

Powerware Series

Eaton® FERRUPS®
FE/QFE UPS
User's Guide



Powering Business Worldwide

Class A EMC Statements

FCC Part 15

NOTE This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

ICES-003

This Class A Interference Causing Equipment meets all requirements of the Canadian Interference Causing Equipment Regulations ICES-003.

Cet appareil numérique de la classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

For Users in Germany

We hereby certify that the uninterruptible power system (QFE 500 VA, 700 VA, 850 VA, 1.15 kVA, 1.4 kVA, 1.8 kVA, 2.1 kVA, 3.1 kVA, 4.3 kVA, 5.3 kVA, 7 kVA, 10 kVA, 12.5 kVA, and 18 kVA) complies with the RFI suppression requirements of Vfg. 243/1991 and Vfg. 46/1992. The German Postal Service was notified that the equipment is being marketed. The German Postal Service has the right to retest the equipment and verify compliance.

Hiermit wird bescheinigt, daß die unterbrechungsfreie Stromversorgung (QFE 500 VA, 700 VA, 850 VA, 1.15 kVA, 1.4 kVA, 1.8 kVA, 2.1 kVA, 3.1 kVA, 4.3 kVA, 5.3 kVA, 7 kVA, 10 kVA, 12.5 kVA, and 18 kVA) in Übereinstimmung mit den Bestimmungen der Vfg. 243/1991 und Vfg. 46/1992 funktentstört ist. Der Deutschen Bundespost wurde das Inverkehrbringen dieses Gerätes angezeigt und die Berechtigung zur Überprüfung der Serie auf Einhaltung der Bestimmung eingeräumt.

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Chapter 1 Introduction

The Eaton® FERRUPS® uninterruptible power system (UPS) series provides unmatched reliability in configurable power protection for computers and telecommunications equipment. Patented ferroresonant technology delivers “bulletproof” power protection against spikes, sags, surges, noise, and lightning. This UPS represents a breakthrough in the design of advanced, online UPSs.

Providing outstanding performance and reliability, the FERRUPS's unique benefits include the following:

- Active voltage regulation converts power from almost any AC source into computer-grade power.
- Eliminates harmful harmonic currents from entering a building's wiring where they can disrupt computer operations.
- Enhanced diagnostics initiates automatic startup and scheduled tests on the logic board, battery, and other critical systems.
- Provides regulated output voltage without drawing power from batteries, keeping the batteries fully charged from unexpected blackouts.
- Complete offering of power management software included to ensure data integrity.

Chapter 2 Safety Warnings

Read the following precautions before you install the UPS.

IMPORTANT SAFETY INSTRUCTIONS SAVE THESE INSTRUCTIONS

This manual contains important instructions that you should follow during installation and maintenance of the UPS and batteries. Please read all instructions before operating the equipment and save this manual for future reference.

DANGER



This UPS contains **LETHAL VOLTAGES**. All repairs and service should be performed by **AUTHORIZED SERVICE PERSONNEL ONLY**. There are **NO USER SERVICEABLE PARTS** inside the UPS.

WARNING



- This UPS contains its own energy source (batteries). The output receptacles may carry live voltage even when the UPS is not connected to an AC supply.
 - Do not remove or unplug the input cord when the UPS is turned on. This removes the safety ground from the UPS and the equipment connected to the UPS.
 - To reduce the risk of fire or electric shock, install this UPS in a temperature and humidity controlled, indoor environment, free of conductive contaminants. Ambient temperature must not exceed 40°C (104°F). Do not operate near water or excessive humidity (95% max).
 - To comply with international standards and wiring regulations, the total equipment connected to the output of this UPS must not have an earth leakage current greater than 1.5 milliamperes.
-

CAUTION



- Batteries can present a risk of electrical shock or burn from high short-circuit current. Observe proper precautions. Servicing should be performed by qualified service personnel knowledgeable of batteries and required precautions. Keep unauthorized personnel away from batteries.
 - Proper disposal of batteries is required. Refer to your local codes for disposal requirements.
 - Never dispose of batteries in a fire. Batteries may explode when exposed to flame.
-

Sikkerhedsanvisninger

VIGTIGE SIKKERHEDSANVISNINGER GEM DISSE ANVISNINGER DENNE BRUGERVEJLEDNING INDEHOLDER VIGTIGE SIKKERHEDSANVISNINGER



FARE

Denne UPS indeholder LIVSFARLIG HØJSPÆNDING. Alle reparationer og vedligeholdelse bør kun udføres af en AUTORISERET SERVICE TEKNIKER. Ingen af UPS'ens indvendige dele kan repareres af brugeren.



ADVARSEL!

- Denne UPS indeholder egen energiforsyning (batterier). Udgangsstikkene kan lede strøm, selv når UPS'en ikke er tilsat en AC-energikilde.
- Netledningen må ikke fjernes og stikket må ikke trækkes ud, mens UPS'en er tændt. Dette fjerner sikkerhedsjorden fra UPS'en og fra det udstyr, der er sat til.
- Installér denne UPS i et temperatur- og fugtighedskontrolleret indendørsmiljø, frit for ledende forureningsstoffer for at formindske risikoen for brand og elektrisk stød. Rumtemperaturen må ikke overstige 40°C. UPS'en bør ikke betjenes nær vand eller høj fugtighed (maksimalt 95%).
- I overensstemmelse med internationale normer og bestemmelser for el-installation må det udstyr, der er forbundet til udgangen af denne UPS, tilsammen ikke overskride en jordafdelingsspænding på mere end 1,5 milliamperere.



ADVARSEL

- Batterier kan udgøre en fare for elektrisk stød eller forbrændinger forårsaget af høj kortslutningsspænding. De korrekte forholdsregler bør overholdes.
- Korrekt bortskaffelse af batterier er påkrævet. Overhold gældende lokale regler for bortskaffelsesprocedurer.
- Skaf dig aldrig af med batterierne ved at brænde dem. Batterierne kan eksplodere ved åben ild.

Belangrijke Veiligheidsinstructies

BELANGRIJKE VEILIGHEIDSINSTRUCTIES BEWAAR DEZE INSTRUCTIES DEZE HANDLEIDING BEVAT BELANGRIJKE VEILIGHEIDSINSTRUCTIES

GEVAAR



Deze UPS bevat LEVENSGEVAARLIJKE ELEKTRISCHE SPANNING. Alle reparaties en onderhoud dienen UITSLUITEND DOOR ERKEND SERVICEPERSONEEL te worden uitgevoerd. Er bevinden zich GEEN ONDERDELEN in de UPS die DOOR DE GEBRUIKER kunnen worden GEREPAREERD.

WAARSCHUWING



- Deze UPS bevat zijn eigen energiebron (batterijen). De uitgangsaansluitingen kunnen onder spanning staan wanneer de UPS niet op een wisselstroom voeding is aangesloten.
- Verwijder de ingang snoer niet of haal de stekker van de ingang snoer er niet uit terwijl de UPS aan staat. Hierdoor zou de UPS en uw aangesloten apparatuur geen aardebeveiliging meer hebben.
- Teneinde de kans op brand of elektrische schok te verminderen dient deze UPS in een gebouw met temperatuur- en vochtigheidsregeling te worden geïnstalleerd, waar geen geleidende verontreinigingen aanwezig zijn. De omgevingstemperatuur mag 40°C niet overschrijden. Niet gebruiken in de buurt van water of bij zeer hoge vochtigheid (max. 95%).
- Om aan de internationale normen en bedravingsvoorschriften te voldoen mag de gehele apparatuur die op de uitgang van deze UPS is aangesloten, geen aardlekstroom van meer dan 1,5 milliampère hebben.

OPGELET



- Batterijen kunnen gevaar voor elektrische schok of brandwonden veroorzaken als gevolg van een hoge kortsluitstroom. Volg de desbetreffende aanwijzingen op.
- De batterijen moeten op de juiste wijze worden opgeruimd. Raadpleeg hiervoor uw plaatselijke voorschriften.
- Nooit batterijen in het vuur gooien. De batterijen kunnen ontploffen.

Tarkeita Turvaohjeita

TÄRKEITÄ TURVAOHJEITA - SUOMI SÄILYTÄ NÄMÄ OHJEET TÄMÄ OPAS SISÄLTÄÄ TÄRKEITÄ TURVAOHJEITA



VAARA

Tämä UPS sisältää HENGENVAARALLISIA JÄNNITTEITÄ. Kaikki korjaukset ja huollot on jätettävä VAIN VALTUUTETUN HUOLTOHENKILÖN TOIMEKSI. UPS ei sisällä MITÄÄN KÄYTTÄJÄN HUOLLETTAVIA OSIA.



VAROITUS

- Tämä UPS sisältää oman energialähteen (akuston). Ulostuloliittimissä voi olla jännite, kun UPS ei ole liitettynä verkkojännitteeseen.
- Älä poista tai irrota sisääntulojohtoa, kun UPS on kytkettynä. Tämä poistaa turvamaadoituksen UPS-laitteesta ja siihen liitetystä laitteistosta.
- Vähentääksesi tulipalon ja sähköiskun vaaraa asenna tämä UPS sisätiloihin, joissa lämpötila ja kosteus on säädettävissä ja joissa ei ole virtaa johtavia epäpuhtauksia. Ympäristön lämpötila ei saa ylittää 40 °C. Älä käytä lähellä vettä ja vältä kosteita tiloja (95 % maksimi).
- Kansainväliset normit ja johdotusmääräykset vaativat, että kaikkien tämän UPS-laitteen ulostulokytkentöjen yhteinen maavuotovirta ei ylitä 1,5 milliampeeria (mA).



VARO

- Akusto saattaa aiheuttaa sähköiskun tai syttyä tuleen, jos akusto kytketään oikosulkuun. Noudata asianmukaisia ohjeita.
- Akusto täytyy hävittää säädösten mukaisella tavalla. Noudata paikallisia määräyksiä.
- Älä koskaan heitä akkuja tuleen. Ne voivat räjähtää.

Consignes de sécurité

CONSIGNES DE SÉCURITÉ IMPORTANTES CONSERVER CES INSTRUCTIONS CE MANUEL CONTIENT DES CONSIGNES DE SÉCURITÉ IMPORTANTES

DANGER!



Cet onduleur contient des TENSIONS MORTELLES. Toute opération d'entretien et de réparation doit être EXCLUSIVEMENT CONFIEE A UN PERSONNEL QUALIFIE AGRÉÉ. AUCUNE PIÈCE RÉPARABLE PAR L'UTILISATEUR ne se trouve dans l'onduleur.

AVERTISSEMENT!



- Cet onduleur renferme sa propre source d'énergie (batteries). Les prises de sortie peuvent être sous tension même lorsque l'onduleur n'est pas branché sur le secteur.
- Ne pas retirer le cordon d'alimentation lorsque l'onduleur est sous tension sous peine de supprimer la mise à la terre de l'onduleur et du matériel connecté.
- Pour réduire les risques d'incendie et de décharge électrique, installer l'onduleur uniquement à l'intérieur, dans un lieu dépourvu de matériaux conducteurs, où la température et l'humidité ambiantes sont contrôlées. La température ambiante ne doit pas dépasser 40 °C. Ne pas utiliser à proximité d'eau ou dans une atmosphère excessivement humide (95 % maximum).
- Afin d'être conforme aux normes et règlements internationaux de câblage, le courant de fuite à la terre de la totalité du matériel branché sur la sortie de l'onduleur ne doit pas dépasser 1,5 mA.

ATTENTION!



- Les batteries peuvent présenter un risque de décharge électrique ou de brûlure par des courts-circuits de haute intensité. Prendre les précautions nécessaires.
- Une mise au rebut réglementaire des batteries est obligatoire. Consulter les règlements en vigueur dans votre localité.
- Ne jamais jeter les batteries au feu. L'exposition aux flammes risque de les faire exploser.

Sicherheitswarnungen

WICHTIGE SICHERHEITSANWEISUNGEN AUFBEWAHREN. DIESES HANDBUCH ENTHÄLT WICHTIGE SICHERHEITSANWEISUNGEN.



WARNUNG

Die USV führt lebensgefährliche Spannungen. Alle Reparatur- und Wartungsarbeiten sollten nur von Kundendienstfachleuten durchgeführt werden. Die USV enthält keine vom Benutzer zu wartenden Komponente.



ACHTUNG

- Diese USV ist mit einer eigenen Energiequelle (Batterie) ausgestattet. An den Ausgangssteckdosen kann auch dann Spannung anliegen, wenn die USV nicht an einer Wechselspannungsquelle angeschlossen ist.
- Das Eingangskabel nicht entfernen oder abziehen, während die USV eingeschaltet ist, weil hierdurch die Sicherheitserdung von der USV und den daran angeschlossenen Geräten entfernt wird.
- Um die Brand- oder Elektroschockgefahr zu verringern, diese USV nur in Gebäuden mit kontrollierter Temperatur und Luftfeuchtigkeit installieren, in denen keine leitenden Schmutzstoffen vorhanden sind. Die Umgebungstemperatur darf 40°C nicht übersteigen. Die USV nicht in der Nähe von Wasser oder in extrem hoher Luftfeuchtigkeit (max. 95 %) betreiben.
- Um internationale Normen und Verdrahtungsvorschriften zu erfüllen, dürfen die an den Ausgang dieser USV angeschlossenen Geräte zusammen einen Erdschlußstrom von insgesamt 1,5 Milliampere nicht überschreiten.



VORSICHT!

- Batterien können aufgrund des hohen Kurzschlußstroms Elektroschocks oder Verbrennungen verursachen. Die entsprechenden Vorsichtsmaßnahmen sind unbedingt zu beachten.
- Die Batterien müssen ordnungsgemäß entsorgt werden. Hierbei sind die örtlichen Bestimmungen zu beachten.
- Batterien niemals verbrennen, da sie explodieren können.

Προειδοποιήσεις Ασφάλειας

ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ

ΦΥΛΑΞΤΕ ΑΥΤΕΣ ΤΙΣ ΟΔΗΓΙΕΣ

ΤΟ ΠΑΡΟΝ ΕΓΧΕΙΡΙΔΙΟ ΠΕΡΙΕΧΕΙ ΣΗΜΑΝΤΙΚΕΣ ΟΔΗΓΙΕΣ ΑΣΦΑΛΕΙΑΣ

ΚΙΝΔΥΝΟΣ



Αυτό το UPS περιέχει ΘΑΝΑΤΗΦΟΡΑ ΤΑΣΗ. Όλες οι επισκευές και οι συντηρήσεις πρέπει να γίνονται ΜΟΝΟ ΑΠΟ ΕΞΟΥΣΙΟΔΟΤΗΜΕΝΟ ΓΙΑ ΤΗ ΣΥΝΤΗΡΗΣΗ ΠΡΟΣΩΠΙΚΟ. Το UPS ΔΕΝ ΠΕΡΙΕΧΕΙ ΚΑΝΕΝΑ ΕΞΑΡΤΗΜΑ ΠΟΥ ΝΑ ΜΠΟΡΕΙ ΝΑ ΕΠΙΣΚΕΥΑΣΤΕΙ ΑΠΟ ΤΟ ΧΡΗΣΤΗ.

ΠΡΟΕΙΔΟΠΟΙΗΣΗΚ



- Το συγκεκριμένο UPS περιέχει τη δική του πηγή ενέργειας (συσσωρευτές). Οι ρευματοδότες εξόδου μπορεί να έχουν ενεργό τάση ακόμη και όταν το UPS δεν είναι συνδεδεμένο σε πηγή εναλλασσόμενου ρεύματος (AC).
- Μην βγάζετε από την πρίζα το καλώδιο τροφοδοσίας όταν το UPS είναι ανοιχτό. Μ' αυτό τον τρόπο αφαιρείτε τη γείωση ασφαλείας από το UPS και από τον εξοπλισμό που είναι συνδεδεμένος με το UPS.
- Για να μειώσετε τον κίνδυνο πυρκαγιάς ή ηλεκτροπληξίας, εγκαταστήστε το συγκεκριμένο UPS σε εσωτερικό χώρο με ελεγχόμενη θερμοκρασία και υγρασία, ο οποίος να μην περιέχει αγώγιμα υλικά. Η θερμοκρασία περιβάλλοντος δεν πρέπει να ξεπερνάει τους 40° C. Μη χρησιμοποιείτε το UPS κοντά σε νερό ή υπερβολική υγρασία (μέγιστη τιμή: 95%).
- Για να συμφωνεί με τα διεθνή πρότυπα και τους κανονισμούς καλωδίωσης, το ρεύμα διαρροής προς τη γη ολόκληρου του εξοπλισμού, που είναι συνδεδεμένος με την έξοδο του συγκεκριμένου UPS, δεν πρέπει να είναι μεγαλύτερο από 1,5 mA.

ΠΡΟΣΟΧΗ



- Οι συσσωρευτές μπορεί να προκαλέσουν ηλεκτροπληξία ή έγκαιμα από υψηλό ρεύμα βραχυκυκλώματος. Λαμβάνετε τις κατάλληλες προφυλάξεις.
- Απαιτείται σωστή διάθεση των συσσωρευτών. Δείτε τους τοπικούς κανονισμούς που αφορούν τις απαιτήσεις διάθεσής τους.
- Ποτέ μην πετάτε τους συσσωρευτές στη φωτιά, γιατί μπορεί να εκραγούν.

Avvisi di sicurezza

IMPORTANTI ISTRUZIONI DI SICUREZZA CONSERVARE QUESTE ISTRUZIONI QUESTO MANUALE CONTIENE IMPORTANTI ISTRUZIONI DI SICUREZZA



PERICOLO

la TENSIONE contenuta in questo gruppo statico di continuità è LETALE. Tutte le operazioni di riparazione e di manutenzione devono essere effettuate **ESCLUSIVAMENTE DA PERSONALE TECNICO AUTORIZZATO**. All'interno del gruppo statico di continuità **NON** vi sono **PARTI RIPARABILI DALL'UTENTE**.



AVVERTENZA

- Questo gruppo statico di continuità contiene una fonte di energia autonoma (le batterie). Le prese di uscita possono condurre tensione energizzata quando il gruppo statico di continuità non è collegato con una fonte di alimentazione a corrente alternata.
- Non rimuovere nè scollegare il cavo di ingresso quando il gruppo statico di continuità è acceso poichè in tal modo si disattiverrebbe il collegamento a terra di sicurezza del gruppo statico di continuità e dell'apparecchiatura ad esso collegata.
- Per ridurre il rischio di incendio o di scossa elettrica, installare il gruppo statico di continuità in un ambiente interno a temperatura ed umidità controllata, privo di agenti contaminanti conduttivi. La temperatura ambiente non deve superare i 40°C. Non utilizzare l'unità in prossimità di acqua o in presenza di umidità eccessiva (95% max).
- Per conformità con gli standard internazionali e con le norme in merito al cablaggio, tutta l'apparecchiatura collegata con l'uscita del gruppo statico di continuità non deve avere una corrente di dispersione di terra superiore a 1,5 milliampere.



ATTENZIONE

- Le batterie possono presentare rischio di scossa elettrica o di ustioni provocate da alta corrente dovuta a corto circuito. Osservare le apposite istruzioni.
- Le batterie devono essere smaltite in modo corretto. Per i requisiti di smaltimento fare riferimento alle disposizioni locali.
- Non gettare mai le batterie nel fuoco poichè potrebbero esplodere se esposte alle fiamme.

Viktig Sikkerhetsinformasjon



FARLIG

Denne UPS'en inneholder LIVSFARLIGE SPENNINGER. All reparasjon og service må kun utføres av AUTORISERT SERVICEPERSONALE. BRUKERE KAN IKKE UTFØRE SERVICE PÅ NOEN AV DELENE i UPS'en.



FARLIG

- Denne UPS'en har en egen energikilde (batterier). Stikkontaktene kan være strømførende selv om UPS'en ikke er tilsluttet en vekselstrømforsyning.
- Strømforsyningskabelen må ikke fjernes eller trekkes ut når UPS'en er på, slik at ikke sikkerhetsjordingen fjernes fra UPS'en og det utstyret som er forbundet med den.
- For å redusere fare for brann eller elektriske støt, bør denne UPS'en installeres i et innendørs miljø med kontrollert temperatur og luftfuktighet som er fritt for ledende, forurensende stoffer. Romtemperaturen må ikke overskride 40°C. Den må ikke brukes i nærheten av vann eller ved meget høy luftfuktighet (95% maks.).
- Alt utstyr som er forbundet med utgangen av denne UPS'en må ikke ha en sterkere total lekkasjestrøm enn 1,5 milliampere for å være i overensstemmelse med internasjonale standarder og forkablingsbestemmelser.



FORSIKTIG

- Batterier kan forårsake elektriske støt eller forbrenning på grunn av høy kortslutningsstrøm. Følg instruksene.
- Batterier må fjernes på korrekt måte. Se lokale forskrifter vedrørende krav om fjerning av batterier.
- Kast aldri batterier i flammer, da de kan eksplodere, hvis de utsettes for åpen ild.

Regulamentos de Segurança

INSTRUÇÕES DE SEGURANÇA IMPORTANTES GUARDE ESTAS INSTRUÇÕES ESTE MANUAL CONTÉM INSTRUÇÕES DE SEGURANÇA IMPORTANTES



CUIDADO

A UPS contém VOLTAGEM MORTAL. Todos os reparos e assistência técnica devem ser executados **SOMENTE POR PESSOAL DA ASSISTÊNCIA TÉCNICA AUTORIZADO**. Não há nenhuma PEÇA QUE POSSA SER REPARADA PELO USUÁRIO dentro da UPS.



