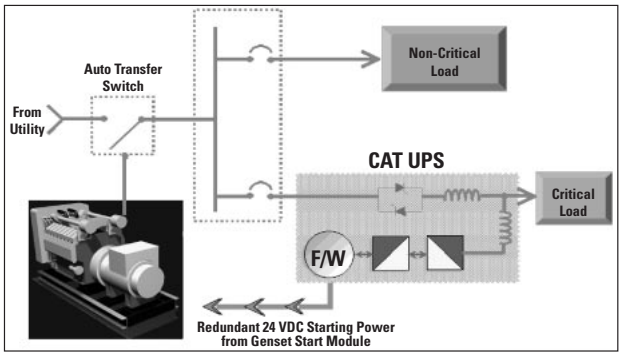
CATERPILLAR®

PRODUCT NEWS

Engine Division August 2001

Cat® UPS Feature Clarification

Market:	Electric Power
Application:	Continuous, uninterrupted, quality power
Description:	To clarify and provide functional description of Cat UPS features • Genset start • Upgrade capability • 3-wire vs. 4-wire • Static bypass switch • Maintenance bypass • Redundant flywheel and power stage • General dimension drawings
General Comments:	



Genset start

24 volt genset start option – This is a factory installed option that draws a stiff 24 Volt DC starting voltage from the flywheel to provide a redundant source for the traditional starting battery in our genset. This option can be used with a redundant starter to provide a fully redundant starter path. A significant (10X) increase in start reliability of the genset is accomplished when this feature is added.

Up to 1000 amps of starting current at 24 VDC is available directly from the flywheel system to the engine generator starter and also provides 24 VDC power for controls during the start sequence. The Genset Start box can be located up to 500 feet (wiring path) from the UPS and up to 25 feet from the genset. This option requires a specific type of 3-phase AC cable between the UPS and the Genset Start box and DC cable from the start box to the genset and redundant starter motors. This feature is rated up to 50° C for five cranking cycles of 10 seconds each. Since this feature will only consume between 1% and 3% of the flywheel's total capacity, it will not significantly affect UPS performance and the overall reduction in runtime is negligible. Only one genset start system is available per power stage (MMU) of the UPS. This option must be ordered at the time of initial order, as it is not field installable. A starting power paralleling option diode for the starting batteries will soon be available to allow the Genset Start option to be used without redundant starters.

UPS 300

UPS 600

UPS 900

60 Hz, 480 volt

Upgrade capability

A unique feature of the CAT UPS is the modular expansion capability. This allows the capacity of a Cat UPS to be increased in the field to meet future growth of critical power needs. All multi-module UPS systems, except for the 750 and 900, offer the capability of increasing the maximum power rating by adding additional power stages as long as the input and output feeders of the UPS are sized to handle the increased capacity. Maximum capacity after expansion is 900 kVA for 480V UPS and 750 kVA for 380V-415V systems. One must initially configure the UPS for upgrade to higher kVA rating in the future by including connection sockets or isolation disconnect switches for all additional power stages (MMU) to be added. You must specify either sockets or switches in the initial order. Switches give you the capability to isolate individual power stages for service or maintenance that the sockets do not provide. Field upgrades are not permitted unless the system has been equipped at the factory to accept the additional MMU(s). The stand-alone 250i and 300 kVA UPS are not expandable. If expansion capability will ever be needed, the 250iE or 300E must be ordered. If you order a 250iE/300E, it is only expandable to a 500/600 unless sockets or switches for expansion to a 750/900 are specified at the time of order. If a 750/900 and/or N+1 will ever be needed, the correct expansion options must be ordered up front. Additionally, if isolation switch sets are desired, switches for the maximum number of power stages you'll ever have on that particular UPS must also be ordered up front. It is not permitted to mix sockets and isolation switches on the same UPS.

3-wire vs. 4-wire

If you will need a system neutral to supply single-phase loads on the output of your UPS without an intervening transformer, you must order the 4-wire option. The 3-wire (no neutral)-with-ground configuration is the standard configuration for a 480 VAC system and the 4-wire-with-ground, capable of supporting a double sized neutral, is standard with the 380/400/415 VAC systems.

4-Wire input & output (480 VAC systems) – While the majority of 480 VAC UPS applications will require 3-wire power, some installations may require single-phase loads (usually lighting) to be connected directly to the UPS. These applications require the optional 4-wire input & output feature. Please keep in mind that it is normally better to connect single-phase 277 V load to a 480 V system through a transformer rather than running neutrals. However, if single-phase loads are to be supported directly from the UPS output without an intermediate transformer, then the 4-wire and ground system is required. It is recommended that a 2X neutral be used to connect a 4-wire and ground system.

Please be very certain you specify whether you need a three or four wire system at the time of order, as this is not a field installable option. The unit has to be re-manufactured at the factory if a change between 3-wire and 4-wire is required. If a 3-wire 50 Hz configuration is required, please contact the factory.

