COLUMBIA UNIVERSITY
FACILITIES

SECTION 26 33 53
DESIGN REQUIREMENTS

UNINTERRUPTIBLE POWER SUPPLY

1.GENERAL INFORMATION

1.1 This section applies to uninterruptible power supplies.

2.DESIGN REQUIREMENTS

2.1 UPS system type, configuration, capacity and capacity of back-up batteries shall be appropriate to the needs of the project as agreed to by Columbia University.

2.2 Automatic Restart: Upon restoration of utility AC power, after a utility AC power outage and prior to a UPS automatic end of discharge shutdown, the rectifier/charger shall automatically restart, walk in, and gradually assume the inverter and battery recharge loads.

2.3 The following quantitative indications shall be displayed on the UPS:

a. Input AC voltage, line to line and line to neutral for each phase.
b. Input AC current for each phase.
c. Bypass AC voltage, line to line and line to neutral for each phase.
d. Bypass AC current for each phase.
e. Bypass input frequency.
f. System input frequency.
g. Battery and DC bus voltage.
h. Battery charge/discharge current and direction.
i. Output AC voltage line to line and line to neutral for each phase.
j. Output AC current for each phase.
k. System output frequency.
l. Percent of rated load being supplied by the UPS.
m. Battery time left during battery operation.

2.4 The following status indications shall be displayed on the UPS:

a. Normal operation.
b. Load on static bypass.
c. Load on maintenance bypass
d. Load on battery.
e. Inverter off.
f. System shutdown.

2.5 The following alarm indications shall be displayed which shall activate an audible alarm on the UPS:

a. Battery charger/system problem.

b. Battery under/over-voltage warning and shutdown.
c. Bypass and System AC input over/under-frequency.
d. Bypass and System AC input over/under-voltage.
e. Bypass AC input and inverter output not synchronized.
f. Bypass and System AC input incorrect phase rotation.
g. Bypass and System AC input single-phase condition.
h. System AC output over/under-voltage
i. System AC over-current.
j. Inverter fault.
k. Inverter output contactor open.
l. Static switch failure.
m. Input circuit breaker tripped.
n. Load transferred to bypass.
o. UPS overload shutdown.
p. UPS over-temperature (warning and shutdown).
q. External shutdown (remote EPO activated).
r. External battery circuit breaker UVR (undervoltage release).

2.6 Maintenance Bypass Switch: A manually operated, fully rated, continuous duty maintenance bypass switch shall connect the critical load to an input AC power source, bypassing the rectifier/charger, inverter, and static transfer switch. A separate bypass feeder to the UPS is preferred to enable complete bypass of the UPS. For 480 volt input units, provide a step-down transformer in the bypass line.

3.CONSTRUCTION REQUIREMENTS

3.1 Concrete Bases: Provide concrete bases for UPS, switches, battery rack and all components.

3.2 Required Factory testing shall include:
a. Functional test and demonstration of all functions, control, indicators, sensors and protective devices.
b. Full load test.
c. Transient response test.
d. Overload test.
e. Power failure test.
f. Efficiency test at 50 percent, 75 percent and 100 percent of full rated load.

3.3 Columbia shall be given 4 weeks' notice of said tests and the opportunity to witness testing on the unit before shipment is made.

3.4 Required field testing shall include:
a. Verification of fuse sizes, types and continuity.

b. Electrical and mechanical interlock systems for correct operation and sequencing.
c. Operation of forced ventilation.
d. Filters are in place and/or vents are clear.
e. Proper configuration of neutral and ground conductors.
f. Battery polarity and string voltage.
g. Printed circuit boards configuration verification.
h. Input voltage and phase rotation.
i. Static transfer from inverter to bypass and back.
j. DC undervoltage trip level tests on inverter input breaker.
k. Alarm circuit operation.
l. Synchronizing indicator operation for static switch and bypass switches.
m. Battery tests.

3.5 Require the services of factory trained field service personnel to test the entire system. Testing shall consist of a complete test of the UPS system and the associated accessories supplied by the manufacturer.

END OF SECTION