ADVERTÊNCIA

- Esta UPS contém sua própria fonte de energia (baterias). Os receptáculos de saída podem conter voltagem ativa quando a UPS não se encontra conectada a uma fonte de alimentação de corrente alternada.
 - Não remova ou desconecte o cabo de entrada quando a UPS estiver ligada. Isto removerá o aterramento de segurança da UPS e do equipamento conectado.
 - Para reduzir o risco de incêndios ou choques elétricos, instale a UPS em ambiente interno com temperatura e umidade controladas e livres de contaminadores condutíveis. A temperatura ambiente não deve exceder 40°C. Não opere próximo a água ou em umidade excessiva (máx: 95%).
 - Para estar de acordo com os padrões internacionais e os regulamentos de fiação, o equipamento total conectado à saída desta UPS não deve ter uma corrente de fuga à terra maior que 1,5 miliampères.
-



PERIGO

- As baterias podem apresentar o risco de choque elétrico, ou queimaduras provenientes de alta corrente de curto-circuito. Observe as instruções adequadas.
 - Siga as instruções apropriadas ao desfazer-se das baterias. Consulte os códigos do local para maiores informações sobre os regulamentos de descarte de produtos.
 - Nunca jogue as baterias no fogo, porque há risco de explosão.
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Предупреждения по мерам безопасности

ВАЖНЫЕ УКАЗАНИЯ ПО МЕРАМ БЕЗОПАСНОСТИ СОХРАНИТЕ ЭТИ УКАЗАНИЯ ДАННОЕ РУКОВОДСТВО СОДЕРЖИТ ВАЖНЫЕ УКАЗАНИЯ ПО МЕРАМ БЕЗОПАСНОСТИ



ОПАСНО

В данном ИБП имеются СМЕРТЕЛЬНО ОПАСНЫЕ НАПРЯЖЕНИЯ. Все работы по ремонту и обслуживанию должны выполняться ТОЛЬКО УПОЛНОМОЧЕННЫМ ОБСЛУЖИВАЮЩИМ ПЕРСОНАЛОМ. Внутри ИБП нет узлов, ОБСЛУЖИВАЕМЫХ ПОЛЬЗОВАТЕЛЕМ.



ПРЕДУПРЕЖДЕНИЕ

- Данный ИБП содержит собственные источники энергии (аккумуляторы). На выходных розетках может иметься напряжение, даже когда ИБП не подключен к сети переменного тока.
- Не отсоединяйте сетевой шнур и не извлекайте его вилку из розетки при включенном ИБП. При этом защитное заземление отключается от ИБП и от оборудования, подключенного к ИПБ.
- Для снижения опасности пожара или поражения электрическим током устанавливайте ИБП в закрытом помещении с контролируемыми температурой и влажностью, в котором отсутствуют проводящие загрязняющие вещества. Температура окружающего воздуха не должна превышать 40°C. Не эксплуатируйте устройство около воды или в местах повышенной влажностью (макс. 95%).
- Для обеспечения соблюдения требований международных стандартов и требований к разводке электрических цепей, суммарная величина тока утечки на землю всего оборудования, подключенного к выходу ИБП, не должна превышать 1,5 миллиампера.



ОСТОРОЖНО

- Аккумуляторы могут вызвать опасность поражения электрическим током или ожога от тока короткого замыкания. Соблюдайте соответствующие меры предосторожности.
- Необходимо соблюдать правила утилизации аккумуляторов. Обратитесь к местным нормативным актам за информацией о требованиях к утилизации.
- Никогда не бросайте аккумуляторы в огонь. Аккумуляторы могут взорваться под воздействием огня.

Advertencias de Seguridad

INSTRUCCIONES DE SEGURIDAD IMPORTANTES GUARDE ESTAS INSTRUCCIONES ESTE MANUAL CONTIENE INSTRUCCIONES DE SEGURIDAD IMPORTANTES



PELIGRO

Este SIE contiene VOLTAJES MORTALES. Todas las reparaciones y el servicio técnico deben ser efectuados SOLAMENTE POR PERSONAL DE SERVICIO TÉCNICO AUTORIZADO. No hay NINGUNA PARTE QUE EL USUARIO PUEDA REPARAR dentro del SIE.



ADVERTENCIA

- Este SIE contiene su propia fuente de energía (las baterías). Los receptáculos de salida pueden transmitir corriente eléctrica aun cuando el SIE no esté conectado a un suministro de corriente alterna (c.a.).
- No retire o desenchufe el cable de entrada mientras el SIE se encuentre encendido. Esto suprime la descarga a tierra de seguridad del SIE y de los equipos conectados al SIE.
- Para reducir el riesgo de incendio o de choque eléctrico, instale este SIE en un lugar cubierto, con temperatura y humedad controladas, libre de contaminantes conductores. La temperatura ambiente no debe exceder los 40°C. No trabaje cerca del agua o con humedad excesiva (95% máximo).
- Para cumplir con los estándares internacionales y las normas de instalación, la totalidad de los equipos conectados a la salida de este SIE no debe tener una intensidad de pérdida a tierra superior a los 1,5 miliamperios.



PRECAUCIÓN

- Las baterías pueden presentar un riesgo de descargas eléctricas o de quemaduras debido a la alta corriente de cortocircuito. Preste atención a las instrucciones correspondientes.
- Es necesario desechar las baterías de un modo adecuado. Consulte las normas locales para conocer los requisitos pertinentes.
- Nunca deseche las baterías en el fuego. Las baterías pueden explotar si se las expone a la llama.

Säkerhetsföreskrifter

VIKTIGA SÄKERHETSFÖRESKRIFTER SPARA DESSA FÖRESKRIFTER DENNA BRUKSANVISNING INNEHÅLLER VIKTIGA SÄKERHETSFÖRESKRIFTER

FARA



Denna UPS-enhet innehåller LIVSFARLIG SPÄNNING. ENDAST AUKTORISERAD SERVICEPERSONAL får utföra reparationer eller service. Det finns inga delar som ANVÄNDAREN KAN UTFÖRA SERVICE PÅ inuti UPS-enheten.

VARNING



- Denna UPS-enhet har en egen energikälla (batterier). De utgående kontaktorna kan vara strömförande när UPS-enheten inte är ansluten till en växelströmkälla.
- Ta aldrig bort nätsladden när UPS-enheten är påslagen. Detta tar bort skyddsjordningen från både UPS-enheten och den anslutna utrustningen.
- Minska risken för brand eller elektriska stötar genom att installera denna UPS-enhet inomhus, där temperatur och luftfuktighet är kontrollerade och där inga ledande föroreningar förekommer. Omgivande temperatur får ej överstiga 40°C. Använd inte utrustningen nära vatten eller vid hög luftfuktighet (max 95 %).
- För att överensstämma med internationell standard och installationsföreskrifter får inte den totala utrustning som anslutits till uttagen på denna UPS-enhet ha läcksström som överstiger 1,5 milliamperere.

VIKTIGT



- Batterierna kan ge elektriska stötar eller brännskador från hög kortslutningsström. Följ tillämpliga anvisningar.
- Batterierna måste avyttras enligt anvisningarna i lokal lagstiftning.
- Använda batterier får aldrig brännas upp. De kan explodera.

SAFETY WARNINGS

Chapter 3 UPS Startup

This section provides step-by-step instructions for starting the Eaton FERRUPS UPS. Follow these procedures closely to avoid potential damage to your equipment or the UPS and to protect yourself and others from hazardous operating conditions.

Identifying Your UPS



NOTE Before starting up the UPS, verify that it has been installed according to the Eaton FERRUPS FE/QFE UPS (500 VA–18 kVA) Installation Guide.

FERRUPS UPSs come in different sizes (see Figure 1). Identify your UPS model and continue to the appropriate startup section.

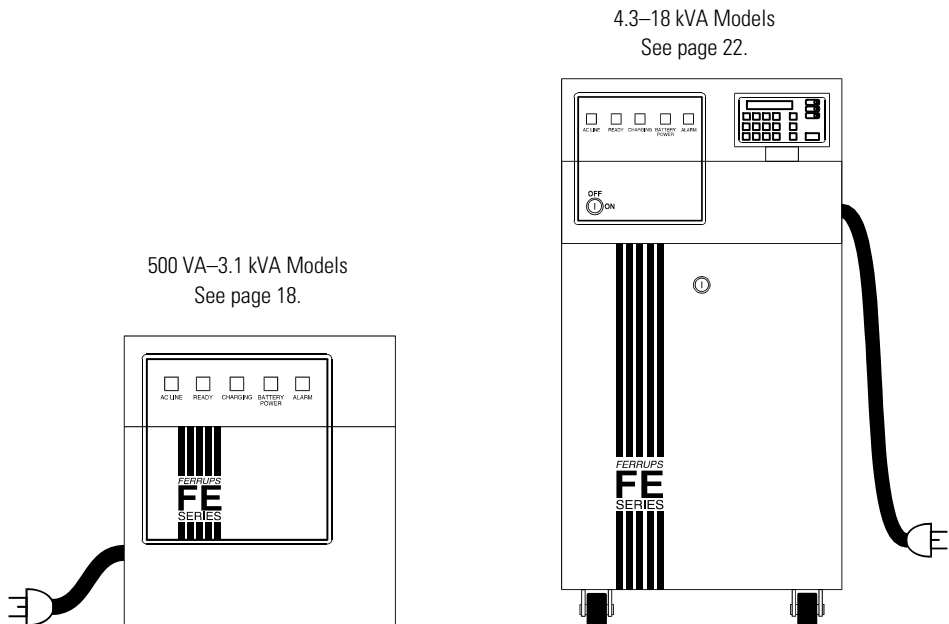


Figure 1. Identifying the FERRUPS UPS

Startup for the FE/QFE 500 VA–3.1 kVA UPS

Before starting up the UPS, review the rear panel for your UPS model.

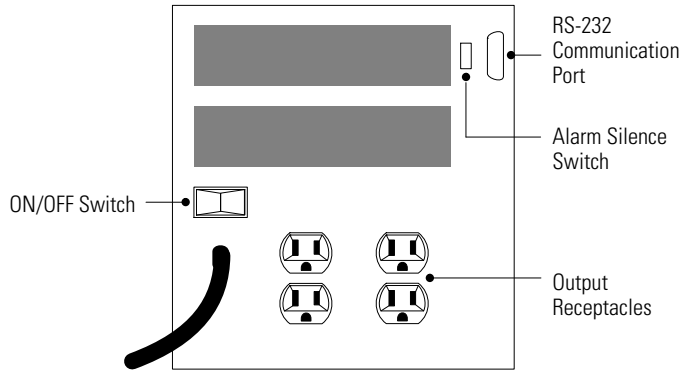


Figure 2. FERRUPS 500–850 VA UPS Rear Panel

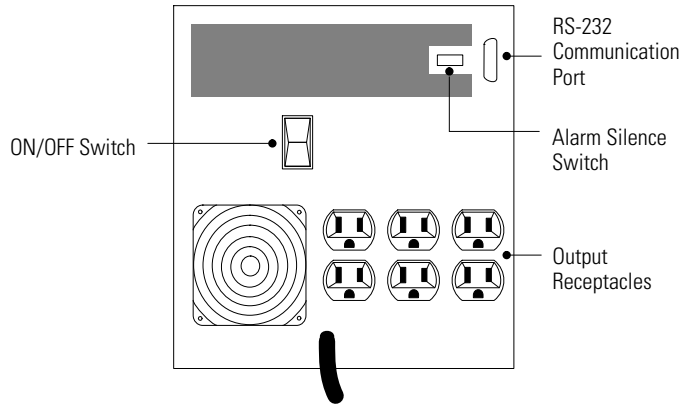


Figure 3. FERRUPS 1.15–1.4 kVA Rear Panel

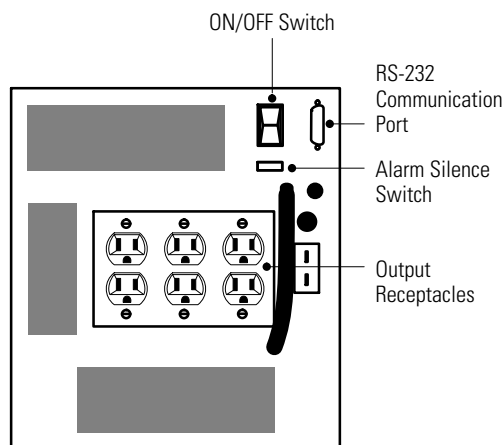


Figure 4. FERRUPS 1.8–3.1 kVA Rear Panel

To start the FE/QFE 500 VA–3.1 kVA UPS, use the following steps:

1. Confirm the equipment to be protected by the UPS is powered off.
2. **For FE Plug-Receptacle UPSs:** Plug the UPS power cord into a power outlet.



NOTE If the plug does not match your receptacle outlet, ask your electrician to install the proper outlet.

For QFE Plug-Receptacle UPSs: Disconnect the power cord from the computer or other equipment to be protected by the UPS and plug it into the UPS. Plug the other end of the power cord into a power outlet.



NOTE Do not use the cord supplied with the UPS; this cord is for plugging the equipment into the UPS output receptacles.

NOTE If the plug does not match your receptacle outlet, ask your electrician to install the proper outlet.

For Hardwired UPSs: Confirm that an electrician has completed and tested the connection to the proper power source and connected your protected equipment according to the *Eaton FERRUPS FE/QFE UPS (500 VA–18 kVA) Installation Guide*. Turn the AC line disconnect switch to the ON position.

- The AC LINE indicator illuminates (see Figure 5).



NOTE The AC LINE indicator does not illuminate for FE 500 VA–3.1 kVA models with serial numbers 25000 and greater until the UPS ON/OFF switch is turned to the ON position.

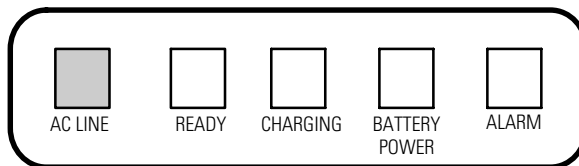


Figure 5. Front Panel Indicators

- If you have an external battery cabinet with a DC switch, turn the switch to the ON position.
- Turn the UPS ON/OFF switch to the ON position.

After a short startup test, the READY indicator flashes for a few seconds and then remains illuminated. The UPS is ready to supply output power.



NOTE The UPS and external battery cabinets are shipped with the batteries charged. However, batteries may lose some of the charge during shipping and storage. You can use the UPS immediately after unpacking, but it may not provide the full-rated backup time during a power failure. Upon initial startup, the UPS may need to operate for 24 hours before the battery is fully charged and full battery-backup time is available. If the CHARGING indicator is illuminated, operate the UPS for 24 hours to fully charge the battery.

- For Plug-Receptacle UPSs:** Plug the equipment to be protected into the UPS output receptacles.



NOTE For QFE models, use the supplied UPS cord to connect your equipment to the UPS output receptacles.

For Hardwired UPSs: Turn the bypass switch to the UPS position.

- Turn on the equipment that is connected to the UPS.

If the ALARM indicator illuminates, see “Alarms” on page 107.

8. If your FERRUPS UPS is configured to use an external battery cabinet, you must program the battery capacity in ampere-hour (Ah) for the total number of battery packs used in the UPS. If you purchased one of the FERRUPS battery pack options available from Eaton, select the Ah value from Table 1.



NOTE A Remote Control Panel (part number RCK-0007), PC, or terminal is required to communicate with the UPS.

Before programming the battery Ah, enter the user-level password following the instructions in “Entering Passwords” on page 30. To change the battery Ah, parameter 69 (Batt Ah), follow these steps:

| | |
|---------------------------|--------------------------------------|
| Press this key: | Display shows: |
| [DISPLAY] [6] [9] [ENTER] | 69 Batt AH [<i>Default</i>] |
| [PROGRAM] | 69 Pgm: |
| [Ah Value from Table 2] | 69 Pgm: [xxx] |
| [ENTER] | 69 Pgm: [<i>new value</i>] |

where *xxx* is the Battery Ah value from Table 1.

Table 1. External Battery Pack Ah Values

| Battery Pack | Battery Ah | Battery Pack | Battery Ah |
|--------------|------------|--------------|------------|
| 1ME | 100 | 10ME | 150 |
| 2ME | 150 | 11ME | 200 |
| 3ME | 200 | 12ME | 225 |
| 4ME | 225 | 13ME | 300 |
| 5ME | 300 | 14ME | 400 |
| 6ME | 400 | 15ME | 600 |
| 7ME | 600 | 21ME | 75 |
| 8ME | 75 | 24ME | 150 |
| 9ME | 100 | 25ME | 200 |

Startup for the FE/QFE 4.3–18 kVA UPS

Before starting up the UPS, review the rear panel for your UPS model.

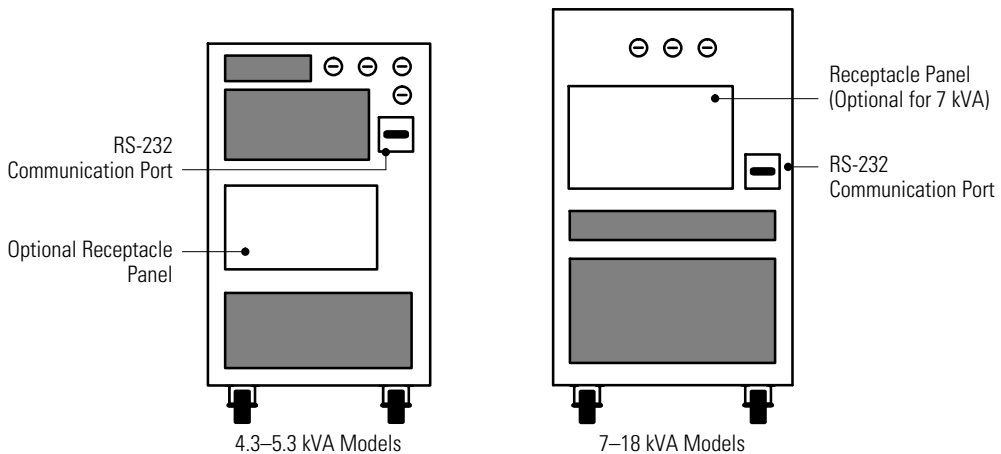


Figure 6. FERRUPS 4.3–18 kVA Rear Panels

To start the FE/QFE 4.3–18 kVA UPS, use the following steps:

1. Confirm the equipment to be protected by the UPS is powered off.
2. **For Plug-Receptacle UPSs:** Verify that the AC input power is off at the service panel. Plug the UPS power cord into a power outlet.



NOTE *If the plug does not match your receptacle outlet, ask your electrician to install the proper outlet.*

For Hardwired UPSs: Confirm that an electrician has completed and tested the connection to the proper power source and connected your protected equipment according to the *Eaton FERRUPS FE/QFE UPS (500 VA–18 kVA) Installation Guide*. Confirm that your AC line disconnect switch and the UPS ON/OFF switch are both in the OFF position.

3. If your UPS has a DC switch, turn on the switch according to the UPS model:

4.3–7 kVA: If you have an external battery cabinet(s) with a DC switch, turn the switch to the ON position.

If you do not have an external battery cabinet(s): unlock the UPS front cover panel using the FERRUPS key and remove the front cover panel. Locate the DC switch behind the UPS front cover panel. If there is a precharge button next to the switch, press it for a few seconds. Turn the DC switch to the ON position and reinstall the UPS front cover panel.

10–18 kVA: If you have an external battery cabinet(s) with a DC switch, turn the switch to the ON position.

4. **Start the UPS on battery power:** Use the FERRUPS key to turn the UPS ON/OFF switch to the ON position. After a brief self-check, the BATTERY POWER and READY indicators illuminate. The UPS beeps every 20 seconds, indicating the UPS is running on battery power. The control panel scrolls this display:

```

FERRUPS
Mode:           Auto
Charger:       Off
Beeper:        Enabled

```



NOTE *If the ALARM indicator is on, see “Troubleshooting” on page 107*

5. **For Plug-Receptacle UPSs:** Turn the AC input power on at the service panel. The AC LINE indicator illuminates. After a few seconds, the UPS switches from battery power to AC input power. The BATTERY POWER indicator turns off.

For Hardwired UPSs: Turn the AC line disconnect switch to the ON position. The AC LINE indicator illuminates. After a few seconds, the UPS switches from battery power to AC input power. The BATTERY POWER indicator turns off. Now, turn the UPS bypass switch (either on the back of the UPS or mounted nearby) to the UPS position.

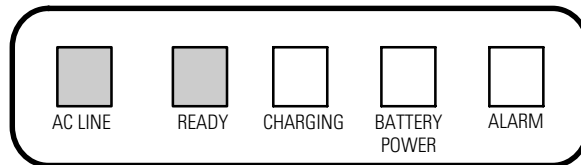


Figure 7. Front Panel Indicators



NOTE The UPS and external battery cabinets are shipped with the batteries charged. However, batteries may lose some of the charge during shipping and storage. You can use the UPS immediately after unpacking, but it may not provide the full-rated backup time during a power failure. Upon initial startup, the UPS may need to operate for 24 hours before the battery is fully charged and full battery-backup time is available. If the CHARGING indicator is illuminated, operate the UPS for 24 hours to fully charge the battery.

6. **For Plug-Receptacle UPSs:** Plug the equipment you want to protect into the UPS receptacles and turn on the equipment. If the ALARM indicator illuminates, see “Alarms” on page 107.

For Hardwired UPSs: Turn on the equipment connected to the UPS. If the ALARM indicator illuminates, see “Alarms” on page 107.

7. Set the time and date using the control panel.



NOTE The correct time and date for is needed for the UPS alarm and inverter logs. Reset the time and date whenever the UPS has been shut down.

Time is parameter 0; see “Parameters” on page 33 for more information. To set the time (in 24-hour format), follow these steps:

| | |
|-----------------|-------------------|
| Press this key: | Display shows: |
| [DISPLAY] | Display: |
| [0] | Display: 0 |
| [ENTER] | 00 Time: 11:30:20 |
| [PROGRAM] | 00 Pgm: |

Enter the correct time (in 24-hour format). For example, if the time is 9:30 a.m.:

| | |
|-----------------|------------------|
| Press this key: | Display shows: |
| [9][3][0] | 00 Pgm: 930 |
| [ENTER] | 00 Time 09:30:00 |

The date is parameter 10. To set the date, follow these steps:

| | |
|-----------------|-------------------|
| Press this key: | Display shows: |
| [DISPLAY] | Display: |
| [1][0] | Display: 10 |
| [ENTER] | 10 Date: 01/01/96 |
| [PROGRAM] | 10 Pgm: |

Enter the correct date (in MMDDYY format). For example, to enter June 4, 1993:

| | |
|--------------------|------------------|
| Press this key: | Display shows: |
| [0][6][0][4][9][3] | 10 Pgm: 060493 |
| [ENTER] | 10 Date 06/04/93 |

8. If your FERRUPS UPS is configured to use an external battery cabinet, you must program the battery capacity in ampere-hour (Ah) for the total number of battery packs used in the UPS. If you purchased one of the FERRUPS battery pack options available from Eaton, select the Ah value from Table 2.



