

Sorensen ASD FLX Series

10–320 kW

Programmable Precision High Power DC Power Supply

40–60 Vdc*

- High Power Density: 30kW in 3U
- Water-Cooled
- Front Loading Modules for Flexible Configuration
 - Configure modules for 40V, 60V or other (as available) easily with rear panel dip switches
- Advanced Digital Features
 - "Flight data" recorder-like function
 - Advanced fault detection



The **ASD FLX** with its 3U, 30kW water-cooled packaging provides one of the highest power densities available. The ASD FLX is designed for industry leading load transient response with outstanding output ripple and noise. The water-cooled packaging allows for use in environments that normally exclude air-cooled power supplies.

The ASD FLX gets its name from its modular design with front loading modules for easy access and flexible voltage assignment. ASD FLX chassis houses three 10kW modules which allows user flexibility to scale power requirements by adding additional modules. This configuration provides redundant (n+1) capability as well as significant reduction of Mean Time to Repair (MTTR) which can be accomplished by swapping out a faulty module. The chassis with light weight, removable modules allows for easy one person installation.

Advanced digital controls included in the ASD FLX have the ability to allow you to program slew rates, such as current and voltage without external hardware, as well as program transient response times on the load to emulate specific recovery times. The ASD FLX optional advanced features also allow you to program different "fault levels," enabling detection of output cabling, connections or load problems before they cause critical system problems. The factory flight data recorder feature has the ability to record parameters such as voltage, current, power, load impedance, faults and input voltages, assisting the factory service centers with diagnosis and repair.

The advanced digital monitoring and control features and flexible voltage assignment modules makes the Sorensen ASD FLX the supply of choice for stringent and high value processes and applications.

* Other voltages available upon request

Advanced features include:

- Precise programming of voltage and current slew rate for sensitive loads.
- Industrial field bus interface (Modbus-TCP, Modbus-RTU, Ethernet) enable real-time digital control.
- Built-in energy meter calculates the delivered energy throughout a process or period of time.
- Optional real time clock enables accurate time-stamping of data logged events.
- Built in power quality monitoring detects and saves input voltage anomalies which can be saved for later diagnostic analysis.
- Programmable analog interface scaling facilitates integrating the ASD FLX with existing systems easily.
- Front panel status LEDs.
- Configure modules for desired voltage (40V, 60V, etc. as available) through convenient rear panel dip switches.
- Field upgradeable firmware.
- Master-slave parallel operation capability.

167–8000 A dc



380

400

480

ETHERNET
(Modbus-TCP) RS485
(Modbus-RTU)

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ASD FLX Series : Product Specifications

| Input | | Type: 3-phase, 3-wire plus ground, neutral not required. Not phase rotation sensitive | | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------|------|------------------|----------------|
| Voltage Ranges | 342VAC to 528VAC (model F) Nominal rating is 380/400/480VAC | | | | |
| Frequency | Rated 47 through 63 Hz | | | | |
| Efficiency | >89% nominal line, full load. | | | | |
| Input Current, per phase, typical | | 400/380Vac | | 480Vac | |
| | 10kW unit (1 module) | 21Arms | | 17Arms | |
| | 20kW unit (2 modules) | 42Arms | | 33Arms | |
| | 30kW unit (3 modules) | 63Arms | | 50Arms | |
| Current Inrush | 200A Typical | | | | |
| Power Factor | >0.9 @ Full Load and at nominal line | | | | |
| Brownout Provisions | Designed to meet SEMI F47-0706, S3, S8, S14 at nominal input voltages | | | | |
| Output | | | | | |
| Voltage Output | 10kW | 20kW | 30kW | Noise (pk-pk)*** | Noise (RMS)*** |
| 40Vdc | 250A | 500A | 750A | 250mV | 60mV |
| 60Vdc | 167A | 334A | 501A | 250mV | 60mV |
| (*) Measured at the load terminals, with 1uF in parallel and 6ft of low-inductance load cable with supply operating at full load and nominal input line voltage. (**) RMS noise is measured directly across the output terminal with supply operating at full load and nominal input line voltage. (***) Value is for 30kW, single voltage models. Other variations may increase value by 2x. | | | | | |
| Sense | To compensate load cables voltage drop, units can generate 2% additional voltage at full scale of output voltage. | | | | |
| Output | | | | | |
| Load Regulation (Specified at No load to Full load change, nominal AC input) | | | | | |
| Voltage | 0.1% of maximum output voltage/ current | | | | |
| Current | 0.1% of maximum output voltage/ current | | | | |
| Line Regulation (Specified at ±10% of nominal AC input, constant load) | | | | | |
| Voltage | 0.05% of maximum output voltage/ current | | | | |
| Current | 0.05% of maximum output voltage/ current | | | | |
| Transient Response | A 50% step load will recover to within 0.75% of original value within 1mSec | | | | |
| Stability | ±0.05% of set point after 8 hrs. at fixed line, load and temperature. After 30min warm-up. | | | | |
| Analog Remote Programming for chassis level, three (3) modules installed | | | | | |
| Voltage Accuracy | 1% of full scale | | | | |
| Current Accuracy | 1.5% of full scale | | | | |
| Power Accuracy | 2% of full scale | | | | |
| Voltage Monitoring | 1% of full scale | | | | |
| Current Monitoring | 1.5% of full scale | | | | |
| Power Monitoring | 2% of full scale | | | | |
| Programming range | 0-10Vdc, 4-20mA | | | | |
| Output | | | | | |
| Output Float | Units maybe put in series with the float limit of output terminals must be within ±500V of chassis potential | | | | |
| Parallel | Multiple units can be paralleled to form higher power systems. Chassis control loops are tied together so that resulting higher power systems have the same transient response as a 30kW system. Control commands are only required to be sent to "master" supply. Parallel supplies require a shielded CAT 5 cable (STP) and appropriate output wiring connections by the user. | | | | |
| Calibration | End user calibration is supported. All standard and digital calibration can be performed without removing covers. | | | | |
| Digital Control (Optional) | Ethernet (Modbus-TCP or Ethernet/IP), RS-485 (MODBUS-RTU) | | | | |
| Analog Control | All control signals are isolated from the outputs | | | | |

