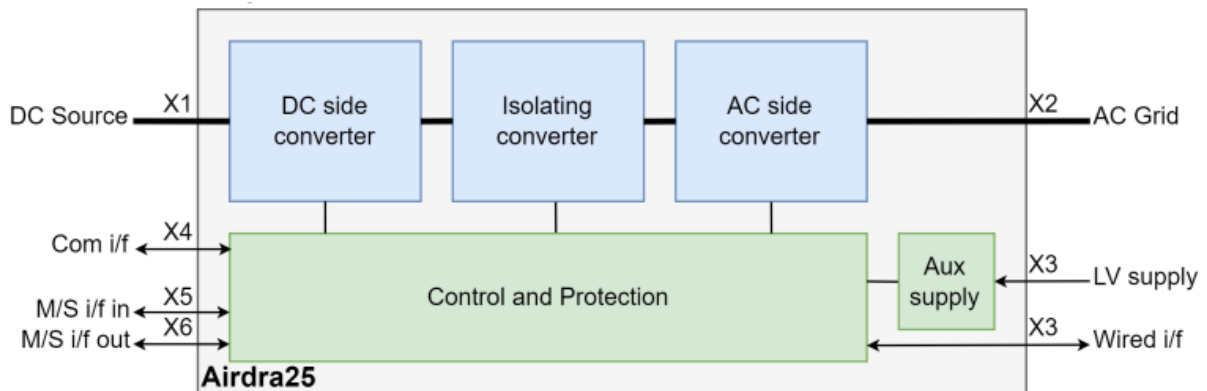
## Model Selection

Model	Vdc	Vdc Output (A)	Vac <sub>3Phase</sub>	Output <sub>3Phase</sub> (Arms)	Efficiency (%)	Operating Temperature	Cooling Method
Airdra25	100-240	200	380-480	40	97	-20°C to 45°C	Forced Air

\*Single Phase Operation on Request

## Functional Description

### Top level block diagram



## DC Voltage: 100V – 240V

Technical Data	Value	Comments/Remarks
DC Voltage Range	100-240V	Polarity inversion not allowed
Max Continuous DC Current	±200A	
Max Short term DC Current	±250A for 5s	
Max DC Inrush Current	200A peak	Shall be limited externally
Max DC Fuse Rating	250Adc	
DC Grounding	Pos or Neg Pole Allowed	
DC Side Series Connection	Up to 2 Shelves	
DC Side Parallel Connection	Up to 20 Shelves	P/Q mode Only

## AC Three Phase Voltage: 380V – 480V

Technical Data	Value	Comments/Remarks
AC Rated Voltage Range	380-480V	
AC Voltage Variation Range	88-110%	
AC Nominal Frequency	50/60Hz	Range: 47-62Hz
Max Continuous AC Current	40Arms	
Max Short-Term AC Current	50Arms for 5s	
Max AC Inrush Current	±70A peak	Is limited per phase inside the Airdra25
Max AC Fuse Rating	50A	Fusing shall be applied externally, coupled MCB with B-characteristic or faster
AC Side Parallel Connection	Up to 20 Shelves	M/S interface cabling required for Vac mode

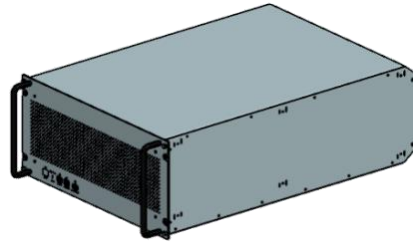
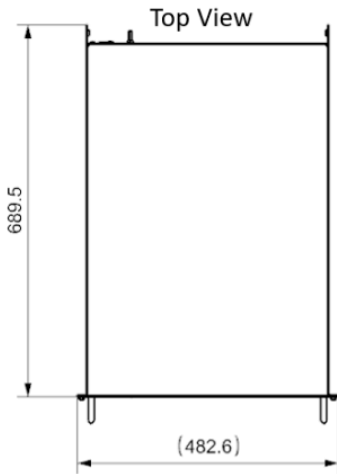
## Controller DC Voltage: 20V – 30V

Technical Data	Value	Comments/Remarks
DC Voltage Range	20-30Vdc	
Max Current	Approx. 4A	
Max Power Consumption	100W	