NOTE A Remote Control Panel (part number RCK-0007), PC, or terminal is required to communicate with the UPS.

Before programming the battery Ah, enter the user-level password following the instructions in “Entering Passwords” on page 30. To change the battery Ah, parameter 69 (Batt Ah), follow these steps:

| | |
|---------------------------|--------------------------------------|
| Press this key: | Display shows: |
| [DISPLAY] [6] [9] [ENTER] | 69 Batt AH [<i>Default</i>] |
| [PROGRAM] | 69 Pgm: |
| [Ah Value from Table 2] | 69 Pgm: [<i>xxx</i>] |
| [ENTER] | 69 Pgm: [<i>new value</i>] |

where *xxx* is the Battery Ah value from Table 2.

Table 2. External Battery Pack Ah Values

| Battery Pack | Battery Ah | Battery Pack | Battery Ah |
|--------------|------------|--------------|------------|
| EBPS10 | 33 | 11FE | 200 |
| EBPS12.5 | 75 | 12FE | 225 |
| EBPS18 | 75 | 13FE | 300 |
| 1FE | 100 | 14FE | 400 |
| 2FE | 150 | 15FE | 600 |
| 3FE | 200 | 16FE | 100 |
| 4FE | 225 | 17FE | 150 |
| 5FE | 300 | 18FE | 200 |
| 6FE | 400 | 19FE | 225 |
| 7FE | 600 | 20FE | 300 |
| 8FE | 75 | 21FE | 400 |
| 9FE | 100 | 22FE | 600 |
| 10FE | 150 | | |

Chapter 4 Operation

This section describes:

- The UPS front panel indicators
- Using the control panel
- Automatic system testing
- Parameters
- Shutting down the UPS

Front Panel Indicators

The UPS front panel indicators indicate how the UPS is operating and also alert you of potential power problems. Figure 8 shows the UPS front panel indicators. Table 3 explains the status of each indicator.

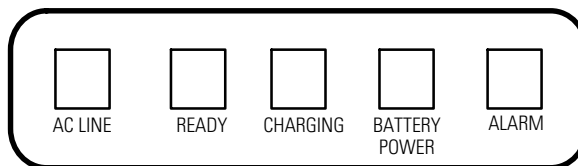


Figure 8. Front Panel Indicators

Table 3. Indicator Status

| Indicator | Status | Explanation |
|-----------|--------|--|
| AC LINE | On | The UPS is getting power from the AC input power source. NOTE The AC LINE indicator does not illuminate for FE 500 VA–3.1 kVA models with serial numbers 25000 and greater until the UPS ON/OFF switch is turned to the ON position. |
| | Off | <ul style="list-style-type: none">• The UPS is not getting input power.• There is a power outage.• The AC input breaker is tripped.• The UPS is unplugged.• For FE 500 VA–3.1 kVA models with serial numbers 25000 and greater, the UPS ON/OFF switch is not in the ON position. |

| Indicator | Status | Explanation |
|---------------|----------|---|
| READY | On | The UPS is ready to provide battery backup power when needed. |
| | Off | The UPS cannot provide battery backup power because: <ul style="list-style-type: none"> • It is in the Line Condition mode or the Off mode (see the following section, “Using the Control Panel”). • The batteries may be discharged. • It may be running on battery power (Inverter On mode). |
| | Flashing | The UPS is testing the batteries as part of the automatic system test (see “Automatic System Test” on page 32); or, you have started a timed shutdown (see page 78). |
| CHARGING | On | The UPS is charging its batteries. |
| | Off | The battery charger is off; batteries are at full charge. |
| BATTERY POWER | On | The UPS is providing power from its batteries; it is in the Inverter On mode. |
| | Off | The UPS is providing conditioned power from the AC input power source, or the UPS is off. |
| | Flashing | The UPS is testing the inverter as part of the automatic system test (see “Automatic System Test” on page 32). |
| ALARM | On | The UPS is warning you that an alarm exists. If you have not silenced the alarm, the beep sequence identifies the problem (see “Alarms” on page 107). If you have a control panel, an alarm message appears on its display. |
| | Off | No alarm exists. |

Using the Control Panel

The control panel comes with all FE/QFE 4.3–18 kVA models. If you have an FE/QFE 500 VA–3.1 kVA, you may have ordered the remote control panel as an option (refer to the *Eaton Remote Control Panel User's Guide*).

The control panel is attached to the front of the UPS with a 6-ft (1.8m) cable, providing hand-held operation. The control panel's READY, BATTERY POWER, and ALARM indicators work like the READY, BATTERY POWER, and ALARM indicators on the front of the UPS (see “Front Panel Indicators” on page 27).

You can use the control panel to change UPS system modes and display and change parameters. You can also lock the control panel and change some of its features. If you press the wrong key at any time, press [CLEAR] and then the correct key.

Changing Operating Modes

There are four UPS operating modes:

- Off
- Auto
- Line Condition
- Inverter On (on battery)

The FERRUPS UPS selects the appropriate operating mode automatically; however, there may be times when you need to set the operating mode manually from the control panel. Notice that names of the operating modes appear in red on the bottom of keys 1–4.

Table 4. Operating Modes

| Operating Mode | How to Select It | What It Means |
|-----------------------------|--------------------------------------|--|
| Off | Press [CTRL]-[1] [ENTER] [ENTER]. | The UPS does not provide power to your equipment, but you can still use the control panel if battery power is present. The READY indicator is off. |
| Auto | Press [CTRL]-[2] [ENTER] [ENTER]. | This is the normal operating mode. The UPS conditions AC input power and provides the conditioned power to your equipment. The UPS is ready to switch to battery power if necessary. The AC LINE and READY indicators should be illuminated. |
| Line Condition | Press [CTRL]-[3] [ENTER] [ENTER]. | The UPS is conditioning AC input power and providing the conditioned power to your equipment, but if there is a brownout or power outage, the UPS does not switch to battery power. Instead, the UPS shuts down its output until AC input power is available again. The READY indicator is off when the UPS is in this mode. |
| Inverter On (on battery) | Press [CTRL]-[4] [ENTER] [ENTER]. | The UPS converts battery power to AC power for your equipment. It does not charge the batteries. The BATTERY POWER indicator is on. The UPS calculates the run time remaining and sounds an alarm when run time starts to get low. The READY indicator is off. |

Entering Passwords

Before you can change some parameter values, you must enter a password. You must also enter a password before you enter some of the commands listed on page 76.



NOTE *Some parameters, such as Time, Date, and Unit ID, are not password-protected initially. If you change parameter 39 to "Yes," a user-level password is required to change these parameters, to use [CTRL] keys, or to use some commands. See "Parameters" on page 33 and "Entering Commands from a Terminal or Computer" on page 76 for more information.*

The user-level password is 377 and the service-level password is 2639. To enter the user-level password, follow these steps:

| | |
|-----------------|----------------------|
| Press this key: | Display shows: |
| [CLEAR] | FERRUPS |
| [PROGRAM] | Password: |
| [3] [7] [7] | Password: 377 |
| [ENTER] | Level: User |

To clear the password, press [CLEAR] until **Password Cleared** appears on the control panel display.

Displaying and Changing Parameters

The names of the first 11 parameters appear in green on the top of the number keys. To display a parameter, press [DISPLAY], the parameter number, and [ENTER]. For example, to display parameter 0 (Time), follow these steps:

| | |
|-----------------|-------------------------|
| Press this key: | Display shows: |
| [DISPLAY] | Display: |
| [0] | Display: 0 |
| [ENTER] | 00 Time 07:04:08 |

To change a parameter, display it first. Then, press [PROGRAM], enter the new value for the parameter, and press [ENTER]. For example, to change parameter 0 (Time), follow these steps:

| | |
|-----------------------|-------------------------|
| Press this key: | Display shows: |
| [DISPLAY] [0] [ENTER] | 00 Time 07:04:08 |
| [PROGRAM] | 00 Pgm: |
| [9] [3] [0] | 00 Pgm: 930 |
| [ENTER] | 00 Time 09:30:00 |

Locking and Unlocking the Control Panel

You may need to lock the control panel if you want to limit its use. When disabled, the control panel does not respond to the key functions until it is enabled again.

To disable the panel, press the keys shown in the following example (verify that you have the necessary code to unlock the control panel).

| | |
|------------------------------|----------------------|
| Press this key: | Display shows: |
| [CLEAR] and [ENTER] together | Keypad Locked |

When you lock the control panel, it beeps and displays **Keypad Locked** for approximately two seconds. The control panel beeps and shows this display whenever you try to use the keys. The front panel indicators continue to show the UPS status, and the control panel shows UPS alarms. To enable the control panel again,

| | |
|------------------------------|------------------------|
| Press this key: | Display shows: |
| [CLEAR] and [ENTER] together | Unlock #: |
| [8] [2] [0] [4] [9] | Unlock #: 82049 |
| [ENTER] | Keypad Unlocked |

After approximately two seconds, the control panel shows the same display it showed before you unlocked it. If you enter the wrong unlock number, the control panel displays **Keypad Locked** for two seconds, and the control panel remains locked.

Using the Configuration Menu

The control panel includes a Configuration Menu that lets you adjust its baud rate and brightness, turn the beeper on or off, turn on and off the click you hear when you press keys, and control other features. The label on the back of your control panel includes more information on this menu (see Figure 9).

Remote Control Panel (RCP)
Access Instructions for Configuration Menu

Simultaneously press [CONTROL] and [PROGRAM] to enter RCP Configuration menu

At any time: Press **[ENTER]** to display/edit next menu item
Press **[PROGRAM]** to exit menu and save changes
Press **[CLEAR]** to exit menu without saving changes

| Menu Item | Range | Notes |
|------------|-------|--|
| Baud Rate | 0 - 5 | 0=300, 1=1200, 2=2400, 3=4800, 4=9600, 5=19200 |
| Brightness | 0 - 7 | Display brightness: 0=Min, 7=Max |
| Beeper | 0 - 1 | Beeper enabled? 0=No, 1=Yes |
| Keyclick | 0 - 1 | Keyclick enabled? 0=No, 1=Yes |
| Repeat | 0 - 1 | Autorepeat of depressed key? 0=No, 1=Yes |
| Connect | 0 - 1 | Send "123DCP" at startup? 0=No, 1=Yes |

Figure 9. Remote Control Panel

Automatic System Test

The UPS performs an automatic system test every seven days to test the memory, batteries, and inverter. During the system test, the BATTERY POWER and READY indicators flash. For the results of the last system test, you can display parameter 26 (see page 38).

Logic Test

First, the UPS checks its memory. If it finds a problem, the UPS sounds alarm O, Memory Check (---). See page 110.

Inverter Test

The inverter converts DC battery power into the AC power your equipment uses. During the inverter test, the UPS pulses its inverter to see if it delivers the proper amount of current. If not, the UPS sounds alarm N, Check Inverter (-•). See page 109.

Although it is testing the inverter, the UPS is not in Inverter On mode. The UPS continues to condition input power and is ready to provide battery power if there is a power outage. The BATTERY POWER indicator flashes during this part of the test.



NOTE FE 500 VA–3.1 kVA models with serial numbers 25000 and greater do not perform an individual inverter test.

Battery Test

The UPS also checks its batteries to verify that they can support your equipment for the minimum specified run time. If not, the UPS sounds alarm M, Check Battery (––). See page 109. The READY indicator flashes during this part of the test.

Parameters

Table 5 shows the FERRUPS setup and operation parameters. You can view or reset the parameters using the control panel or a terminal or computer.

If you plan to view or change parameters from the control panel, see “Using the Control Panel” on page 28 for instructions.

If you plan to view or change parameters from a terminal or computer that you have connected to the RS-232 port, see “Entering Commands from a Terminal or Computer” on page 76. When you use commands to display or change parameters, identify the parameter with either its number or name (see Table 5). If you use the name, you can enter the entire parameter name or just the short form; you can also abbreviate the parameter name as long as your abbreviation includes the letters in the short form.

Although you do not need a password to view any of the first 26 parameters, all of them require a password to change (see the password column in Table 5). See “Entering Passwords” on page 30 or “Entering Commands from a Terminal or Computer” on page 76 for password information.



NOTE All changeable parameters except 0 (Time), 10 (Date), and 15 (Unit ID) are set at the factory. Only qualified technicians using the proper metering equipment should change other parameters. Improper calibration may cause the FERRUPS UPS to malfunction. Call your service representative before you attempt to change any parameters except 0, 10, and 15.