ASD FLX Series : Product Specifications

10–320 kW

Advanced Digital Features (Requires Optional Digital Control):

| | |
|--------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Graphical User Interface | Graphical User Interface (Windows based) enables remote control and display of the supply operation including the advanced features listed below: |
| Data logging | Programmable update rate of 1 sec to 1000 sec (default 10 sec) with last 1000 points stored. Stored parameters include, output voltage/current, programmed set points, input voltage, output impedance, cable impedance, total power deliver, power meter, internal faults |
| System fault reporting | Outside of set point, output impedance (detection of cabling, connection or load problems) |

| Physical | Chassis | Module | |
|--------------------------------|--------------------------------------------------------------------------------------------|------------------|---------------------------------------|
| Width | 19.00in (48.3cm) | 4.58in (11.6cm) | |
| Depth | 30.00" (76.2 cm) | 25.2in (64.0 cm) | |
| Height | 3U - 5.22" rack mount (13.25 cm) | 4.57in (11.6cm) | |
| Weight | 65 lbs (29.5 kg) | 25 lbs (11.4 kg) | 140 lbs (63.6 kg) chassis + 3 modules |
| Shipping Weight | Contact factory for more product & shipping weights | | |
| Mounting provisions of chassis | EIA rack-mount with slide provisions. Recommended rack slide: Jonathan slide, P/N 370EZ-28 | | |
| AC Input Connector | Phoenix Contact terminal block | | |
| Protective Ground | 1/4-20 stud | | |
| Chassis Output Connectors | bus bar per module * | | |
| Water Connections | 3/8-18 NPTF hex bulkhead | | |
| Ambient Temperature | 0 to 50°C | | |
| Humidity | Relative humidity up to 95%, non-condensing | | |
| Module Installation Provision | Front loading , lock mechanism. 30lbs/in Torque | | |

Water Cooling Specifications

| | |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Flow | 1.5 gpm minimal, 1.75gpm nominal. Internal condensation must be prevented by ensuring that the temperature of the coolant is sufficiently high compared with the ambient air dew point |
| Temperature | 25°C maximum |
| Maximum pressure | 80 PSI |
| Pressure drop | typical 12 PSI @ 1.5gpm per chassis |

Regulatory

Certified to UL/CSA 61010 and IEC/EN 61010-1 by a NRTL, CE Compliant, LVD Categories: Installation Category II: Pollution Degree 2; Class II Equipment: for Indoor Use Only. Rack mount equipment requires proper enclosure provided in end use. EMC Directive, EN 61326:1998

Model Number Description

| | | | |
|--------------------------------------------------------------|--------|---------|---------|
| Voltage-Current Combinations: (rounded to whole A) | 40X250 | 40X500 | 40X750 |
| | 60X167 | 60X334 | 60X501 |
| | 80X125 | 80X250 | 80X375 |
| | 160X62 | 160X125 | 160X187 |

ASDF VoltageXCurrent XX YY

Option 2 : YY

AA - Standard unit AC Real-time clock (must include advanced digital feature package)

Option 1 : XX

2A - Advanced digital feature package including full isolated analog interface and Ethernet (Modbus-TCP) or RS485 interface.
2G - Advanced digital feature package including full isolated analog interface (SG-compatible) and Modbus-RTU (serial) interface
1D - for SG-compatible isolated analog interface. No access to advanced digital features or GUI. Serial port is available with maintenance functions only

* External paralleling bus bars are optional

ASD Flx Series : Product Diagram