	250i	250iE	500	750	300	300E	600	900
480 VAC	N/A	N/A	N/A	N/A	3 std 4 opt	3 std 4 opt	3 std 4 opt	3 std 4 opt
380 400 415 VAC	4 std	4 std	4 std	4 std	N/A	N/A	N/A	N/A

Note: N+1 is available with any configuration except the 250i and 300

Static bypass switch

This option in the Cat UPS price list ensures an instantaneous transition from on-line to bypass operation in the event of a catastrophic internal UPS failure or substantial overload. The option utilizes Silicon Controlled Rectifiers (SCRs) to instantaneously connect the bypass source to the output. At the same time, the MMU output contactors opens and the bypass breaker closes in parallel with the static switch.

Any time a CAT UPS powers a "critical load", the static switch bypass should be ordered up front. By critical load, this implies any load that cannot tolerate up to a 50-millisecond break in power during a break before make (open transition) type of transfer. Typically, this will be 99% of the loads you will put on a UPS. The static bypass switch should be included except in those industrial applications in which the additional security of the static switch cannot justify the added cost and the loads will not require bypass transfer to handle starting surge currents that are a normal part of the process. The Cat UPS has an electromechanical contactor as a standard bypass switch. It has slower response time than the optional static bypass switch.

Maintenance bypass

The maintenance bypass options in the Caterpillar price list allows for complete system isolation without load interruption in order to perform maintenance on the UPS system. No cabinet expansion is required for this option, which is a significant advantage over competitive UPS systems. There is no power protection while in maintenance bypass mode and the maintenance bypass is not turned off by the EPO. The following are options for maintenance bypass for UPS 250iE/UPS 300E and larger systems:

- Single input, 3 device bypass – not available on 750 and 900 models
- Dual input, 2 device bypass
- Dual input, 3 device bypass

Note: Dual input systems require inputs to come from a common (synchronized) source, matching phase and rotation.

Dual input is also available without maintenance bypass for the multi-module systems. UPS 250i and UPS 300 all are single input only, and the 3-device configuration is the only maintenance bypass available.

The maintenance bypass option for a UPS 250i or UPS 300 allows the MMU to be serviced without interruption to the load. All expandable units will allow the MMU to be serviced or replaced without interruption of power provided the isolation switches are included in the system cabinet. The bypass cabinet is permanently attached to the MMU. If bypass capability for these rare but possible eventualities is required, Multi-MMU Cat UPS systems (250iE/300E and larger) do not have this limitation. An external maintenance bypass should be provided rather than the maintenance bypass.

Another level of maintenance bypass is an external maintenance bypass, which will allow for complete system isolation for maintenance. This is a separate cabinet located away from the Cat UPS either in a floor mounted or wall mounted configuration. This external maintenance

bypass can be used on any of the Cat UPS products, and is not currently available from Caterpillar, but can be purchased locally by contractor or the other third parties. Minimum technical requirements of this external maintenance bypass are listed below:

An External Maintenance Bypass is available from your local Cutler-Hammer supplier that is specific to our UPS applications. This EMB can be used to safely transfer the critical load to bypass in the event of maintenance or replacement of a CAT UPS System. This product will meet UL-67 safety standards and available in NEMA1 ANSI-61 finished enclosure. The maximum weight will be 800 lbs and has dimensions of 90H × 24D × 36W. Service voltage is 600V max. 3 ph 4-wire/ 3-wire with 200% rated neutral copper bus. Kirk-Key Interlocking will be optional and transfer sequence labels are standard.

Redundant flywheel and power stage

A dual input feed provides another level of redundancy and enhances serviceability of the overall critical power path as well as the UPS. Any time a 750/900 kVA UPS is ordered or a smaller UPS is to be expanded to 750/900 kVA with the 3-breaker maintenance bypass, a dual input feed must be ordered up front. The ability to add a dual feed to the 300 kVA UPS is currently being reviewed.

The multi-module systems offer the capability to add N+1 redundancy via a redundant power stage (MMU). With this redundancy, one gains significant system reliability improvement and the capability to perform maintenance or repair of an MMU without putting the load in an unprotected state. When planning N+1 redundancy, please keep in mind this is a factory-installed option only. Field installed option for N+1 is not currently available. N+1 redundant systems operate differently from non-redundant systems and always include the MMU isolation switches. This means, for example, that one cannot order a UPS 900 and expect it to behave the same as a UPS 600 N+1 system, even though they have the same number of power stages. In an N+1 redundant system, one power stage does not share power with the others during normal operation from utility, and its input static switch is open. However, its inverter and flywheel are online, are connected to the output bus, supply reactive current to the load and supply flywheel power during a power disturbance just like the other MMUs. The redundant MMU can also take over for another MMU instantaneously. Redundant status rotates among the MMUs automatically in a fail-safe manner. The transfer of redundant status from one unit to another occurs automatically at programmable times. By having one unit as a redundant unit, the efficiency, input currents and input power factor characteristics change very little between redundant and non-redundant configurations.

General Dimension Drawings

Current general dimension drawings are available on the Electric Power Website: https://electricpower.cat.com. Click on Products/New! UPS 250i/300/600/900/Drawings to access the most current UPS general dimension drawings. Files are available in Adobe Acrobat and AutoCad.

The published 250i spec sheet LEHX0844-01 contains incorrect overall product dimensions. Please refer to the Electric Power Website for accurate general dimension drawings.

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