Table 5. Parameters

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|------------------|--------------------|-----------------------|--|
| 0 | time (t) | 00 Time 12:00:00 | User | 00:00:00– 23:59:59 | The system time (HH:MM:SS) shown in 24 hour military time. The UPS uses this time to time stamp events in the alarm history and total run time on inverter. When the DC power has been turned off or the UPS restarted, the time shown is the last recorded time before the unit was shutdown. The system time should be reset when the UPS has been turned back on. |
| 1 | acvoltsin (vi) | 01 V In 120.0 | Service | 0.0–500.0 | The measured AC input voltage being supplied into the UPS. When this value drops below the brownout voltage, the UPS switches to inverter. |
| 2 | acvoltsout (vo) | 02 V Out 120.0 | Service | 0.0–500.0 | The measured AC load voltage being supplied to the connected loads at the output of the UPS. |
| 3 | Reserved | 03 --Reserved-- | | | Parameter reserved for future use. |
| 4 | acampsout (o) | 04 I Out 3.1 | Service | 0.0–220.0 | The measured AC load current being supplied to connected loads at the output of the UPS. |
| 5 | vaout (va) | 05 VA Out 374 | Change Not Allowed | 0–27000 | Calculated Volt Amps (VA) or Apparent Power is drawing from the output of the UPS. This parameter uses the measured values from parameters 2 and 4 in determining this value and should be less than the value shown by parameter 19 (Maximum VA or output load). |
| 6 | ibatt (ib) | 06 I Batt 0.0 | Service | 0.0–200.0 | The measured current flowing either into the battery (charge) or from the battery (discharge). |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|---------------------------------|-----------------------------|------------------|--------------------|-----------------------|--|
| 7 | vbatt (vb) | 07 V Batt 12.57 | Service | 0.00–175.00 | The measured DC battery voltage. |
| 8 | frequency (f) | 08 Freq 60.01 Hz | Change Not Allowed | 47.00–63.00 | The measured AC input frequency being supplied into the UPS (measured in Hz) during normal operation. During a utility or input power outage, this parameter will display the inverter output frequency (also measured in Hz) while the connected loads are supported by the inverter from battery. |
| 9 | runtime (rt) | 09 RunTime 12m | Change Not Allowed | 0–9999 | A calculated value that predicts the expected support time from battery power during a utility or input power outage. |
| 10 | date (d) | 10 Date 06/01/93 | User | 01/01/1998–12/31/2167 | The System Date (MM:DD:YY). The UPS uses this date to time stamp events in the alarm history and total run time on inverter. When the DC power has been turned off or the UPS restarted, the date shown is the last recorded date before shutdown. The system date will need to be reset once the UPS has been turned back on. |
| 11 or [DISPLAY] [1] [1] [ENTER] | ambtemp (at) | 11 Amb Temp 23c | Change Not Allowed | -63–193 | The temperature (measured in Celsius) inside the UPS. The UPS sounds an alarm and may shut down if this value becomes too high. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|------------------------------|--------------------|--------------------|--|
| 12 | heatsinktemp (st) | 12 SinkTemp 26c | Change Not Allowed | -63–193 | The temperature (in Celsius) of the heatsink inside the UPS. The UPS sounds an alarm and may shut down if this value becomes too high. This parameter is only for models that monitor heatsink temperature. NOTE The display always shows -63c on models that do not use a heatsink temperature probe. |
| 13 | Reserved | 13 --Reserved-- | | | Parameter reserved for future use. |
| 14 | xfmrtemp (xt) | 14 XfmrTemp 28c | Change Not Allowed | -63–193 | The temperature (in Celsius) of the heatsink inside the UPS. The UPS sounds an alarm and may shut down if this value becomes too high. This parameter is only for models that monitor transformer temperature. NOTE The display always shows -63c on models that do not use a transformer temperature probe. |
| 15 | unitident (id) | 15 Unit ID Network #1 UPS | User | 0–20 Characters | A user configurable unit identification string commonly used to identify the type or location of a product connected to a network. |
| 16 | fullload (l) | 16 FullLoad% 075 | Change Not Allowed | 0–150 | The percentage of output load applied to the UPS output. This value is determined by the value provided by Measured VA (parameter 5) divided by Max VA (parameter 19). |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|--|--------------------|-----------------|---|
| 17 | watts (w) | 17 Watts 374 | Change Not Allowed | 0–15000 | Calculated wattage (W) or Real Power the connected load equipment is drawing from the output of the UPS (a calculation absent of any reactive or apparent energy). |
| 18 | powerfact (pf) | 18 PF 0.73 Lead, or 18 PF 0.82 Lag, or 18 PF 1.00 Dist | Change Not Allowed | 0.00–1.00 | Power factor is a relationship difference between voltage and current created by the way connected loads draw energy from the UPS output. Power factor is calculated by Watts Out (parameter 17) divided by VA Out (parameter 5). This parameter also displays whether the power factor (or ration of current to voltage) is leading (Lead), lagging (Lag), or distortion (Dist). |
| 19 | valimit (val) | 19 VALimit 500 | Change Not Allowed | 350–18000 | The maximum Voltage Amps (Apparent Power) the UPS can supply to your equipment at the present power factor. The UPS sounds an overload alarm when VA Out (parameter 5) is higher than this value. |
| 20 | powerouts (po) | 20 #PwrOut 1 | Change Not Allowed | 0–65535 | The number of times there has been a loss of input power since the UPS was started. |
| 21 | overloads (ol) | 21 #OvrLds 0 | Change Not Allowed | 0–65535 | The number of times the UPS has sensed an output overload or the number of times VA Out (parameter 5) has been greater than VA Limit (parameter 19). |
| 22 | syshours (sh) | 22 SysHrs 00000 | Change Not Allowed | 0–65535 | The total number of hours the UPS has been operating, regardless of mode. This number does not increase when the UPS ON/OFF switch is in the OFF position. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|--|-----------------------------|--|--------------------|-----------------|---|
| 23 | invmin (im) | 23 InvMin 0000.0 | Change Not Allowed | 0000.0–6553.5 | The total number of minutes the inverter has run since the UPS was started. |
| 24 | inverterlog (il) | 24 Inverter Log + L 0319 2127 1215 | Change Not Allowed | | A log listing of the date, time, duration and reason code for the last 20 inverter runs (support time from battery). See "Alarm and Inverter Logs" on page 110 for more details and Table 21 on page 112 for specific inverter codes (reasons for going to inverter operation). |
| 25 | alarmlog (al) | 25 Alarm Log + L 0319 2127 1215 | Change Not Allowed | | A log listing of the date, time, duration and reason code for the last 20 unit alarms. See "Alarm and Inverter Logs" on page 110 for more details and Table 20 on page 108 for specific Alarm codes and their definitions. |
| 26 | testresults (tr) | 26 Test Results (+ 7 more displays) | Change Not Allowed | | This parameter records the results of the last system test. The parameter display includes the time and date of the test and the results of each part of the system test (see "Automatic System Test" page 32). |
| NOTE Parameters greater than 26 are alarm and operation set points, calibration factors and other settings. You usually do not need access to these parameters for normal operation of the UPS. | | | | | |
| 27 | crestfact (cf) | 27 Crest 1.41 | Change Not Allowed | 0.00–5.00 | The crest factor is a calculation between the measured peak output current divided by the RMS or average output current and is used in determining the type and amount of harmonic noise created by loads on the UPS output. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|------------------|--------------------|-----------------|---|
| 28 | brownlevel (bl) | 28 BrnLvl 79.8 | Change Not Allowed | 74.4–192.0 | The value shown by this field represents the level of AC input voltage where the output loads will be switched over and supported by inverter power. This value (and unit operation) are dependant on the settings of parameter 63 and 64 for Extended Brownout operations. |
| 29 | beepfreq (bf) | 29 BeepFrq 1320 | Service | 0–9999 | This setting determines the tone of the audio alarm. A higher number provides a lower pitch tone while a lower number provides a higher pitch. |
| 30 | mindcv (mind) | 30 MinDCV 11.36 | Service | 0.00–200.00 | This parameter records the lowest measured battery voltage since the UPS was turned on or since the Extended History command was issued. |
| 31 | maxdcv (maxd) | 31 MaxDCV 13.59 | Service | 0.00–200.00 | This parameter records the highest measured battery voltage since the UPS was turned on or since the Extended History command was issued. |
| 32 | minacvi (minvi) | 32 MinACVI 0.0 | Service | 0.0–500.0 | This parameter records the lowest measured AC input voltage since the UPS was turned on or since the Extended History command was issued. |
| 33 | maxacvi (maxvi) | 33 MaxACVI 124.2 | Service | 0.0–500.0 | This parameter records the highest measured AC input voltage since the UPS was turned on or since the Extended History command was issued. |
| 34 | minacvo (minvo) | 34 MinACVO 119.1 | Service | 0.0–500.0 | This parameter records the lowest measured AC output voltage since the UPS was turned on or since the Extended History command was issued. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|-----------------------------------|-----------------------|--------------------------|---|
| 35 | maxacvo (maxvo) | 35 MaxACVO 122.5 | Service | 0.0–500.0 | This parameter records the highest measured AC output voltage since the UPS was turned on or since the Extended History command was issued. |
| 36 | minva (minva) | 36 Min VA 115 | Service | 0–20000 | This parameter records the lowest measured VA output power since the UPS was turned on or since the Extended History command was issued. |
| 37 | maxva (maxva) | 37 Max VA 385 | Service | 0–30000 | This parameter records the highest measured VA output power since the UPS was turned on or since the Extended History command was issued. |
| 38 | badpassword (bp) | 38 #Bad PW 0 | Service | 0–65535 | Number of invalid password entries attempted. |
| 39 | ctrlpw (cp) | 39 Ctrl PW 1)Yes | User | 0)No 1)Yes | If set to "1)Yes", a password level of "User" or higher is required to use the red control key functions on the remote control panel and to set time and date. If set to "0)No" no password is required. |
| 40 | serialnumber (si) | 40 Serial Number FE4.3k25000 | Change Not Allowed | 0–20 Characters | The units factory assigned serial number. |
| 41 | modelindex (mi) | 41 ModelIndex 9 + 09: FE4.3kVA | Change Not Allowed | 1: FE500– 14: FE18KVA | The units factory assigned power rating. This parameter also effects Rated VA, Rated Watts, Battery Amp Hours, Runtime Constant, Low Runtime Alarm, Residual Charge, Float charge volts, and equalize charge volts. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|------------------|--------------------|-----------------|--|
| 42 | nomfreq (nf) | 42 NomFrq 1)60Hz | Change Not Allowed | 0)50 Hz–1)60 Hz | The units factory assigned operating frequency (this parameter is not adjustable on models with serial numbers 25000 and greater or on models with serial numbers starting with an "E" or "Y," the default setting is 60 Hz). |
| 43 | nomvin (nvi) | 43 NomVIn 120.0 | Change Not Allowed | 60.0–500.0 | The units factory assigned nominal input voltage. This parameter also effects Brown Out Voltage, Brown Out Level, and the AC Volts Input at the Charger enable set point. |
| 44 | nomvout (nvo) | 44 NomVOut 120.0 | Change Not Allowed | 60.0–500.0 | The units factory assigned nominal output voltage. This parameter also effects Low AC Voltage Output Alarm, unit Shutdown and High AC Voltage Output Alarm set point. |
| 45 | ratedva (rva) | 45 RatedVA 500 | Change Not Allowed | 100–30000 | The units factory assigned maximum VA rating. |
| 46 | ratedwatts (rw) | 46 RatedW 350 | Change Not Allowed | 100–30000 | The units factory assigned maximum KW rating. |
| 47 | ilimitlevel (ill) | 47 ILimitLvl 123 | Change Not Allowed | 10–253 | For models with serial numbers less than 25000, this setting determines the maximum amount of output current the UPS would support. For models with serial numbers 25000 and greater or with serial numbers starting with an "E" or "Y," this parameter is Unused - Reserved for future use. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|------------------|--------------------|-----------------|---|
| 48 | ilimitamps (ila) | 48 ILimitAmp 229 | Change Not Allowed | 0–600 | For models with serial numbers less than 25000, this setting determines the maximum amount of output current the UPS would support. For models with serial numbers 25000 and greater or with serial numbers starting with an "E" or "Y," this parameter is Unused - Reserved for future use. |
| 49 | rackmount (rm) | 49 Rackmnt 0)No | Change Not Allowed | 0)No–1)Yes | For models with serial numbers less than 25000, this setting identifies whether the unit is configured as a rack mount or stand alone configuration. For models with serial numbers 25000 and greater or with serial numbers starting with an "E" or "Y," this parameter is Unused - Reserved for future use. |
| 50 | startup (sta) | 50 Startup 1)On | Service | 1)On 0)Off | Determines if the UPS will deliver power to the users load when the UPS is first turned on. When set to "0)Off" the UPS will not close the static switch or run on inverter. |
| 51 | lowfreq (lf) | 51 LowFreq 57.00 | Service | 45.00–65.00 | If the AC input frequency being fed to the UPS falls below this parameter, the loads will be supported by the inverter until the AC input frequency rises above this parameter. |
| 52 | highfreq (hf) | 52 HiFreq 63.00 | Service | 45.00–65.00 | If the AC input frequency being fed to the UPS rises above this parameter, the loads will be supported by the inverter until the AC input frequency falls below this parameter. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|------------------|----------------|-----------------|---|
| 53 | slewratesr | 53 SlewRate 100 | Service | 5–500 | This parameter determines the maximum rate of change (measured in cycles per sec or Hz/Sec) the UPS will follow before breaking sync with the AC input and supporting the UPS output loads from the inverter. |
| 54 | phaselockpl | 54 PhaseLk 500 | Service | 50–5000 | This parameter determines the maximum frequency window the UPS will allow before breaking sync with the AC input and supporting the UPS output loads from the inverter. |
| 55 | freqglitchcntfgc | 55 FreqGlCnt 3 | Service | 1–60 | A counter that determines how many cycles the AC input is outside the High/Low frequency parameters before supporting the UPS output loads from the inverter. |
| 56 | lineglitchcntlgc | 56 LineGlCnt 3 | Service | 1–20 | A counter that determines how many voltage glitches in a row must occur before the UPS supports output loads from the inverter. |
| 57 | linedeltalid | 57 LineDelta 80 | Service | 1–512 | Sets a voltage acceptance window for the Line Glitch counter in parameter 56. |
| 58 | xferdelayxd | 58 XferDly 1.0 | Service | 0.0–999.9 | Sets the number of seconds the inverter will support the UPS output loads if set by either a frequency or voltage glitch as determined by setup parameters 55, 56, and 57. |
| 59 | lowvoutalarmlvoa | 59 LVOAlrm 108.0 | Service | 0.0–500.0 | Alarm parameter indicating the AC output voltage has exceeded (lower than) the value set by this parameter (normally set to 90% of the nominal output voltage setting). |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|------------------|----------------|-----------------|---|
| 60 | lowvoutshutdn (lvos) | 60 LVOShdn 102.0 | Service | 0.0–500.0 | The output voltage level that the UPS will shutdown the connected loads because of low output voltage (requires “Low AC Volts Out Shutdown” (parameter ___ to be enabled). |
| 61 | hivoutalarm (hvoa) | 61 HVOAlrm 129.6 | Service | 0.0–500.0 | Alarm parameter indicating the AC output voltage has exceeded (higher than) the value set by this parameter (normally set to +8% of the nominal output voltage setting). |
| 62 | hivinalarm (hvia) | 62 HVIAIrm 138.0 | Service | 0.0–500.0 | Alarm parameter indicating the AC input voltage has exceeded (higher than) the value set by this parameter (normally set to +15% of the nominal input voltage setting). |
| 63 | extbrnout (ebo) | 63 ExBrOut 1)Yes | User | 0)No 1)Yes | Enables/Disables Extended Brownout operation. When enabled, this parameter operates in response to the amount of load on the inverter output, varying from 80% of nominal AC input voltage at full load to 62% of nominal AC input voltage at no load. When disabled, the UPS uses the value set in parameter 64. |
| 64 | brownoutv (bv) | 64 BrnOutV 96.0 | Service | 50.0–500.0 | When parameter 63 is set to “0)No”, parameter 64 determines at what level of nominal AC input voltage the output loads will be support by inverter. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|-----------------|----------------|-----------------|--|
| 65 | lowbattv (lb) | 65 LoBatV 41.00 | Service | 6.00–175.00 | During a loss of nominal AC input voltage, the inverter supports the connected output loads from battery power. When the battery voltage reaches the value set by this parameter, the UPS will shutdown and remain off until normal AC input power is restored. |
| 66 | nearlowbattv (nlb) | 66 NLBatV 44.00 | Service | 6.00–175.00 | During a loss of nominal AC input voltage, the inverter supports the connected output loads from battery power. When the battery voltage reaches the value set by this parameter, an alarm condition is set indicating that battery voltage is getting low and unless input power is restored soon, the connected loads will be shutdown. |
| 67 | highbattv (hb) | 67 HiBatV 59.60 | Service | 6.00–200.00 | Alarm parameter indicating the battery DC voltage has exceeded (higher than) the value set by this parameter and the battery charger is turned off until the battery voltage drops below this setup parameter (normally set to 15v per battery). |
| 68 | lowruntime (lr) | 68 LowRunTm 5 | User | 0–999 | During a loss of nominal AC input voltage, the inverter supports the connected output loads from battery power. When the battery run time in minutes reaches the value set by this parameter, an alarm condition is set indicating that the battery run time is getting low and unless input power is restored soon, the connected loads will be shutdown. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|------------------|----------------|-------------------|---|
| 69 | battamphours (bah) | 69 Batt AH 55 | Service | 5–20000 | The Amp Hour (AH) rating or power size of the battery being used in the UPS to support the connected loads during a loss of AC input voltage is stored in this location. |
| 70 | runtimeK (k) | 70 RuntimeK 62 | Service | 1–200 | An engineering value used in calculations that predict how much battery support time is remaining in the system. Increasing this value increases the displayed run time. Decreasing this value decreases the displayed run time. Changing this value only effects the time remaining value shown on the front panel and has no effect on the actual support time of the system. |
| 71 | testlevel (tl) | 71 TestLevel 3 | User | 0–3 | This setting determines which parts of the Automatic System Test the product will conduct. 0: Testing disabled 1: Logic board test 2: Logic & inverter tests 3: Logic, inverter, and battery tests |
| 72 | testint (tei) | 72 TestInt 7dy | User | 0 (Off) 366 | The number of days between each Automatic System Test. |
| 73 | testtime (tt) | 73 Test@ 1:00:00 | User | 00:00:00–23:59:59 | Using 24 hour military time, this parameter determines when the Automatic System Test will be run. |
| 74 | nomilimit (nil) | 74 NomLimit 360 | Service | 10–999 | The maximum current the UPS can draw from its batteries when it runs on battery power (this parameter is not used on models with serial numbers 25000 and greater or with serial numbers that start with an "E" or "Y"). |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|------------------|--------------------|-----------------|--|
| 75 | batttesttime (btt) | 75 BT Time 60s | Service | 0–999 | Number of seconds that must elapse while running on inverter before comparing calculated run time to low run time alarm set point. (Used during battery test only to check for bad batteries.) |
| 76 | pfmtemp (pt) | 76 PFM Temp 28c | Change Not Allowed | -63–193 | Temperature (measured in Celsius) of the power factor module load resistor. This parameter is only for models that monitor power factor module temperature; for other models, this parameter will always show -63° C. |
| 77 | autorestart (ar) | 77 AutoRst 60s | Service | 0–9999 | The number of seconds the UPS will remain off after being shutdown by an "OFF" command, a "Shutdown" command, or after detecting a recoverable alarm condition. Once this time delay has expired, the UPS will attempt to restart and resume normal operations. Setting this value to "0" disables the Auto Restart feature. |
| 78 | alarmsenable (ae) | 78 AlmEnbl 1)Yes | Service | 0)No 1)Yes | This parameter enables or disables the products ability to sense any alarm condition. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|-----------------|----------------|-----------------|---|
| 79 | consolemode (cm) | 79 Console Mode | User | 1–4 | This parameter enhances the UPS compatibility with the power monitoring/management software. These setting also affects the operation of parameter 97. 1 = UPS sends inverter/alarm messages. 2 = UPS suppresses inverter/alarm messages. 3 = UPS does not echo back commands. 4 = UPS sends the “F” string every 15 seconds. |
| 80 | ambtempalarm (ata) | 80 AT Alarm 60c | Service | 0–200 | This parameter sets the high temperature alarm level for the ambient temperature probe whose value is monitored by parameter 11. Setting this parameter to 0 will disable the temperature probe. |
| 81 | ambtemp-shutdn (ats) | 81 AT Shdn 70c | Service | 0–200 | This parameter sets the temperature level where the unit will shutdown due to high ambient temperature. |
| 82 | hstempalarm (hta) | 82 HT Alarm 75c | Service | 0–200 | This parameter sets the high temperature alarm level for the heatsink temperature probe whose value is monitored by parameter 12. Setting this parameter to 0 will disable the temperature probe. |
| 83 | hstempshutdn (hts) | 83 HT Shdn 85c | Service | 0–200 | This parameter sets the temperature level where the unit will shutdown due to high heatsink temperature. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|-----------------|----------------|-----------------|--|
| 84 | xtempalarm (xta) | 84 XT Alarm 0c | Service | 0–200 | This parameter sets the high temperature alarm level for the transformer temperature probe whose value is monitored by parameter 13. Setting this parameter to 0 will disable the temperature probe. |
| 85 | XtempShutdn (xts) | 85 XT Shdn 0c | Service | 0–200 | This parameter sets the temperature level where the unit will shutdown due to high transformer temperature. |
| 86 | pfmtempalarm (pta) | 86 PF Alarm 85c | Service | 0–200 | This parameter sets the high temperature alarm level for the Power Factor Module temperature probe whose value is monitored by parameter 76. Setting this parameter to 0 will disable the temperature probe. |
| 87 | pfmtempshutdn (pts) | 87 PF Shdn 95c | Service | 0–200 | This parameter sets the temperature level where the unit will shutdown due to high power factor module temperature. |
| 88 | acvofault (vof) | 88 VOutFlt 24.0 | Service | 0.0–500.0 | A set point at which the UPS shuts down because of output power problems. |
| 89 | invrelaydelay (ird) | 89 IRlyDly 0 | Service | 0–9999 | When the UPS starts running on inverter from battery power, this parameter represents the number of seconds the UPS will delay before activating the inverter relay. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|-------------------------------------|----------------|--------------------------|--|
| 90 | remotebaudrate (rb) | 90 Rem Baud 7 + [07]: 1200 baud | Service | [0] : 50 [15] : 38400 | The baud rate of the remote RS232 control panel's RJ-45 (phone jack) connector. If you have a device connected to the port, changing the baud rate could cause communication problems. Baud rate settings are as follows: [0]:50, [1]:75, [2]:110, [3]:135, [4]:150, [5]:300, [6]:600, [7]:1200, [8]:1800, [9]:2400, [10]:3600, [11]:4800, [12]:7200, [13]:9600, [14]:19200, [15]:38400. |
| 91 | remotewrdfmt (rwf) | 91 RemWordFmt 0 + [00]: 8N1 | Service | 0–7 | Sets the word format of the remote RS-232 (RJ-45) connector. (0–7: 8N1, 8N2, 7N1, 7N2, 7E1, 7E2, 7O1, 7O2). May inhibit communications to any connected device if changed. |
| 92 | remotehandshake (rh) | 92 Rem HndShk 15 SRx*STx*CTS*RTS | Service | 0–15 | This parameter enables or disables hardware and software handshaking of the control panel's RJ-45 (phone jack) connection on 4.3–18 kVA models (this parameter is not used on models with serial numbers 25000 and greater or with serial numbers that start with an "E" or "Y"). |
| 93 | remoterpc (rrcp) | 93 Rem RCP 1)Yes | Service | 0)No 1)Yes | When set to "1)Yes", the remote RS-232 (RJ-45) port can communicate with the handheld remote. When set to "2)No" the port acts as a RS-232 port. |
| 94 | remotectl (rc) | 94 Rem Ctrl 15 + Eco Err Msg P=> | Service | 0–15 | This parameter enables or disables messaging and echo back on the remote RS232 RJ-45 connector. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|-------------------------------------|----------------|------------------------|---|
| 95 | consolebaudrate (cb) | 95 Con Baud 7 + [07]: 1200 baud | Service | [0]: 50 [15]: 38400 | The baud rate of the UPS' communications port. If you have a device connected to the port, changing the baud rate could cause communication problems. Baud rate settings are as follows: [0]:50, [1]:75, [2]:110, [3]:135, [4]:150, [5]:300, [6]:600, [7]:1200, [8]:1800, [9]:2400, [10]:3600, [11]:4800, [12]:7200, [13]:9600, [14]:19200, [15]:38400. |
| 96 | consolewrdfmt (cw) | 96 ConWordFmt 0 + [00]: 8N1 | Service | 0–7 | Sets the word format of the UPS' communications port. (0–7: 8N1, 8N2, 7N1, 7N2, 7E1, 7E2, 7O1, 7O2). May inhibit communications to any connected device if changed. |
| 97 | consolehandshake (ch) | 97 Con HndShk 12 SRx*STx** | Service | 0–15 | This parameter enables and disables hardware and software handshaking at the RS-232 communication port (this parameter is not used on models with serial numbers 25000 and greater or with serial numbers that start with an "E" or "Y"). |
| 98 | consolercp (crp) | 98 Con RCP 0)No | Service | 0)No 1)Yes | When set to "1)Yes" the console DB-25 port can communicate with the handheld remote. When set to no the port acts as an RS-232 port. |
| 99 | consolectrl (cc) | 99 Con Ctrl 15 + Eco Err Msg P=> | Service | 0–31 | This parameter enables or disables messaging and echo back on the console RS232 RJ-45 connector. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|---|----------------|--------------------|---|
| 100 | search1 (s1) | 100 Search #1 + Network UPS 1 | Service | 0–20 Characters | To enable the UPS to automatically log onto the host system that it is connected to, this parameter is used to enter the string the host system uses to search for a UPS. When the UPS receives this search string, it will respond with the string entered in parameter 102. |
| 101 | search2 (s2) | 101 Search #2 + Network UPS 1 | Service | 0–20 Characters | When the UPS receives this search string, it will execute the command entered in parameter 103. |
| 102 | response1 (r1) | 102 Response #1 + UPS #1 active | Service | 0–40 Characters | When the UPS receives the search string entered in parameter 100, it will respond to the host system with the string entered here. |
| 103 | response2 (r2) | 103 Response #2 + Identify _____ | Service | 0–40 Characters | When the UPS receives the search string entered in parameter 101, it will execute the command entered here. |
| 104 | relaymask1 (rm1) | 104 RMask1 65535 + PONMLKJIHGFEDC BA | Service | 0–65535 | This parameter determines which of the alarms A-P will activate the alarm relay contact at the RS232 port (on the back panel). |
| 105 | relaymask2 (rm2) | 105 RMask2 65535 + 543210ZYXWVUTS RQ | Service | 0–65535 | This parameter determines which of alarms Q-T will activate the alarm relay contact at the UPS' RS232 port (on the back panel). (See "Using the RelayMask Parameters to Control the Alarm Contacts," on page 90, to program this parameter). |
| 106 | epomode (em) | 106 EPO Mode 0 | Service | 0–16 | This parameter allows the enabling of the Remote Emergency Power-off Mode and the setting of the edge/level sensitivity trigger and the active high/low level of the trigger input. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|------------------|--------------------|-----------------|---|
| 107 | epodebounce (edb) | 107 EPODbc 0.3s | Service | 0.0–999.9 | This parameter determines the amount of time (in tenths of a second) that the shutdown signal needs to be active before being considered a valid request for shutdown. In electrically noisy environments, this function is especially helpful in preventing false activation of this remote shutdown capability. |
| 108 | epodeLay (edl) | 108 EPODly 0.1s | Service | 0.0–999.9 | This parameter sets the length of delay (in tenths of a second) after receiving a valid remote shutdown. |
| 109 | pabase (pab) | 109 PABase 3560 | Change Not Allowed | 0–20000 | This parameter affects how the product will transfer to and from inverter power (this parameter is not used on models with serial numbers 25000 and greater or with serial numbers that start with an "E" or "Y"). |
| 110 | cfacvin (cfvin) | 110 CFACVIN 1203 | Change Not Allowed | 0–32767 | A stored software calculation value used in the calibration of the AC input voltage. |
| 111 | cfacvid (cvid) | 111 CFACVID 554 | Change Not Allowed | 1–1023 | A stored software calculation value used in the calibration of the AC input voltage (this parameter is not used on models with serial numbers 25000 and greater or with serial numbers that start with an "E" or "Y"). |
| 112 | cfacvon (cvon) | 112 CFACVON 1186 | Change Not Allowed | 0–32767 | A stored software calculation value used in the calibration of the AC output voltage. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|-----------------|--------------------|-----------------|---|
| 113 | cfacvod (cvod) | 113 CFACVOD 554 | Change Not Allowed | 1–1023 | A stored software calculation value used in the calibration of the AC output voltage (this parameter is not used on models with serial numbers 25000 and greater or with serial numbers that start with an "E" or "Y"). |
| 114 | cfacaon (caon) | 114 CFACAON 67 | Change Not Allowed | 0–32767 | A stored software calculation value used in the calibration of the AC output current. |
| 115 | cfacaod (caod) | 115 CFACAOD 44 | Change Not Allowed | 1–1023 | A stored software calculation value used in the calibration of the AC output current (this parameter is not used on models with serial numbers 25000 and greater or with serial numbers that start with an "E" or "Y"). |
| 116 | cfdcvn (cdvn) | 116 CFDCVN 1385 | Change Not Allowed | 0–32767 | A stored software calculation value used in the calibration of the DC battery voltage. |
| 117 | cfdcvd (cdvd) | 117 CFDCVD 629 | Change Not Allowed | 1–1023 | A stored software calculation value used in the calibration of the DC battery voltage (this parameter is not used on models with serial numbers 25000 and greater). |
| 118 | cfdcan (cdan) | 118 CFDCAN | Change Not Allowed | 0–32767 | A stored software calculation value used in the calibration of the DC battery current. |
| 119 | cfdcad (cdad) | 119 CFDCAD 512 | Change Not Allowed | 1–1023 | A stored software calculation value used in the calibration of the DC battery current (this parameter is not used on models with serial numbers 25000 and greater). |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|------------------|--------------------|-----------------|---|
| 120 | softwver (sv) | 120 SW Ver 8.02 | Change Not Allowed | 00.00–99.99 | For software versions 8.01 to 8.05, this parameter identifies the product software version number. See parameter 137 for software versions 8.06 and higher. |
| 120 | cfchgnc (ccn) | 120 CFCHGN | Change Not Allowed | 0–32767 | For software versions 8.06 and higher, this parameter is used as the calibration factor numerator for DC charging current. Displayed AC Amps Out = (A/D reading) * CFCHGNN / 65536 |
| 121 | nvchecksum (c) | 121 Chksum 1CF8h | Change Not Allowed | 0000h–FFFFh | For software version 8.01 to 8.05, this parameter stores the Nonvolatile RAM Checksum value. See parameter 138 for software versions 8.06 and higher (this parameter is not used on models with serial numbers 25000 and greater or with serial numbers that start with an "E" or "Y"). |
| 121 | cfchgd (ccd) | 121 CFCHGD 1023 | Change Not Allowed | 1–1023 | For software versions 8.06 and higher, this parameter is used as the calibration factor denominator for DC amps (charging current) (this parameter is not used on models with serial numbers 25000 and greater). |
| 122 | romchecksum (rcs) | 122 ROMChk 41B7h | Change Not Allowed | 0000h–FFFFh | For software versions 8.01 to 8.05, this parameter stores the EPROM Checksum value. See parameter 139 for software versions 8.06 and higher (this parameter is not used on models with serial numbers 25000 and greater or with serial numbers that start with an "E" or "Y"). |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|--|-----------------------------|------------------|--------------------|-----------------|--|
| 122 | chargertype (ct) | 122 Chgr Type 3 | Service | 0–3 | For software versions 8.06 and higher, this parameter specifies the type of charger operation available: 0 = Float Charger set by Hardware; 1 = Float Charger set by software parameter 123 and 125; 2 = Hysteresis Charger set by software parameters 124 and 125; 3 = Charger Disabled, assuming an external charger Units rated 500 VA to 3.1 kVA can only support options 0 and 3. Units rated 4.3 to 18 kVA can support all four options. |
| NOTE Parameters 123 through 153 are only available in software versions 8.06 and greater. | | | | | |
| 123 | maxchargeamp (mc) | 123 MaxChgA 20.0 | Change Not Allowed | 1.0–99.9 | If parameter 122 is set to “1” or “2,” parameter 123 represents the the continuous rated charger current. This parameter is not used for parameter 122 settings of “0” or “3” (this parameter is not used on models with serial numbers 25000 and greater or with serial numbers that start with an “E” or “Y”). |
| 124 | lowchargerv (lcv) | 124 LoCV 13.00 | Service | 0.0–200.0 | When parameter 122 is set to “2,” this parameter determines at what battery voltage the charger is turned on to begin recharging the battery (this parameter is not used on models with serial numbers 25000 and greater or with serial numbers that start with an “E” or “Y”). |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|---------------------|--------------------|-----------------|---|
| 125 | floatchargerv (fcv) | 125 FltCV 13.30 | Service | 0.0–200.0 | When a software controlled float charger is enabled by parameter 122 (1), this parameter determines the voltage level the charger will try to maintain depending on battery condition. |
| 126 | highchargerv (hcv) | 126 HiCV 57.60 | Service | 0.0–200.0 | When a software controlled hysteresis charger is enabled by parameter 122 (2), this parameter determines the voltage level the charger is turned OFF. |
| 127 | equalizechargerv (ecv) | 127 EqICV 50.40 | Service | 0–200.00 | When a software controlled hysteresis charger is enabled by parameter 122 (2), this parameter determines the voltage level the charger is turned ON. |
| 128 | chargerondelay (cod) | 128 ChOnDly 240s | Change Not Allowed | Feb–99 | The amount of time (in seconds) that the UPS will delay before starting the charger after the unit is started or after an inverter run (this parameter is not used on models with serial numbers 25000 and greater or with serial numbers that start with an "E" or "Y"). |
| 129 | lowacdelay (lacd) | 127 LoACD+C147ly 5s | Change Not Allowed | 1–255 | Once the UPS senses a low AC output voltage, this parameter determines the number of seconds the unit waits before causing a Low AC Output alarm shutdown. This prevents false transfers or shutdowns caused by loads being applied on the output of the UPS. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|------------------|----------------|-----------------|--|
| 130 | boostv | 130 BoostV 100 | Service | 60–276 | If the AC input voltage is below this level and above the brownout voltage, the UPS will switch to the boost tap. NOTE Parameter 133 is applied to this set point to provide hysteresis. This parameter is not used on models with serial numbers less than 25000. |
| 131 | buckv | 131 BuckKV 120 | Service | 60–276 | If the AC input voltage is above this level and below the inverter voltage (parameter 132), the UPS will switch to the boost tap. NOTE Parameter 133 is applied to this set point to provide hysteresis. This parameter is not used on models with serial numbers less than 25000. |
| 132 | invrtrv | 132 InvrtrV 138 | Service | 60–300 | If the AC input voltage is above this level the UPS will transfer to battery power. NOTE Parameter 133 is applied to this set point to provide hysteresis. This parameter is not used on models with serial numbers less than 25000. |
| 133 | taphyst | 133 TapHyst 8 | Service | 1–10 | This parameter is added or subtracted from the other tap switching parameters to provide hysteresis. This parameter is not used on models with serial numbers less than 25000. |
| 134 | Reserved | 134 --Reserved-- | | | Parameter reserved for future use. |
| 135 | Reserved | 135 --Reserved-- | | | Parameter reserved for future use. |
| 136 | Reserved | 136 --Reserved-- | | | Parameter reserved for future use. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|------------------|--------------------|-----------------|--|
| 137 | softwver (sv) | 137 SW Ver 9.56 | Change Not Allowed | 00.00–99.99 | Software version number. The UPS software version for units with 8.06 and higher. See parameter 120 for earlier software versions. |
| 138 | nvchecksum (c) | 138 Chksum 1CF8h | Change Not Allowed | 0000h–FFFFh | A checksum value for non-volatile RAM memory in units with version 8.06 and higher software versions. See parameter 121 for earlier software versions. |
| 139 | romchecksum (rsc) | 139 ROMChk 41B7h | Change Not Allowed | 0000h–FFFFh | A checksum value for ROM (EPROM) memory in units with version 8.06 and higher software versions. See parameter 122 for earlier software versions. |
| 140 | memaddr (ma) | 140 MemAdr 016Ch | Change Not Allowed | 0000h–FFFFh | Address of any word location in memory. Used in conjunction with MemoryValue (parameter 141). |
| 141 | memval (mv) | 141 MemVal 0000h | Change Not Allowed | 0000h–FFFFh | Value of location pointed to by MemoryAddress (parameter 140). |
| 142 | equalmax-count (emc) | 142 EqMaxC 8640 | Change Not Allowed | 0–65535 | The maximum equalize time (in 10 second units) that the charger may remain in equalize mode before being forced OFF. |
| 143 | equalholdcount (ehc) | 143 EQHold 3599 | Change Not Allowed | 0–65535 | Displays the time (in 1 second units) that the charger will remain in equalize mode after charging current drops below the full-charge threshold. |
| 144 | chargeron-count (coc) | 144 ChgOnCnt 240 | Change Not Allowed | 0–65535 | Displays the time (in seconds) remaining before the charger will turn on after being turned off. |
| 145 | Reserved | 145 --Reserved-- | | | Parameter reserved for future use. |