## General Information

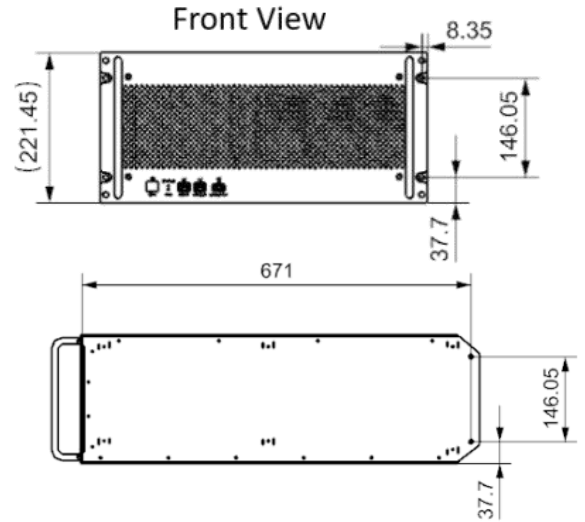
Technical Data	Value	Comments/Remarks
Operating Modes	PQ Mode, Vac Mode, Vdc Mode	Configurable via control interface
Galvanic Isolation	Yes	Between AC and DC side and between AC/DC side and LV supply and interfaces
Control Interface	Ethernet 100M	SunSpec ModBus TCP/IP Compliant with IEEE1547-2018
Wired Interface Output	53V/0.5Adc Max	Potential free relay contact, closed when initialized and not in an Error state
Wired Interface Input	Max ±53V, off below 12V	Potential free opto coupler, max 5mA at 24V
Master/Slave Interface	Proprietary RS422 ring	Input to output via straight-through ethernet cables
Reliability	2.4kFIT	Telcordia method I, fan tray excluded

# Mechanical



## Dimensions & Weight

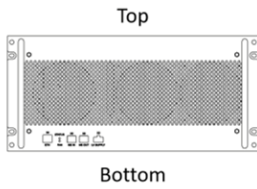
Dimensions	Unit (kg)
19" x 5U x 650mm	35
IEC60297-3 Compliant	



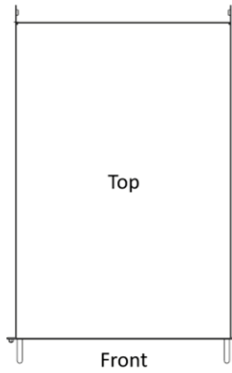
# Installation & Mounting Orientation

Airdra25 possible Mounting Orientations:

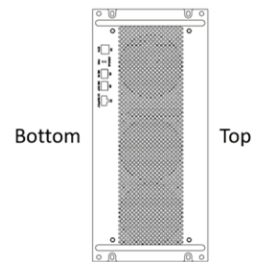
Option 1



Option 2



Option 3



## Application Information

The Airdra25 can be used for several applications connecting a DC source or load to the AC grid or create a stand-alone AC grid in island operation. To support different applications three operating modes are implemented, which can be configured via the control interface:

- **PQ Mode**, in which the Airdra25 regulates the active power (P) flow from the DC side to the AC side or vice versa and controls the reactive power (Q) at the AC side. The voltage on the DC side is determined by the DC source, the voltage on the AC side is determined by the AC grid. A typical example is a fuel cell which is connected to the grid (grid following).
- **Vac Mode**, in which the Airdra25 regulates the AC voltage and frequency as set by the control interface (grid forming). The active and reactive power is determined by the AC load and can still be regenerative. The voltage and current on the DC side are determined by the DC source, but the active power shall follow the AC load. A typical example is a gen-set supplied from a battery or fuel cell.
- **Vdc Mode**, in which the Airdra25 regulates the DC voltage as set by the control interface. The voltage and current on the AC side are determined by the AC grid, but the active power shall follow the DC side. The reactive power can still be set independently. In this mode the Airdra25 operates as a bi-directional DC power supply. This mode was implemented to support series connection of 2 x Airdra25s on the DC side. By setting one Airdra25 in Vac or PQ mode and one in Vdc mode, the DC voltage and the active power can be balanced.

Furthermore, the Airdra25 can be connected in parallel, both on the DC and on the AC side. For the PQ mode this can be done without the need for using the M/S interface, as the voltage on both sides is determined by the DC source or AC grid. For the paralleling in the other modes the M/S interface shall be connected. The M/S interface shall be connected in a ring from output from one module to the input to the next module. By closing the ring, the operation of the ring can be verified. In a ring one single Airdra25 shall be configured as master, the other modules shall be configured as slave.

Learn more in our Application Note highlighting nine different examples of configurations based upon different applications and or use cases: ["Link"](#)

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