Table 5. Parameters (continued)

| Parameter Number | Parameter Name (Short Form) | Sample Display | Password Level | Possible Values | Explanation |
|------------------|-----------------------------|------------------|--------------------|------------------------|--|
| 146 | chargervoltage (cv) | 146 ChgrV 13.6 | Change Not Allowed | 0.0–160.0 | Target voltage for software charger. the charger will always attempt to maintain the battery voltage to this level unless current-limited. This value changes depending on mode. |
| 147 | Reserved | 147 --Reserved-- | | | Parameter reserved for future use. |
| 148 | alarms1 (a1) | 148 Alarm1:0010h | Change Not Allowed | 0000h–FFFFh | A hexadecimal weighted value of alarms A-S. |
| 149 | alarms2 (a2) | 149 Alarm2:0010h | Change Not Allowed | 0000h–FFFFh | Hexadecimal weighted value of alarms Q–5. |
| 150 | linestat (ls) | 150 LS:01000110b | Change Not Allowed | 00000000b 11111111b | Status bits that correspond to the following line status states: Line Fault, Brownout, Freq detect, unused, unused, Phase Overflow, Freq locked, PLL locked. |
| 151 | absphase (ap) | 151 APhase 0000h | Change Not Allowed | 00000–65535 | Absolute value of the phase difference between AC volts in and the PLL phase of the system. |
| 152 | inoutphase (lop) | 152 IOPhse 08256 | Change Not Allowed | 00000–65535 | Measured AC Volts input/output phase measured in time ticks (362 nSec/tick) |
| 153 | phasedly (pd) | 153 PhDly 25500 | Change Not Allowed | 00000–65535 | Delay in timer ticks between AC volts in voltage waveform and corresponding AC volts out voltage waveform. Used for conducting smooth transfers on and off inverter. |

UPS Shutdown

The FERRUPS UPS is designed for many years of round-the-clock operation. Usually, you do not need to shut down the UPS, even if your equipment is shut down for several days. Even when it's not powering your equipment, the UPS monitors its internal condition and keeps the Time and Date parameters current.

The following situations may require a UPS shutdown:

1. When you do not expect to use it for an extended period of time.
2. When it is being serviced.
3. Before you move it.
4. When it has gone into the Off mode because the batteries have been discharged during an extended outage.
5. When a system malfunction requires a UPS shutdown.



CAUTION

When AC input voltage is present, the UPS system can provide output voltage even though its batteries are disconnected. To confirm that there is no UPS output voltage, always disconnect the AC input source; if the UPS has one or more separate external battery cabinets, open the DC disconnect switch on each external battery cabinet or disconnect the external battery cabinet from the UPS.

1. **UPSs with no bypass switch:** Turn off the protected equipment. Continue to Step 2.

If you need to use the equipment while the UPS is off, plug the equipment into standard wall outlets and restart the equipment.

UPSs with a Break-Before-Make (BBM) bypass switch (see the label on the side of the switch): Shut down the protected equipment. Turn the bypass switch to the LINE position. Continue to Step 2.

If you need to use the equipment while the UPS is off, restart the equipment. The equipment receives direct AC line instead of conditioned power from the UPS.

UPSs with a Make-Before-Break (MBB) bypass switch (see the label on the side of the switch): Verify that the AC LINE indicator is on, the BATTERY POWER indicator is off, and the UPS is providing output. If all three of these conditions are present, turn the bypass switch to the LINE position. Your equipment receives direct AC line instead of conditioned power from the UPS. Continue to Step 2.

If all three of these conditions are not present, follow Steps 2–4 before you turn the bypass switch to the LINE position. This causes a break in power to your equipment between shutting down the UPS and turning the bypass switch to the LINE position.



CAUTION

Equipment can be damaged if you change the switch position when line is applied and the UPS is off or on battery! Refer to the *Eaton Make-Before-Break (MBB) Maintenance Bypass Switch User's Guide*.

2. Turn the UPS ON/OFF switch to the OFF position.
3. If the UPS is plugged in, unplug it. For hardwired models, turn the AC line disconnect switch to the OFF position.
4. **500 VA–3.1 kVA:** If you have an external battery cabinet with a DC switch, turn the switch to the OFF position. If your external battery cabinet does not have a DC switch, unplug the connector between the external battery cabinet(s) and the UPS; be sure to reconnect this connector before you start the UPS again.

4.3–18 kVA: Unlock the UPS front cover panel using the FERRUPS key and remove the front cover panel. Locate the DC switch behind the front cover panel. Turn the DC switch to the OFF position and reinstall the UPS front cover panel. If you have an external battery cabinet with a DC switch, turn the switch to the OFF position.
5. **If the UPS is turned off for an extended period of time,** recharge the batteries every 90–120 days to prevent battery damage.

To restart the UPS, see “UPS Startup” on page 17.

Extended Power Outages

If the power is out for an extended time, the UPS continues to provide power for your equipment until it gets near the end of its run time. You can check the remaining battery run time by reading parameter 9 (see page 35).

At a preset number of minutes before the end of the run time (factory-default setting is five minutes), the UPS sounds a Low Run Time alarm (–••). Shut down your equipment and turn off the UPS to conserve the remaining battery power (see “UPS Shutdown” on page 61). When AC input power returns, turn on the UPS to recharge the batteries.

If the UPS automatically shuts down because its battery voltage is too low, turn off the UPS until the AC input power returns (see “UPS Shutdown” on page 61).

Chapter 5 Communication

The FERRUPS UPS is capable of full-duplex communication and can communicate with a computer, a Local Area Network (LAN), or a multi-user computer system. If your system comes with UPS monitoring and automatic shutdown software, the FERRUPS UPS can communicate with that software. If your system does not have software, you can use the power monitoring/management and protection software on the software CD included with your UPS.

If you do not plan to use the power monitoring/management and protection software, you can still set up RS-232 communication with the UPS and use commands and parameters to control UPS operation.

Power Management and Protection Software

Eaton provides several comprehensive power monitoring/management software products and UPS load protection software products. Each FERRUPS UPS ships with a CD containing several of the software products. Visit www.eaton.com/pq/software for the latest updates to the products on the CD as well as any new power monitoring/management and protection software products.

Communication Port

This section explains how to use the FERRUPS communication port. This information applies to all FERRUPS FE, FES, FER, QFE, QFES, and QFER UPS models.

The communication port lets you set up full duplex RS-232 communication with the FERRUPS UPS so you can send commands and receive messages from the UPS. You can also display the information that the FERRUPS UPS gathers and stores about power conditions and its own operation. The communication port also includes relay contacts, a +12 Vdc level, a remote emergency power-off connection, and pins for special options.

The following section, "Using the Communication Port", describes the many ways you can use the RS-232 port. "Setting UP RS-232 Communication," on page 70, and "Communicating with the FERRUPS UPS," on page 76, describe RS-232 communication. "Remote Emergency Power-off," on page 87, describes the Remote Emergency Power-off (REPO) feature and how you can adjust the FERRUPS UPS settings to work with your REPO system. "Using the RelayMask Parameters to Control the Alarm Contacts," on page 90, describes how to control the operation of the alarm contacts. "Connecting an External Relay to Monitor the Dry Contacts," on page 93, describes how to connect an external relay to monitor the FERRUPS UPS contacts.

Using the Communication Port

This section describes the ways that you can use the FERRUPS communication port. You can use more than one feature at a time as long as you connect each device to the correct pins on the FERRUPS communication port. To use a combination of features, you must have a cable that is made specifically for your applications. Figure 10 shows the many ways you can use the communication port.

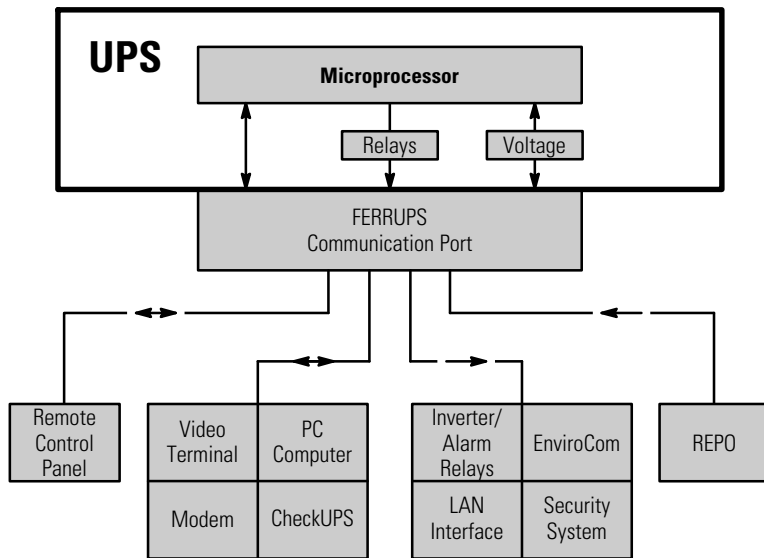


Figure 10. Communication Port Uses

The communication port cable pins are identified in Figure 11 and the pin functions are described in Table 6.

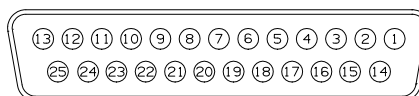


Figure 11. Communication Port

Table 6. Communication Port Pin Functions

| Pin | Function | Function |
|-----|---|---|
| 2 | Transmit Data (in) | |
| 3 | Receive Data (out) | |
| 4 | Request to Send | Hardware handshake signals are not supported on models with serial numbers 25000 and greater. |
| 5 | Clear to Send | For models with serial numbers below 25000, see the following section, "Connecting a Terminal or Computer to the RS-232 Port," to enable hardware (console) handshake functionality. |
| 6 | Remote Shutdown Supply Voltage [+12V Level (0.01A)] | |
| 7 | Signal Ground | |
| 11 | (N.C. Contact) opens after a 15-second delay after going On Inverter | These relay contacts are rated at 25 Vac/Vdc and 250 mA (see "Remote Monitoring" on page 94). NOTE FE 500 VA–3.1 kVA models with serial numbers 25000 and greater have equivalently rated DC solid state switches (Open Collector). |
| 12 | (N.O. Contact) closes after a 15-second delay after going On Inverter | |
| 13 | (C) On Inverter, Signal Common | |
| 14 | Unregulated Relay Supply Voltage (+12V, 0.5A for 500 VA–3.1 kVA) (+12V 0.3A for 4.3 kVA–18 kVA) | |
| 18 | Remote Shutdown Supply Voltage [+12V Level (0.01A)] | |
| 20 | AS/400 Option | |

Table 6. Communication Port Pin Functions (continued)

| Pin | Function | Function |
|-----|--------------------------------|---|
| 21 | Remote Shutdown Input | |
| 23 | (N.O. Contact) closes on ALARM | These relay contacts are rated at 25 Vac/Vdc and 250 mA (see "Remote Monitoring" on page 94). NOTE FE 500 VA–3.1 kVA models with serial numbers 25000 and greater have equivalently rated DC solid state switches (Open Collector). |
| 24 | (C) ALARM, Signal Common | |
| 25 | (N.C. Contact) opens on ALARM | |

NOTE Pins 2–5 and 7 are for RS-232 communication, Pins 11–13 and 23–25 are for remote monitoring, and Pin 21 (used with 6 or 18) is for remote shutdown. The following sections describe how to take advantage of these features. Pin 20 is for option use only.

RS-232 Communication: Pins 2, 3, 4, 5, and 7

The FERRUPS UPS can be connected to a terminal, computer, or modem for full duplex communication. This allows the user to send the UPS commands, change the UPS operating mode, view and change parameters, receive messages from the UPS, and read the alarm and inverter logs.

Relay Contacts: Pins 11–13 and 23–25

The FERRUPS UPS alarm and inverter contacts can be used for remote monitoring or for your own alarm system or indicator. With the right interface cable, you can also use the relay contacts to control the shutdown of computer networks. To control the operation of the alarm contacts; see "Using the RelayMask Parameters to Control the Alarm Contacts" on page 90. To connect an external relay to monitor the contacts, see "Connecting an External Relay to Monitor the Dry Contacts" on page 93.

REPO: Pin 21 (with 6 or 18)

The REPO feature lets you connect your computer room's emergency shutdown switch to the FERRUPS UPS. By doing this, you can make sure your emergency shutdown system will shut off the power that goes from the UPS to your protected equipment. You can determine what type of shutdown signal the UPS responds to and how long it waits before shutting down. See "Remote Emergency Power-off," on page 87, for more information.

+12 Level: Pins 6, 14, and 18

You can use the +12 Vdc Level on Pins 6 and 18 for setting an external logic level 1. You can use this to set a fixed input logic level in an external device. The voltage is present any time the FERRUPS UPS is operating.

Pin 14 has +12 Vdc at 0.5 amperes (or 0.3 amperes for FE500VA to FE3.1KVA models). You can use this pin to connect an external relay to monitor the contacts at the port; see “Connecting an External Relay to Monitor the Dry Contacts” on page 93.

Options

Remote Control Panel (RCP). You can connect an optional control panel to the RS-232 port to communicate with the FERRUPS UPS. Optional RCPs work like the control panel that is standard on 4.3 kVA–18 kVA models; if you have one of these models, you can use a standard and optional control panel to communicate with the UPS at the same time. The RCP provides quick, easy communication with the UPS.

CheckUPS Software. CheckUPS runs on your computer. During a long power outage, this optional software automatically shuts down the computer and the FERRUPS UPS before the UPS batteries run down. It also lets you communicate with the UPS. CheckUPS is available for most kinds of computers and operating systems.

Interface Kits. If your computer or local area network has its own UPS monitoring or shutdown software, you can use an Eaton interface kit. These kits include cables, cards, adapters, and instructions for interfacing between the UPS and your computer system.

EnviroCom. EnviroCom I and II monitor the FERRUPS UPS alarm and inverter contacts. These devices use a telephone line to let you know when there is an alarm or when the UPS is running on battery power. EnviroCom II includes a modem so you can communicate with the UPS from a remote location.

Setting Up RS-232 Communication

Connecting a Terminal or Computer



NOTE When you connect your computer or terminal to the FERRUPS UPS RS-232 communication port, signal ground and chassis ground must not be connected within the terminal or computer. These two signals may or may not be common in your computer or terminal. If they are common, you must remove any jumper connection between signal ground and chassis ground.

When you connect the computer or terminal to the FERRUPS UPS RS-232 communication port, signal ground from your computer or terminal is connected to Pin 7 (signal ground) on the UPS. This signal ground is a reference ground for the other RS-232 signals.

NOTE Before you connect a computer or terminal to the FERRUPS UPS RS-232 communication port, make sure it receives its power from the UPS.

NOTE The battery bank must not be positive ground.



CAUTION

Do not make connections to the RS-232 communication port if the UPS is connected to a positive ground battery system. The RS-232 ground must be isolated or equipment damage will result.

To connect a terminal or computer to the FERRUPS UPS communication port:

1. Obtain a cable designed specifically for this purpose (see Figure 12 and Figure 13). Eaton offers cables for computers or terminals using 25-pin or 9-pin serial ports; call your service representative to order one of these cables. If you would like to build your own cable, follow these requirements:
 - Use a high-quality, shielded cable.
 - **Do not use a standard 25-conductor straight-through cable;** only include straight-through connections for the pins shown in Figure 12 and Figure 13.

For RS-232 communication, use Pins 2 (transmit data), 3 (receive data), and 7 (signal ground). For hardware handshaking (request to send on Pin 4 and clear to send on Pin 5), contact your service representative. No other pins should be connected from the UPS RS-232 port to your terminal or computer.

For more information on pin connections and the function of the non-serial pins on the RS-232 port, see Table 6 on page 67, “Remote Monitoring” on page 94, and “Remote Shutdown” on page 95.



NOTE To connect a modem, refer to Eaton RS-232 Communication Port User's Guide.

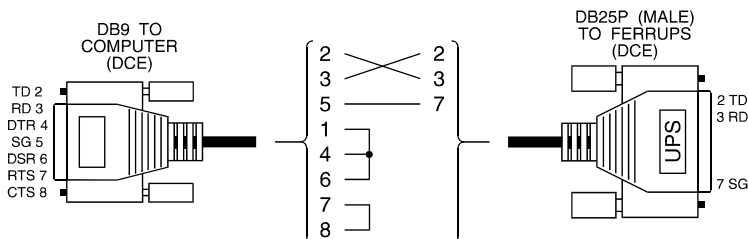


Figure 12. DB-9 to UPS Pinout

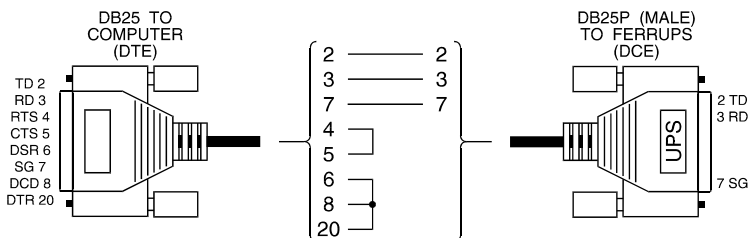


Figure 13. DB-25 to UPS Pinout

2. Connect the cable from the RS-232 port on the UPS rear panel to the serial port on your terminal or computer.
3. Your terminal or computer should be set to: 1200 baud, 8 bits, No parity, 1 stop bit, and full duplex.

The terminal or terminal emulation software should also be set to full duplex. If you are using a terminal, note that the FERRUPS UPS supports the TeleVideo® 900 series, ADM3A and WYSE® 50 emulation.

Table 7 shows the standard settings at the UPS DB-25S port and the settings that can be adjusted.

Table 7. DB-25 Port Settings

| Specification | Standard Setting | Adjustable to |
|---------------|--|---|
| Connector | 25 pin D (female) wired as DCE | |
| Format | ASCII, 8 bits, 1 stop bit Most significant bit set to 0 | Standard setting or 7/8 bits, 1/2 stop |
| Baud Rate | 1200 | 50–38400 |
| Parity | None | Odd, Even, or None |
| Duplex | Full | Full or Half |

- Turn your terminal on or run your terminal emulation software. Then press [ENTER] on your keyboard; a prompt appears on the screen. The prompt varies depending on your current password level:

=> Normal prompt
User=> User-level password has been entered

- Press [ENTER] on your keyboard a few times to verify that the UPS responds.
- To control or monitor the UPS, simply type the desired command and press [ENTER].

Table 8 shows what keystrokes to use as you type commands or view displays. See Table 9 for more information on UPS commands.

Table 8. Keystroke Commands

| Action | Key Sequence |
|--|---------------------------|
| Delete last character typed. | [BACKSPACE] or [CTRL]-[H] |
| Delete line. | [CTRL]-[X] |
| Pause displays that take more than one screen. | [CTRL]-[S] |
| Resume scrolling. (Turn Pause off.) | [CTRL]-[Q] |

Terminal Emulation

If you are connecting a terminal to the RS-232 port, the terminal must be capable of serial communication.

If you are connecting a computer, the computer must be running terminal emulation software (such as HyperTerminal®). Most modem software packages can emulate a terminal.

If you do not have an emulation program, you can use the BASIC program shown in Figure 14. Before you use an emulation program, you must often set the baud rate and data format. On some computers, you can do this with switches, and on others, you can make the changes with software. For example, MS-DOS users would use

```
MODE COM1:1200 N, 8, 1.
```

The BASIC program lets a computer emulate a dumb terminal. It should work on any IBM PC or compatible. To use the program, simply connect the proper cable from your computer's COM1: serial port to the FERRUPS UPS communication port. After you have made the connection, run the BASIC program shown in Figure 14.

Emulation Program

```
10 REM program to communicate with the FERRUPS
20 REM
30 SCREEN 0,0: WIDTH 80: CLS
40 KEY OFF:LOCATE 25,1
50 PRINT "FERRUPS COMMUNICATIONS PROGRAM-hit ESC to exit"
60 LOCATE 1,1,1 : PRINT "Enter the command HELP for a menu"
70 OPEN "COM1:1200,N,8,1,CS,DS" AS #1
80 PRINT #1,""
100 A$=INKEY$: IF A$="" THEN 120
110 IF A$=CHR$(27) THEN 990 ELSE PRINT #1,A$
120 IF EOF(1) THEN 100
130 A$=INPUT$(LOC(1),#1)
140 B$=CHR$(10):C$=" ":GOSUB 200: REM Replace line feeds by spaces
150 B$CHR$(8):C$=CHR$(29):GOSUB 200: REM Replace backspaces by cursor lefts
160 PRINT A$;
180 GOTO 100
200 P%=0
210 P%=INSTR(P%+1,A$,B$)
220 IF P%>0 THEN MID$(A$,P%,1)=C$:GOTO 210
230 RETURN
990 CLOSE: KEY ON
```

Figure 14. BASIC Program for Terminal Emulation



NOTE If you are using hardware handshake, omit the “CS” option in the OPEN statement of line 70.

NOTE If you are using MS-DOS QBASIC (which comes with DOS 6.0) or MICROSOFT QUICKBASIC, change the OPEN statement in line 70 to:

```
OPEN "COM1:1200,N,8,1,DS,RB1024,TB64" AS #1
```

NOTE Notice the use of the “DS” option in the OPEN statement of line 70. This inhibits testing of the DSR line from the FERRUPS UPS. This is necessary because FERRUPS does not use this line.

NOTE Because of the way the BASIC PRINT statement works, the program must strip out or make substitutions for the line-feeds and backspaces sent from FERRUPS to preserve the screen display. Hence lines 140 and 150, and the subroutine at line 200.

Enabling Hardware Handshaking



NOTE Hardware handshaking is not available on models with serial numbers 25000 and greater or with serial numbers starting with an “E” or “Y.”

To enable hardware handshaking with your computer or terminal, change the setting for parameter 97 (console handshake) to 15. You can do this either through a control panel or through a computer or terminal that you have connected to the communication port.

Control Panel: Display parameter 97; then press
[PROGRAM] [1] [5] [ENTER]

Computer or Terminal: Type the command **program 97**, and enter 15 as the new value.

Using a Modem

To use a modem with the FERRUPS UPS, you must configure both the modem and the UPS properly.

To configure the UPS, set parameter 97 (console handshake) to 15 (see “Enabling Hardware Handshaking” if you need instructions for changing parameter values).

Set up the modem to ignore the DTR signal and to support the RTS and CTS signals. You should also disable the modem's ability to send result codes. In most modern modems, you can make these changes using modem “AT” commands. In these modems, you can use a computer or terminal to send the following string to your modem. The following string sets your modem to work optimally with the UPS:

AT &F &DO &K3 QO &W <CR>

AT is a required command prefix

&F resets the modem to factory defaults

&DO sets the modem to ignore the state of DTR

&K3 enables RTS/CTS handshaking

QO puts the modem in quiet mode, suppressing result codes

&W makes the changes permanent

<CR> is a required terminating carriage return

Since modem commands vary for different brands of modems, the above string may not work as shown. In many older modems, you must set DIP switches to make the required changes in your modem. See the documentation that came with your modem to configure its response to RS-232 control signals.

The FERRUPS UPS communication port is wired as a DCE (data communication equipment) device. Since most modems are also wired DCE, you must use a “null modem” cable to connect the modem to the UPS. See Figure 12 and Figure 13 to build a cable to connect the UPS to a modem. If you want to use handshaking, see Figure 15.

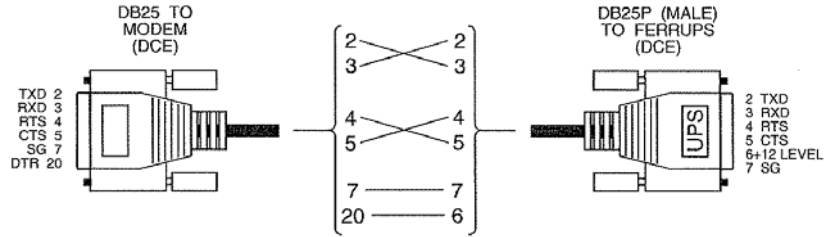


Figure 15. DB-25 to UPS Pinout (with handshaking)

Communicating with the FERRUPS UPS

To monitor or control the FERRUPS UPS from a terminal or computer, simply type in one of the commands and press [ENTER] (see Table 9 on page 76). Use the following command syntax:

- type the command in uppercase or lowercase
- use the entire command or the short form (you can also abbreviate the command as long as you include the letters in the short form)
- use a semicolon to separate more than one command on a line

Passwords

Some of the commands require a password. To enter a password follow the instructions in “Entering Passwords” on page 30.



NOTE The user-level password is 377 and the service-level password is 2639.

Table 9. Commands

| Command | Short Form | Password | Function |
|------------------|------------|----------|--|
| alarmshelp | ah | None | Shows a list of all possible alarm messages, the audio code and letter for each alarm and whether the alarm is active. |
| alarmlog | al | None | Displays Alarm Log. See “Alarm and Inverter Logs” on page 110. |
| alarmtest | at | None | Allows you to test the alarm function. Alarmtest sounds the User Test alarm (J). See page 109. |
| alarmtest cancel | at c | None | Turns the User Test alarm off. |

*If you change parameter 39 to “Yes,” this command requires a user-level password.

Table 9. Commands (continued)

| Command | Short Form | Password | Function |
|-----------------|------------|-------------------------------|--|
| chargemode | chm | None* | Shows the UPS battery charger mode. By entering a mode after the chargemode command, you can change the charger mode: <ul style="list-style-type: none"> • chargemode off (chm f) or chargemode disable (chm d) = charger off • chargemode on (chm o) or chargemode enable (chm e) = charger on • chargemode auto (chm a) = charger enabled if AC input voltage and battery voltage are acceptable |
| clearalarms | ca | None | Clears all active alarms. |
| clearhistory | ch | None | Clears the minimum and maximum parameter values shown when you use the extendedhistory or history commands. |
| clearpassword | cp | None | Clears the current password. |
| commands | cm | None | Displays a list of all valid commands. |
| contdisplay | cd | Depends on parameter password | Continuously displays the parameter that you are currently displaying. You can specify other parameters for the continuous display by entering the name or number of each parameter after the contdisplay command. |
| contstatus | cs | None | Continuously displays the Status information (see the status command). |
| date | da | None* | Displays system time and date. To set the date, enter date [month]/[day]/[year] . |
| delay | dl | None | Delays next command when you enter a number after delay . Each unit represents 2.5 milliseconds, so delay 1 would cause a 2.5-millisecond delay. For a 1-second delay, enter delay 400 . |
| display | d | Depends on parameter password | Displays the values of one or more parameters (see Table 5 on page 34). Format: display [parameter # or name] [parameter # or name] Example: d 1 fullload ol displays the values of parameters 1, 16, and 21. |
| extendedhistory | xh | None | Displays the minimum and maximum values of parameters 1 (Vac In), 2 (Vac Out), 7 (Vdc), and 5 (VA Out); the command then clears the minimum and maximum values (see Table 5 on page 34). |

*If you change parameter 39 to “Yes,” this command requires a user-level password.

Table 9. Commands (continued)

| Command | Short Form | Password | Function |
|----------------------|---------------|-------------------------------|---|
| format | f | None | Displays an 80-character line containing information on the FERRUPS status. The power monitoring/management and protection software uses this data. |
| help | ? or he | None | Shows a list of terminal/computer commands. |
| history | h | None | Displays the minimum and maximum values of parameter 1 (Vac In); the command then clears the minimum and maximum values. |
| identify | l | None | Shows Eaton's address and telephone number and the software version. |
| inverterlog | il | None | Displays the Inverter Log. See "Alarm and Inverter Logs" on page 110. |
| logs | l | None | Displays both the Alarm and Inverter Logs. See "Alarm and Inverter Logs" on page 110. |
| off [time] | o [time] | None* | Shuts down the UPS a given number of seconds. The READY indicator flashes until the UPS shuts down, and the UPS beeps 5 seconds before shutdown. Example: OFF 60 shuts down the UPS in 60 seconds. |
| off [time] autostart | o [time] a | None* | Shuts down the UPS in a given number of seconds (see above), and restarts the UPS shortly after power returns. |
| off cancel | o c | None* | Cancels timed shutdown. |
| parameters | p | Depends on parameter password | Shows a list of system parameters. See "Parameters" on page 33. You can also display a range of parameters by entering the starting and ending parameter number or name after the command. Example: Parameters 1 10 displays parameters 1 through 10. |
| paramkeywords | pk | Depends on parameter password | Displays all parameters and their keywords (the names you can use with commands). You can also display a range of parameters by entering the names or numbers of the starting and ending parameters. |
| password | pw | None | Allows you to enter the user-level password. Typing password alone clears the current password. Example: password 377 enters the user-level password. |
| program | pr | Depends on parameter password | Lets you set the value of any parameter. You must enter the appropriate password before you reset the value. See the Password command above. Format: PR [parameter # or name] [newvalue] Example: PR 0 815 resets the time (parameter 0) to 8:15 a.m. |

*If you change parameter 39 to "Yes," this command requires a user-level password.

Table 9. Commands (continued)

| Command | Short Form | Password | Function |
|--------------------------------------|------------|----------|--|
| remote | rm | None | Configures the RS-232 port so the connected terminal works like a control panel. |
| shutdown or shutdown autostart | sd sd a | None* | Shuts down the UPS output in 60 seconds (if you enter shutdown alone) or the number of seconds you specify after the command. The READY indicator flashes until the UPS shuts down. If you specify autostart , the UPS restarts shortly after power returns. |
| shutdown cancel | sd c | None* | Cancels a shutdown started with the shutdown command. |
| shutup | sh | None | Turns off audible alarm. |
| status | s | None | Shows date, time, system status, present system mode, active alarms, and the value of various system parameters. |
| systemmode _ | sm | None* | Typing systemmode alone displays which system mode is now active. You can use systemmode with a , f , i , or l to enter one of the modes below. |
| systemmode auto | sm a | None* | Enters the Auto mode. This is the normal FERRUPS UPS mode. In this mode, the UPS provides conditioned AC power to your equipment; if there is a power outage, the UPS is ready to switch to battery power. |
| systemmode off | sm f | None* | Enters the Off mode. In this mode, the UPS is not providing power to your equipment, but you can still use the UPS control panel. |
| systemmode inverter | sm i | None* | Enters the Inverter On mode. In this mode, the UPS is converting DC battery power to AC power for your equipment. |
| systemmode linecondition | sm l | None* | Enters the Line Condition mode. In this mode, the UPS provides conditioned AC power to your equipment, but it does not switch to battery power if there is a power outage. Instead, the UPS sounds a Low AC Out alarm. |
| systemtest | stst | None* | Starts a system test of the logic, inverter and battery. |
| time | t | None | Shows the current UPS time. To set the time, enter [hour]:[minutes] after the command. |
| unshutup | u | None | Turns audible alarm back on. |

*If you change parameter 39 to "Yes," this command requires a user-level password.

Help Commands

To learn more about FERRUPS communication, use one of the following commands:

- **Help.** When you enter **help** or **?**, the terminal displays each command and a brief explanation.
- **AlarmsHelp.** When you enter **alarmshelp**, the terminal displays a list of alarms with their letters and codes, the current status of the alarm (active or off), and the relay setting. See Figure 16.

| Active | Alarm Name | Ltr | Code | Relay |
|--------|------------------|-----|------|-------|
| No | Low Battery | A | •- | Yes |
| No | Near Low Battery | B | -••• | Yes |
| No | High Battery | C | -•-• | Yes |
| No | Low Runtime | D | -•• | Yes |
| No | Low AC Output | E | • | Yes |
| No | High AC Output | F | ••-• | Yes |
| No | Output Overload | G | --• | Yes |
| No | Hi Ambient Temp | H | •••• | Yes |
| No | Hi Heatsink Temp | I | •• | Yes |
| No | User Test Alarm | J | •--- | Yes |
| No | Hi Transfmr Temp | K | -•- | Yes |
| No | Check Charger | L | •-•• | Yes |
| No | Check Battery | M | -- | Yes |
| No | Check Inverter | N | -• | Yes |
| No | Memory Check | O | --- | Yes |
| No | Emergency PwrOff | P | •--• | Yes |
| No | Hi PFM Res Temp | Q | --•- | Yes |
| No | Probe Missing | R | •-• | Yes |
| No | High AC Input | S | ••• | Yes |
| No | Call Service | T | - | Yes |

Figure 16. Sample List of Alarms

- **Commands.** When you enter **commands**, the terminal displays all valid FERRUPS commands. The capitalized letters in each command are the short form for that command.

Status Commands

The **status** and **contstatus** commands display several FERRUPS parameter values, active alarms, and other status information. See Figure 17 for an example of a **status** display.

The **contstatus** command displays the same information as the **status** command, but it continuously updates the information until another key is pressed.

```

Status report for FE500VA [Unit ID Number from parameter 15] [Serial Number]
Thursday, November 19, 2009 ■ 14:51:31

                Parameters                                System
-----
V In           120.4      Freq           60.20      Mode:         Auto
-----
                Watts           347      Ready:        Yes
V Out          118.8      VA Out         345      Inverter:     Off
I Out          2.9        PF 1.00       Charger::     On
-----
                Load            99%      Beeper:       Enabled
V Batt         12.45      Runtime        6m        Level:        (None)
I Batt         0.9        AmbTemp        20c
                BrnLvl          95.8

```

Figure 17. Sample List of Alarms

Parameter Commands

The section describes the commands used to display and program parameters.

When the following commands are used, you must often specify a parameter. You can enter the parameter name or number. See Table 5 on page 34 for a list of parameters.

The **display**, **contdisplay**, **parameters**, and **paramkeywords** commands display parameters. The **program** command changes parameter values.

- **Display.** The **display** (or **d**) command displays specific parameters on your computer or terminal. If you enter **display 0**, **display time**, or **d t**, the computer or terminal displays parameter 0.



NOTE *You must type a space between the command and the parameter name or number.*

```
00 Time 14:42:21
```

If more than one parameter name or number is entered after the **display** command, those parameters are also displayed. If you enter **d time 45 10**, parameters 0, 45, and 10 are displayed.

```
00 Time 14:42:21
45 RatedVA 500
10 Date 05/14/09
```

You can mix parameter names and numbers after a command and you can list the parameters in any order.

After displaying a parameter, the next parameter can be displayed by entering **display** alone.

- **Contdisplay.** The **contdisplay** (or **cd**) command

The **contdisplay** (or **cd**) command displays the same parameter values as the **display** command, but it continuously updates the parameter values until another key is pressed.

- **Parameters.** The **parameters** (or **p**) command displays a parameter if you enter a parameter name or number after the command. If you enter **parameter 0**, **parameter time**, or **p t**, the computer or terminal displays parameter 0.

```
00 Time 14:42:21
```

Enter **parameters** (or **p**) to display all the user-level and service-level parameters (see Table 5 on page 34).

To display a range of parameters, enter the starting and ending parameters after the command. For example, enter **parameter 0 5**, **parameter time vaout**, or **p t va**, and parameters 0 through 5 are displayed.

```
00 Time 14:42:21
```

```
01 V In      118.2
```

```
02 V Out     118.2
```

```
03 ---Reserved---
```

```
04 I Out     2.9
```

```
05 VA Out    345
```

- **Paramkeywords.** The **paramkeywords** (or **pk**) command displays the keyword or name of each parameter you display.



NOTE *The capitalized letters in the keywords to the right are the short form of the parameter name (or keyword).*

NOTE *Reserved parameters do not have keywords.*

Enter **paramkeywords** (or **pk**) to display all the user-level and service-level parameters and their keywords (see Table 5 on page 34).

If you enter **paramkeywords time vaout** (or **pk t va**), parameters 0 through 5 are displayed along with their keywords.

```
00 Time 14:43:59      Time
01 V In      118.2      acVoltsIn
02 V Out     118.2      acVoltsout
03 ---Reserved---      *
04 I Out     2.9        acampsIOut
05 VA Out    345        VAout
```

- **Program.** The **program** (or **pr**) command allows you to program parameters.



NOTE Before you can program or change some parameters, you must enter the User or Service password. To enter a password follow the instructions in “Entering Passwords” on page 30.

NOTE Some parameters cannot be changed.

- If a parameter is currently displayed, enter **program** to program the parameter. The parameter's old value is displayed and you are asked to enter a new value.

Example 1: If parameter 0 is displayed (00 Time 14:59:43), and you want to change the time, enter program to change the parameter. You may need to enter the User password before you can change the parameter (see “Parameters” on page 33).

```
User=>program time
Old value: 00 Time 14:59:50
>>>New value for parameter 00=>
```

After you enter the new value, the display shows the new parameter value.

```
>>>New value for parameter 00=>09:30:00
New value: 00 Time 09:30:00
User=>
```

- If a parameter is not currently displayed, enter **program** and the parameter's name or number.

Example 2: If you enter **parameter time**, the old value is displayed and you are asked to enter a new value.

```
User=>program time
Old value: 00 Time 14:59:50
>>>New value for parameter 00=>
```

Enter the new value at the prompt (see Example 1).

- If you want to enter a new parameter value without seeing the old value first, enter **program**, the parameter name or number, and the new value at the same time.

Example 3: Enter program time 09:30:00 to change the time. The computer or terminal displays:

```
User=>program time 09:30:00
Old value: 00 Time 14:59:50
New value 00 Time 09:30:00
User=>
```


Format Command

The format command tells the FERRUPS UPS to send system status and metering information in a fixed format. This information can be incorporated into your host system software without any text or punctuation. The data string is made up of:

1. For 8.01–8.04 software, <cr><lf><cr>, or a carriage return, a line feed, and another carriage return. For 8.05 and higher software, <cr><cr><lf>, or two carriage returns and a line feed.
2. 80 ASCII characters that represent 40 hexadecimal bytes of information.
3. <cr><cr><lf>, or two carriage returns and a line feed.

See Table 10 for the data format.

Table 10. Format Command Data Format

| Characters | Number of Bytes | Description |
|------------|-----------------|--|
| Header | Not Applicable | For 8.01–8.04 software, a <cr><lf><cr> or <ODH><OAH><ODH> sequence. For 8.05 and higher software, a <cr><cr><lf> or <ODH><ODH><OAH> sequence. |
| 0–1 | 1 | Month (BCD) Range: 01–12 |
| 2–3 | 1 | Day (BCD) Range: 01–31 |
| 4–5 | 1 | Hours (BCD) Range: 00–23 |
| 6–7 | 1 | Minutes (BCD) Range: 00–59 |
| 8–9 | 1 | Seconds (BCD) Range: 00–59 |
| 10–11 | 1 | System Mode (BCD) Range: 00–03 00 = Off 01 = Auto 02 = Line Conditioning 03 = Inverter (Battery Power) |
| 12–13 | 1 | Reserved. |
| 14–15 | 1 | Alarm Status (BCD) Range: 00–01 00 = Alarms disabled 01 = Alarms enabled |
| 16–17 | 1 | Inverter Status (BCD) Range: 00–01 00 = Inverter is off 01 = Inverter is on |
| 18–19 | 1 | Charger Status (BCD) Range: 00–01 00 = Charger is off 01 = Charger is on |

| Characters | Number of Bytes | Description | | | | | | | | | | | | | | | | | | |
|------------|---------------------|---|----------------|---------------|------------------|-----------------------|------------------|--------------------|---|---|---|-------|---------------------|-----------------|----------------|---------------|------------------|-----------------------|------------------|--------------------|
| 20–21 | 1 | Alarm Status Register #1, alarms A–H (bit-mapped, 1=true). See the following information: | | | | | | | | | | | | | | | | | | |
| | | Bit Position | | | | | | | | | | | | | | | | | | |
| | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>7</th> <th>6</th> <th>5</th> <th>4</th> <th>3</th> <th>2</th> <th>1</th> <th>0</th> </tr> </thead> <tbody> <tr> <td>Alarm</td> <td>High Ambient Temp</td> <td>Output Overload</td> <td>High AC Out</td> <td>Low AC Out</td> <td>Low Runtime Left</td> <td>High Battery</td> <td>Near Low Battery</td> <td>Low Battery</td> </tr> </tbody> </table> | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Alarm | High Ambient Temp | Output Overload | High AC Out | Low AC Out | Low Runtime Left | High Battery | Near Low Battery | Low Battery |
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | | | | | | | | | | | | |
| Alarm | High Ambient Temp | Output Overload | High AC Out | Low AC Out | Low Runtime Left | High Battery | Near Low Battery | Low Battery | | | | | | | | | | | | |
| 22–23 | 1 | Alarm Status Register #2, alarms I–P (bit-mapped, 1=true). See the following information: | | | | | | | | | | | | | | | | | | |
| | | Bit Position | | | | | | | | | | | | | | | | | | |
| | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>7</th> <th>6</th> <th>5</th> <th>4</th> <th>3</th> <th>2</th> <th>1</th> <th>0</th> </tr> </thead> <tbody> <tr> <td>Alarm</td> <td>Emergency Power Off</td> <td>Check Memory</td> <td>Check Inverter</td> <td>Check Battery</td> <td>Check Charger</td> <td>High Transformer Temp</td> <td>User Test Alarm</td> <td>High Heatsink Temp</td> </tr> </tbody> </table> | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Alarm | Emergency Power Off | Check Memory | Check Inverter | Check Battery | Check Charger | High Transformer Temp | User Test Alarm | High Heatsink Temp |
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | | | | | | | | | | | | |
| Alarm | Emergency Power Off | Check Memory | Check Inverter | Check Battery | Check Charger | High Transformer Temp | User Test Alarm | High Heatsink Temp | | | | | | | | | | | | |
| 24–27 | 2 | AC Volts In (BCD) Range: 0000–9999 | | | | | | | | | | | | | | | | | | |
| 28–31 | 2 | AC Volts Out (BCD) Range: 0000–9999 | | | | | | | | | | | | | | | | | | |
| 32–35 | 2 | Reserved. | | | | | | | | | | | | | | | | | | |
| 36–39 | 2 | AC Current Out in Amps (BCD) Range: 0000–9999. A decimal point is implied after the third digit (xxx.x). | | | | | | | | | | | | | | | | | | |
| 40–45 | 3 | Volt-Amperes (VA) Out (BCD) Range: 000000–999999 | | | | | | | | | | | | | | | | | | |
| 46–49 | 2 | DC Current in Amps (BCD) Range: 0000–9999. A decimal point is implied after the third digit (xxx.x). | | | | | | | | | | | | | | | | | | |
| 50–53 | 2 | DC Volts (BCD) Range: 0000–9999. A decimal point is implied after the third digit (xxx.x). | | | | | | | | | | | | | | | | | | |
| 54–57 | 2 | Frequency in Hz (BCD) Range: 0000–9999. A decimal point is implied after the second digit (xx.xx). | | | | | | | | | | | | | | | | | | |
| 58–61 | 2 | Runtime Minutes Remaining (BCD) Range: 0000–9999 | | | | | | | | | | | | | | | | | | |
| 62–65 | 2 | Ambient Temperature in Degrees Celsius (BCD) Range: 0000–9999 | | | | | | | | | | | | | | | | | | |
| 66–67 | 2 | | | | | | | | | | | | | | | | | | | |
| 66–67 | 2 | Alarm Status Register #3, alarms Q–X (bit-mapped, 1=true). See the following information: | | | | | | | | | | | | | | | | | | |
| | | Bit Position | | | | | | | | | | | | | | | | | | |
| | | <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>7</th> <th>6</th> <th>5</th> <th>4</th> <th>3</th> <th>2</th> <th>1</th> <th>0</th> </tr> </thead> <tbody> <tr> <td>Alarm</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Call Service</td> <td>High AC Input</td> <td>Probe Missing</td> <td>Check PFM Temp</td> </tr> </tbody> </table> | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Alarm | Reserved | Reserved | Reserved | Reserved | Call Service | High AC Input | Probe Missing | Check PFM Temp |
| | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | | | | | | | | | | | | |
| Alarm | Reserved | Reserved | Reserved | Reserved | Call Service | High AC Input | Probe Missing | Check PFM Temp | | | | | | | | | | | | |

| Characters | Number of Bytes | Description | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|------------|-----------------|---|----------|----------|--------------|----------|----------|----------|----------|--|--|--|--|--|---|---|---|---|---|---|---|---|-------|--|----------|----------|----------|----------|----------|----------|----------|----------|
| 68–69 | 2 | Alarm Status Register #4, alarms Y–Z and 0–5 (bit-mapped, 1=true). See the following information: <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th colspan="2"></th> <th colspan="8">Bit Position</th> </tr> <tr> <th colspan="2"></th> <th>7</th> <th>6</th> <th>5</th> <th>4</th> <th>3</th> <th>2</th> <th>1</th> <th>0</th> </tr> </thead> <tbody> <tr> <td>Alarm</td> <td></td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> <td>Reserved</td> </tr> </tbody> </table> | | | Bit Position | | | | | | | | | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | Alarm | | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved |
| | | Bit Position | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | 7 | 6 | 5 | 4 | 3 | 2 | 1 | 0 | | | | | | | | | | | | | | | | | | | | | | | |
| Alarm | | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | Reserved | | | | | | | | | | | | | | | | | | | | | | | |
| 70–71 | 1 | Console Error Codes: 00 = No error 01 = Unrecognized command 02 = Not implemented 03 = Number expected 04 = Bad/missing keyword 05 = String expected 06 = Keyword or number expected 07 = Additional parameters expected 08 = Too many parameters 09 = Value out of range 0A = Bad password 0B = Password required 0C = Parameter not programmable 0D = Cannot change system mode 0E = Unrecognized error code | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 72–73 | 1 | ADR5. Range: 00–FF. A/D conversion value of aux board input. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 74–77 | 2 | Software version number. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 78–79 | 1 | Checksum Byte (Hexadecimal, 00–FF is valid). Equal to the 2's complement hex sum, without carry, of the preceding 39 two-digit hexadecimal numbers. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| trailer | Not Applicable | <cr><cr><lf> or <0DH><0DH><0AH> sequence. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

Remote Emergency Power-off

The Remote Emergency Power-off (REPO) feature on Pin 21 allows you to shut down the UPS output power through your computer room's emergency shutdown switch. The emergency shutdown switch normally shuts down AC input power to all of the equipment connected to the switch. This kind of switch can shut down the UPS input power if the UPS receives its input power through the emergency shutdown switch. However, this setup does not shut down the output power that the UPS provides to the protected equipment; instead, the UPS will continue to provide output power until the batteries run down. To set up the emergency shutdown switch to shut off the UPS output power, use the emergency power-off feature.

To shut down the UPS output power, the emergency shutdown switch must have a set of contacts that apply the +12 Vdc level on Pin 6 (or on Pin 18) to Pin 21. Use a shielded, single twisted pair cable to connect your switch to these Pins. **Do not use Pin 14.**

A brief connection between Pins 6 and 21 (or Pins 18 and 21) shuts down the UPS output and starts the emergency power-off alarm. As long as Pin 6 or Pin 18 is connected to Pin 21, you cannot restart the UPS to provide output power. To restart the UPS, break the connection between Pins 6 and 21 (or between Pins 18 and 21). Then, turn the FERRUPS UPS On/Off switch off and on again.



NOTE You can put the UPS in Auto Mode instead of turning the On/Off switch off and on again.

NOTE The +12 Vdc level on Pin 6 or Pin 18 is only available when the UPS is operating.

NOTE You can change the way the emergency power-off feature operates by using parameters 106, 107, and 108.

Changing the Emergency Power-off Mode (Parameter 106)

Parameter 106, Emergency Power-off Mode, allows you to choose from four available emergency power-off features. The features are turned off by default. To turn on one or more features, add the values of the features you want to use and use the total as the new parameter setting. If you don't want to use any of the features, leave the setting at 0. You can completely disable the emergency power-off feature by setting parameter 106 to 16. See Table 11 and Table 12.

Table 11. Emergency Power-off Features

| Name | Value | When the Feature is Selected | When the Feature is Not Selected |
|-------------------|-------|---|--|
| Rst (Restart) | 8 | The UPS automatically restarts when the emergency power-off signal from your emergency shutdown switch stops. | The UPS does not restart until you break the connection between Pins 6 and 21 (or 18 and 21) and turn the UPS on manually. |
| Inv (Inverter) | 4 | The UPS only shuts down if it receives the emergency power-off signal when it is running on battery power. | The UPS shuts down when it receives the emergency power-off signal regardless of whether it is running on AC input or battery power. |
| Lvl (Level) | 3 | Level-sensitive. The UPS responds to a level emergency power-off signal (not a rising or falling signal). See Table 12. | Edge-sensitive. The UPS responds to an emergency power-off signal made up of rising or falling voltage. See Table 12. |
| Neg (Negate) | 2 | The UPS responds to 0V on Pin 21 as an emergency power-off signal. | The UPS responds to 12V on Pin 21 as an emergency power-off signal. |

Table 12. Emergency Power-off Level and Negative Features

| Level | Negative | Action |
|-------|----------|--|
| On | Off | Pin 6 or 18 is usually not applied to Pin 21, so the UPS usually receives no signal (0V). When Pin 6 or 18 is applied to Pin 21 and the UPS receives a steady or level 12V signal, the UPS shuts down output power and starts the emergency power-off alarm. |
| On | On | Pin 6 or 18 is usually applied to Pin 21, so the UPS usually receives a 12V signal. After Pin 6 or 18 is removed from Pin 21 and the UPS is not receiving a signal (0V), the UPS shuts down output power and starts the emergency power-off alarm. |
| Off | Off | Pin 6 or 18 is usually not applied to Pin 21, so the UPS usually receives no signal (0V). When Pin 6 or 18 is applied to Pin 21 and the voltage is rising to 12V, the UPS shuts down output power and starts the emergency power-off alarm. |
| Off | On | Pin 6 or 18 is usually applied to Pin 21, so the UPS usually receives a 12V signal. After Pin 6 or 18 is removed from Pin 21 and the voltage is falling to 0V, the UPS shuts down output power and starts the emergency power-off alarm. |

Changing the Length of the Emergency Power-Off Signal (Parameter 107)

Parameter 107 tells the FERRUPS UPS how long an emergency power-off signal should be.



NOTE This delay only works if Level is set to On in Parameter 106. See “Changing the Emergency Power-off Mode.”

In some environments with a lot of electrical noise, the noise could act like an emergency power-off signal. To make sure that the UPS recognizes a true emergency power-off signal, you can change the value of parameter 107.

As shipped, parameter 107 is set to 0.3s (0.3 seconds). This means that the UPS waits for an emergency power-off signal on Pin 21 that is at least 0.3 seconds long. If you want the UPS to wait for a longer signal, you can change the setting of parameter 107.

Changing the Delay Before Shutdown (Parameter 108)

As shipped, the UPS waits 0.1 seconds after it recognizes an emergency shutdown signal before it shuts down. You can adjust this delay by changing the value of parameter 108.

Using the RelayMask Parameters to Control the Alarm Contacts

The RelayMask parameters (104 and 105) let you choose which alarms operate the alarm signal contacts at the UPS communication port.

As shipped, the alarm signal contacts change status whenever the UPS alarms. By programming the RelayMask parameters, you can set up the alarm contacts so they only change status during certain alarms. RelayMask1 (parameter 104) is for alarms A–P, and RelayMask2 (parameter 105) is for alarms Q–T. No matter how you program these parameters, when the On/Off switch is off, the alarm contacts act as if an alarm is present.

To program parameters 104 and 105:

1. Enter the Service password (2639). If you are using a FERRUPS UPS control panel, use the [PROGRAM] key to enter the password. If you are using a terminal or computer, use the **password** (or **pw**) command.
2. Display parameter 104 (RelayMask1). If you have a control panel, press [DISPLAY][1][0][4][ENTER]. If not, enter **display 104** on your computer or terminal.
3. Parameter 104 determines whether alarms A–P activate the contacts. At the factory, it is set to 65535; this setting means all of the alarms (A–P) activate the alarm relay contacts.

If you do not want any of the alarms to activate the contacts, write 0 for the total in Table 13. If you want some of the alarms to activate the contacts, find the Alarm Value for each of those alarms and write it in the third column in Table 13. Write 0 for each alarm that you do not want to activate the contacts. Then, add the numbers in the third column.

Example: To enable alarms A (Low Battery), B (Near Low Battery), and C (High Battery), write 1 for alarm A, 2 for alarm B, 4 for alarm C, and 0 for the rest of the alarms. The total is 7.



NOTE For the AS/400, you should only enable the alarm signal contacts for the Low Battery and Near Low Battery alarms. In the blanks in Table 13, A=1, B=2, C through P=0, and total=3.

Table 13. Alarms A–P

| Alarm | Alarm Value | Enter 0 to Disable Contacts or the Alarm Value to Enable Contacts |
|----------------------------------|--------------------|--|
| Low Battery (A) | 1 | |
| Near Low Battery (B) | 2 | |
| High Battery (C) | 4 | |
| Low Runtime (D) | 8 | |
| Low AC Output (E) | 16 | |
| High AC Output (F) | 32 | |
| Output Overload (G) | 64 | |
| High Ambient Temperature (H) | 128 | |
| High Heatsink Temperature (I) | 256 | |
| User Test Alarm (J) | 512 | |
| High Transformer Temperature (K) | 1024 | |
| Check Charger (L) | 2048 | |
| Check Battery (M) | 4096 | |
| Check Inverter (N) | 8192 | |
| Memory Check (O) | 16384 | |
| Emergency Power-off (P) | 32768 | |
| Total: | | |

4. Change the parameter 104 setting to the total you found in Step 3. If you have a control panel, use the [PROGRAM] key to change the setting; if not, use the **program** (or **pr**) command at your terminal or computer.
5. Next, display parameter 105 (RelayMask2); this parameter is for alarms Q–T. If you have never changed the setting, it should be 65535 now, which means alarms Q–T activate the alarm signal contacts.

6. If you do not want any of these alarms (Q–T) to operate the alarm contacts, write 0 for the Total in Table 14.



NOTE For the AS/400, the contacts should be disabled for all of these alarms. Write 0 for the total.

If you want some of the alarms to operate the contacts, write the Alarm Value for each of those alarms in the blanks in Table 14; write “0” for any alarm that you do not want to operate the contacts. (Notice that several alarms are “Reserved;” this means no alarm has been assigned to these letters, and the alarms will not appear on your UPS.) Now, add the numbers in the third column.

Table 14. Alarms Q–T

| Alarm | Alarm Value | Enter 0 to Disable Contacts or the Alarm Value to Enable Contacts |
|--------------------------|---------------|---|
| High PDF Temperature (Q) | 1 | |
| Probe Missing (R) | 2 | |
| High AC Input (S) | 4 | |
| Call Service (T) | 8 | |
| Reserved (U) | 16 | |
| Reserved (V) | 32 | |
| Reserved (W) | 64 | |
| Reserved (X) | 128 | |
| Reserved (Y) | 256 | |
| Reserved (Z) | 512 | |
| Reserved (0) | 1024 | |
| Reserved (1) | 2048 | |
| Reserved (2) | 4096 | |
| Reserved (3) | 8192 | |
| Reserved (4) | 16384 | |
| Reserved (5) | 32768 | |
| | Total: | |

7. Change the parameter 105 setting to the total you found in Step 6. If you have a control panel, use the [PROGRAM] key to change the setting; if not, use the **program** (or **pr**) command at your terminal or computer.
8. Display parameter 104 and 105 to verify the settings.

Connecting External Signal Relays

Status output signals from the FERRUPS products are rated 250 mA at 25 volts AC or DC. Depending on the users application, external signal relays may be required if isolated dry status contacts are required. Models FE 500 VA to 3.1 kVA (with serial numbers 25000 and greater) utilize equivalently rated DC solid state switches (Open Collector).

An unregulated supply voltage of 12 VDC is provided on pin 14 of the DB-25 connector to power the external signal relays. The maximum supply current is 0.5 amps for models 500 VA to 3.1 kVA, and 0.3 amps for models 4.3 kVA to 18 kVA.

When connecting external signal relays, a 1N4148 (or equivalent) diode must be placed in parallel with the relay coil to clamp fly-back voltage (a voltage impulse or spike) that is produced when the relay is de-energized or turned off.

CAUTION



If a fly-back diode is not applied to each relay, the resulting voltage impulse produced when the relay is turned off may damage the FERRUPS logic control board or cause the board to reset its operating parameters to firmware default values. Critical operating parameters required for normal unit operation may need to be reprogrammed including any customized settings that may have been set after installation.

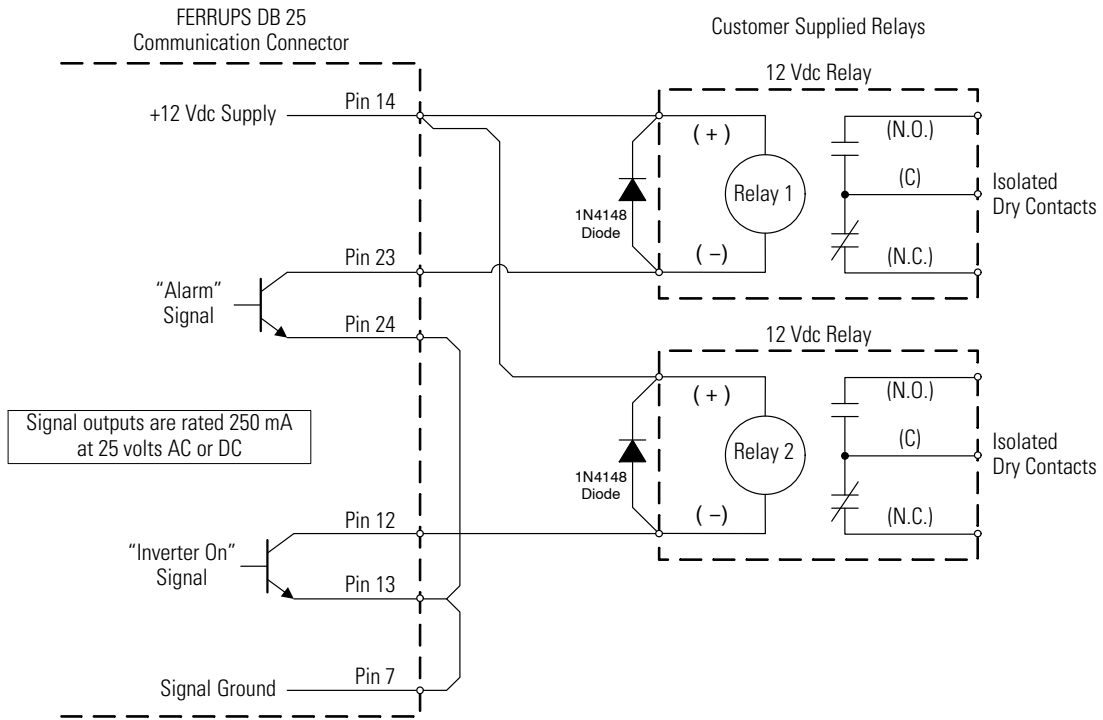


Figure 18. Connecting External Signal Relays

Remote Monitoring

Alarm Signal Contacts: These are relay contacts (rated at 25 Vac/Vdc and 250 mA) that change status on any alarm condition or when the UPS is turned off. Contacts that close on an alarm are available between Pins 23 and 24. Contacts that open on an alarm are available between Pins 24 and 25.

Inverter On Signal Contacts: These are relay contacts (rated at 25 Vac/Vdc and 250 mA) that change status when the inverter turns on. Contacts that close on inverter operation are available between Pins 12 and 13. Contacts that open on inverter operation are available between Pins 11 and 13.



NOTE FE 500 VA–3.1 kVA models with serial numbers 25000 and greater have equivalently rated DC solid state switches.

Remote Shutdown

The FERRUPS UPS can be connected to a remote shutdown switch to shut off output from the UPS to your protected equipment. The shutdown switch must have a set of contacts that can apply the UPS's +12 Vdc on Pin 6 to the UPS's Pin 21. (You can use Pin 18 instead of Pin 6; **do not use Pin 14**). Use a single twisted-pair shielded cable to connect the switch to the UPS pins. A connection between Pins 6 and 21 (or 18 and 21) shuts down UPS output power to the protected equipment.

When the UPS Remote Shutdown feature has been activated, the UPS is in the Off mode and the Emergency Power Off alarm sounds. A control panel or a terminal connected to the UPS displays **Emergency PwrOff**.

To restart the UPS, break the connection between Pins 6 and 21 (or 18 and 21) at the UPS's RS-232 port. Then, follow the steps for your model in "UPS Startup" on page 17. Note that the 12V level on Pin 6 or Pin 18 is only available when the UPS is operating.

Chapter 6 Options

Eaton offers many options for your FERRUPS UPS. If you would like more information, contact Eaton or your local distributor.

Bypass Switches

If your UPS does not have a plug, a bypass switch can transfer the protected equipment to direct AC input power conveniently when it is time to service the UPS. Contact Eaton or your local distributor for recommendations and additional information on the different bypass switches.

Control Panel

Control panels are available that provide UPS monitoring and operation from a remote location.

Environmental Monitoring

Eaton's EnviroCom™ monitors office and UPS conditions and phones you when there is a problem. EnviroCom II also lets you:

- call the UPS for an update on its status and environment
- control and communicate with the UPS through a modem

Extended Run Times

If you want extended run times, contact Eaton or your local distributor for information on adding additional battery capacity or an optional battery charger.

Warranties

Besides our standard two-year warranty, Eaton offers several warranty enhancement plans to meet your service and maintenance needs. Contact Eaton or your local distributor for more information.

OPTIONS

Chapter 7 Maintenance



NOTE *Technicians must observe important safety precautions while performing these checks.*

The FERRUPS UPS is designed to provide years of trouble-free operation. Its internal control system checks the batteries and inverter periodically to ensure reliable operation. In fact, you'll probably find that your FERRUPS system requires less maintenance than any of your other computer peripherals.

Nevertheless, the FERRUPS UPS and optional external battery cabinets do require some attention to assure continued reliable service. Eaton recommends that you schedule preventive maintenance checks at least every six months. At these checks, the service technician should follow Eaton's recommended maintenance schedule, which includes the following items:

- Check operating environment for clean, cool, dry conditions.
- Inspect and clean the unit.
- View and record the alarm and inverter logs.
- Check the batteries.
- Check the AC and DC meter functions and recalibrate if necessary.
- Perform an outage test.
- Check and record the values of the first 19 parameters while the UPS is online and on battery.

MAINTENANCE

Chapter 8 Specifications

Table 15. FE/QFE 500 VA–3.1 kVA

| Model | 500 VA/ 350W | 700 VA/ 500W | 850 VA/ 600W | 1.15 kVA/ 800W | 1.4 kVA/ 1 kW | 1.8 kVA/ 1.25 kW | 2.1 kVA/ 1.5 kW | 3.1 kVA/ 2.2 kW |
|--|-----------------|-----------------|-----------------|-------------------|------------------|---------------------|--------------------|--------------------|
| AC Input Voltage and Current, Standard Charger | | | | | | | | |
| FE: 120 Vac | 4.6A | 5.6A | 6.6A | 8.9A | 11A | 16A | 19A | 25A |
| 208 Vac ¹ | 2.4A | 2.8A | 3.7A | 5.0A | 6.0A | 9.2A | 11A | 14A |
| 220 Vac | 2.3A | 2.7A | 2.5A | 4.6A | 5.8A | 7.8A | 9.4A | 12A |
| 240 Vac ¹ | 2.1A | 2.5A | 3.2A | 4.2A | 5.3A | 8.2A | 9.2A | 12A |
| QFE: 120 Vac | 4.4A | 5.8A | 7.0A | 8.4A | 11A | 15A | 16A | 24A |
| 220 Vac | 2.6A | 3.9A | 4.4A | 4.9A | 5.7A | 7.9A | 8.2A | 13A |
| 230 Vac | 2.5A | 3.8A | 4.2A | 4.6A | 5.4A | 7.5A | 7.8A | 12A |
| 240 Vac | 2.4A | 3.5A | 4.0A | 4.4A | 5.2A | 7.2A | 7.4A | 12A |
| Recommended AC Input Service: 60 Hz with 120 Vac ¹ | 10A | 10A | 10A | 15A | 15A | 20A | 20A | 30A |
| Output Voltage and Maximum Output Current ² | | | | | | | | |
| FE: 120 Vac | 4.1A | 5.9A | 7.0A | 9.3A | 12A | 15A | 17A | 26A |
| 208 Vac | 2.3A | 3.3A | 4.0A | 5.3A | 6.5A | 8.4A | 9.9A | 15A |
| 220 Vac | — | — | — | 5.0A | 6.1A | 8.0A | 9.0A | 14A |
| 240 Vac | 2.1A | 2.8A | 3.4A | 4.7A | 5.6A | 7.3A | 8.6A | 13A |
| QFE: 120 Vac | 4.1A | 5.7A | 7.1A | 9.4A | 12A | 14A | 17A | 25A |
| 220 Vac | 2.2A | 3.2A | 3.8A | 5.0A | 6.4A | 7.9A | 9.3A | 14A |
| 230 Vac | 2.2A | 3.1A | 3.6A | 4.8A | 6.2A | 7.6A | 8.9A | 13A |
| 240 Vac | 2.1A | 2.9A | 3.5A | 4.6A | 5.9A | 7.2A | 8.5A | 13A |
| Efficiency on AC Line | 85% | 86% | 85% | 88% | 88% | 90% | 90% | 91% |
| On Line BTU/hour: | 210 | 277 | 361 | 372 | 465 | 474 | 568 | 742 |
| kW/hour: | 0.062 | 0.081 | 0.106 | 0.109 | 0.136 | 0.139 | 0.166 | 0.217 |
| Audible Noise (dB) | 41 | 41 | 47 | 49 | 49 | 51 | 51 | 51 |

SPECIFICATIONS

| Model | 500 VA/ 350W | 700 VA/ 500W | 850 VA/ 600W | 1.15 kVA/ 800W | 1.4 kVA/ 1 kW | 1.8 kVA/ 1.25 kW | 2.1 kVA/ 1.5 kW | 3.1 kVA/ 2.2 kW |
|---------------------------|---|-----------------|-----------------|--|------------------|---|--------------------|--------------------|
| Run time (minutes) | 9 | 14 | 11 | 18 | 14 | 11 | 9 | 14 |
| QFE Full Load: | 25 | 35 | 28 | 48 | 37 | 30 | 25 | 35 |
| Half Load: | 9 | 11 | 9 | 8 | 11 | 11 | 9 | 14 |
| FE Full Load: | | | | | | | | |
| Weight: | | | | | | | | |
| Without Battery: | | | | | | | | |
| 60 Hz Models: | 44 lb | 46 lb | 51 lb | 92 lb | 106 lb | 120 lb | 132 kg | 144 lb |
| 50 Hz Models: | 22.2 kg | 25 kg | 27.7 kg | 41.7 kg | 45.4 kg | 58.1 kg | 63.5 kg | 69 kg |
| With Battery: | | | | | | | | |
| 60 Hz Models: | 54 lb | 62 lb | 67 lb | 102 lb | 122 lb | 176 lb | 188 lb | 248 lb |
| 50 Hz Models: | 28 kg | 36.3 kg | 39 kg | 59.9 kg | 69.9 kg | 83 kg | 89 kg | 116.1 kg |
| Dimensions (H x W x D) | 12" x 10" x 21.25" 30.5 x 25.5 x 54.0 cm | | | 15.1" x 15.2" x 20.2" 38.5 x 39.0 x 51.5 cm | | 21.2" x 15.25" x 22.9" 54.0 x 39.0 x 58.5 cm | | |

¹Size input protection according to all applicable local or national codes. Fuse and circuit breaker sizes vary. Sizes shown are for the U.S. and Canada.

²At 0.7 leading power factor.

Table 16. FE/QFE 4.3–18 kVA

| Model | 4.3 kVA/ 3 kW | 5.3 kVA/ 3.7 kW | 7 kVA/ 5 kW | 10 kVA/ 7.5 kW | 12.5 kVA/ 10 kW | 18 kVA/ 15 kW |
|---|--|--|--|------------------------|------------------------|--------------------------|
| AC Input Voltage and Current, Standard Charger | | | | | | |
| FE: 120 Vac | 32A ¹ | 38A ¹ | 51A ¹ | — | — | — |
| 208 Vac | 18A | 22A | 30A | 45A | 58A | 86A |
| 220 Vac | 17A | 21A | 27A | 41A | 53A | 81A |
| 240 Vac | 16A | 19A | 26A | 39A | 50A | 76A |
| QFE: 220 Vac | 19A | 21A | 27A | 43A | 55A | 81A |
| 230 Vac | 18A | 20A | 26A | 41A | 53A | 78A |
| 240 Vac | 17A | 19A | 24A | 39A | 51A | 75A |
| Recommended Input Service for 60 Hz Models ² | 120 = 40A ¹ 208 = 25A 240 = 20A | 120 = 50A ¹ 208 = 30A 240 = 25A | 120 = 65A ¹ 208 = 40A 240 = 35A | 208 = 60A 240 = 50A | 208 = 75A 240 = 65A | 208 = 115A 240 = 100A |

| Model | 4.3 kVA/ 3 kW | 5.3 kVA/ 3.7 kW | 7 kVA/ 5 kW | 10 kVA/ 7.5 kW | 12.5 kVA/ 10 kW | 18 kVA/ 15 kW |
|--|--|----------------------------|------------------------|--|----------------------------|--------------------------|
| Output Voltage and Maximum Output Current³ | | | | | | |
| FE: 120 Vac | 34A | 44A | 58A | 82A | 103A | 149A |
| 208 Vac | 20A | 26A | 34A | 48A | 58A | 84A |
| 220 Vac | 19A | 24A | 31A | 46A | 55A | 82A |
| 240 Vac | 17A | 22A | 29A | 41A | 51A | 73A |
| QFE: 220 Vac | 19A | 23A | 31A | 45A | 56A | 84A |
| 230 Vac | 18A | 22A | 30A | 43A | 52A | 76A |
| 240 Vac | 17A | 21A | 28A | 41A | 51A | 73A |
| Efficiency On AC Line | 90% | 90% | 90% | 90% | 91% | 92% |
| On Line BTU/hour: | 1138 | 1403 | 1896 | 2844 | 3375 | 4452 |
| kW/hour: | .333 | .411 | .556 | .833 | .989 | 1.3 |
| Audible Noise (dB) | 50 | 51 | 54 | 55 | 56 | 57 |
| Run time (minutes) | | | | | | |
| Full Load: | 8 | 20 | 12 | 11 | 18 | 10 |
| Half Load: | 20 | 50 | 33 | 26 | 48 | 26 |
| Weight: | | | | | | |
| Without Battery: | | | | | | |
| 60 Hz Models: | 243 lb | 268 lb | 362 lb | 442 lb | 505 lb | 625 lb |
| 50 Hz Models: | 115.7 kg | 131.1 kg | 176.5 kg | 217.7 kg | 251.3 kg | 312.1 kg |
| With Battery⁴: | | | | | | |
| 60 Hz Models: | 348 lb | 484 lb | 578 lb | — | — | — |
| 50 Hz Models: | 163.3 kg | 229.1 kg | 274.4 kg | — | — | — |
| N Cabinet with Standard Batteries | — | — | — | 395 lb (179.2 kg) | 535 lb (242.7 kg) | 675 lb (306.2 kg) |
| Dimensions (H x W x D) ⁵ | 29.5" x 15.5" x 25" 75.0 x 39.5 x 63.5 cm | | | 36.5" x 19" x 32" 93.0 x 48.5 x 81.5 cm | | |

¹FE 4.3 kVA, 5.3 kVA, and 7 kVA models have optional 120 Vac input voltage.

²Size input protection according to all applicable local or national codes. Fuse and circuit breaker sizes vary. Sizes shown are for the U.S. and Canada.

³At 0.7 to 0.83 leading power factor.

⁴FE and QFE 10 kVA, 12.5 kVA, and 18 kVA models do not have internal batteries. Batteries are in a separate external battery cabinet or rack.

⁵If your model has an internal bypass switch, add 8" (20.0 cm) to the depth.

Table 17. Electrical Input and Output

| | |
|--|--|
| Nominal Frequency | Online: 60 Hz (FE) or 50 Hz (QFE) Output frequency tracks input line frequency up to limit, which is adjustable from ± 0.01 Hz to ± 3.00 Hz. Inverter turns on if line frequency exceeds the selected limit. On inverter: 60 Hz (FE) or 50 Hz (QFE) ± 0.03 Hz. |
| Regulation | $\pm 3\%$ load regulation (under any line, load, or battery condition to within -8.3% and $+5\%$ of nominal) |
| Voltage Waveform | Sine wave; $<5\%$ THD at rated linear loads, computer-grade power |
| Overload Capability | Online (nominal Vac in): 150% surge and 125% for 10 minutes. On inverter (nominal Vdc in): 150% surge and 110% for 10 minutes. Overload operation is not thermally limited. The FERRUPS UPS microprocessor continuously monitors output VA and sounds an alarm before loss of output voltage regulation occurs. |
| DC Input Protection | DC fuse and battery charger fuse |
| Output Protection | The ferroresonant transformer inherently limits current and provides overload protection. The FERRUPS UPS has high AC and low AC output voltage alarms, as well as an overload alarm. If the AC output voltage falls below the low AC output voltage alarm setpoint, the UPS sounds an alarm after 5 seconds. If the AC output voltage falls below the low AC output shutdown setpoint, the UPS sounds an alarm and shuts down. Some models have output receptacles protected by fuses or circuit breakers. |
| Isolation, Including Output Neutral to Ground Bonding | The FERRUPS UPS provides a true, separately-derived power source, as defined by National Electrical Code Article 250-5d, with output neutral bonded to ground. There is no direct connection between input and output, and less than 2 pF of effective input to output capacitance. |

Table 18. Environmental and Safety

| | |
|---------------------------------------|--|
| Operating Temperature | 0°C to 40°C (32°F to 104°F) |
| Storage Temperature | UPS with batteries: -20° to 40°C (-4° to 104°F) UPS without batteries: -20° to 60°C (-4° to 140°F) |
| Relative Humidity | 0–95% noncondensing |
| Operating Altitude | Up to 3,000 meters above sea level (10,000 ft) The maximum operating ambient temperature decreases 1°C per 300m above sea level (2°F per 1000 ft above sea level) |
| Ventilation | The air around the UPS must be clean and free of dust, corrosive chemicals, and other contaminants. The FERRUPS UPS uses internal fans to circulate the air for cooling. The air must be free to circulate around the UPS and external battery cabinet(s). Do not operate the UPS in a sealed room or container. |
| Lightning and Surge Protection | The FERRUPS UPS provides 2000-to-1 spike attenuation. Tested using lightning standard per ANSI/IEEE C62.41 Category A (6000V spike and 200A) and Category B (6000V spike and 3000A) test, and ANSI/IEEE C62.45 test procedures. |
| Noise Rejection | Common mode: Greater than 120 dB with output neutral bonded to ground Transverse (Normal) mode: Greater than 60 dB |

Table 19. Battery

| | |
|----------------|---|
| Voltage | 500–850 VA models: Nominal battery voltage is 24 Vdc for 60 Hz, 12 Vdc for 50 Hz. Standard battery charger output is rated at 2A. 1.15–1.4 kVA models: Nominal battery voltage is 48 Vdc Vdc for 60 Hz, 12 Vdc for 50 Hz. Standard battery charger output is rated at 2A. 1.8–3.1 kVA models: Nominal battery voltage is 48 Vdc. Standard battery charger output is rated at 4A. 4.3–7 kVA models: Nominal battery voltage is 48 Vdc. Standard battery charger output is rated at 5A. 10–18 kVA models: Nominal battery voltage is 120 Vdc. Standard battery charger output is rated at 5A. |
| Type | Standard batteries are sealed, gas recombinant, lead-acid type, especially designed for UPS use. |

NOTE Optional battery chargers at higher current ratings are available. Contact Eaton or your local distributor for more information.

SPECIFICATIONS

Chapter 9 Troubleshooting

When your FERRUPS UPS detects an alarm condition, the UPS displays the alarm with the following indications:

- the ALARM indicator on the front panel (and the control panel if you have one) illuminates
- sounds an audible alarm
- displays an alarm message on the control panel (if you have one).



NOTE *If the control panel does not display the message, press [CLEAR] until you reach the scrolling display.*

Alarms

When an alarm occurs, follow these steps:

1. Find out which alarm condition the UPS is detecting.
 - If you have a control panel, you can read the alarm on the display.
 - If you do not have a control panel, listen to the alarm code; the UPS sounds the Morse Code for the alarm letter.
2. Find the alarm in Table 20 and follow the instructions to resolve the problem. If any alarm condition cannot be cleared or resolved, contact your service representative.

3. To silence the alarm:

FE/QFE 500 VA–3.1 kVA models: Turn the Alarm Silence switch on the UPS rear panel to the OFF position.

FE/QFE 4.3–18 kVA models: Press [CTRL]-[5] [ENTER] [ENTER] on the control panel.

4. After the alarm condition is cleared, turn the alarm beep back on (using either the switch or the control panel).



NOTE *If you do not turn the alarm beep back on, the UPS is not able to sound an alarm code the next time there is an alarm.*

Table 20. Alarms

| Letter | Audio Code | Alarm Message | What It Means | What To Do |
|--------|------------|------------------|--|--|
| A | • – | Low Battery | The UPS has shut down after running on battery and discharging the batteries. | Wait for AC input power to be restored. When AC input power returns, turn on the UPS. The CHARGING indicator illuminates as the UPS begins recharging batteries. |
| B | – • • • | Near Low Battery | The battery voltage has reached the Near Low Battery setpoint as determined by setup parameter 66. | The alarm should clear itself when the battery charger has charged the batteries enough. |
| C | – • – • | High Battery | The battery voltage has reached the High Battery setpoint as determined by setup parameter 67. | Verify battery voltage compared to product labeling, if correct, verify setup parameter 67 is set correctly. |
| D | – • • | Low Runtime | The UPS is running on battery power, and the battery runtime remaining is low. | Shut down your equipment and turn off the UPS to conserve battery power. When AC input power returns, turn the UPS on again. |
| E | • | Low AC Output | The output voltage is below the alarm setting as determined by setup parameters 59 and 60. | Verify the output voltage using a voltage meter. If correct, verify setup parameters 59 and 60. If alarm condition continues, bypass the UPS and turn the UPS switch off. Call your service representative. |
| F | • • – • | High AC Output | The output voltage is higher than the alarm setting as determined by setup parameter 61. | Verify the output voltage using a voltage meter. If correct, verify setup parameter 61 is set correctly. If alarm condition continues, call your service representative. |
| G | – – • | Output Overload | The power requirements of the load have either exceeded the UPS capacity or there is a fault some where in the load. | Power down or remove some of the load from the output of the UPS until the overload condition clears. Verify the power requirements for each piece of equipment the UPS is providing power to and determine if the UPS has enough capacity to support everything connected to it's output. |

| Letter | Audio Code | Alarm Message | What It Means | What To Do |
|--------|------------|------------------|--|--|
| H | •••• | Hi Ambient Temp | The temperature inside the UPS is too high. If the temperature reaches a preset point, the UPS shuts down. | Verify the rooms environmental controls (HVAC) are functioning correctly and maintaining a reasonable room temperature. Ensure the input air vents at the front of the unit and the fan exhaust at the back of the unit are not blocked. Ensure the unit is not overloaded. If the alarm condition continues, bypass the UPS and turn the UPS switch off. Contact your service representative. |
| I | •• | Hi Heatsink Temp | The inverter temperature is too high. If the temperature reaches a preset point, the UPS shuts down. | Verify the rooms environmental controls (HVAC) are functioning correctly and maintaining a reasonable room temperature. Ensure the input air vents at the front of the unit and the fan exhaust at the back of the unit are not blocked. Ensure the unit is not overloaded. If the alarm condition continues, bypass the UPS and turn the UPS switch off. Contact your service representative. |
| J | •--- | User Test Alarm | The user is testing the alarm feature. | To start the user test alarm from the control panel, press [CTRL]-[8] [ENTER] [ENTER]. Repeat the procedure to turn the alarm off. |
| K | -•- | Hi Transfmr Temp | The transformer temperature is too high. If the temperature reaches a preset point, the UPS shuts down. | Verify the rooms environmental controls (HVAC) are functioning correctly and maintaining a reasonable room temperature. Ensure the input air vents at the front of the unit and the fan exhaust at the back of the unit are not blocked. Ensure the unit is not overloaded. If the alarm condition continues, bypass the UPS and turn the UPS switch off. Contact your service representative. |
| L | •-•• | Check Charger | The UPS has detected a charger problem. | Contact your service representative. |
| M | -- | Check Battery | The batteries have failed the automatic system test. | Contact your service representative. |
| N | -• | Check Inverter | The inverter has failed the automatic system test. | Contact your service representative. |

| Letter | Audio Code | Alarm Message | What It Means | What To Do |
|--------|------------|------------------|---|--|
| O | --- | Memory Check | Possible microprocessor problem. | Shut down your equipment or bypass the UPS; turn off the UPS. Contact your service representative. |
| P | •--• | Emergency PwrOff | The Remote Shutdown feature has been activated at the RS-232 port (see "Remote Shutdown" on page 95). | To restart the UPS, disconnect the signal to Pin 21 on the RS-232 port. If you have a control panel, put the UPS in Auto mode. If not, turn the UPS ON/OFF switch off and then on again. |
| Q | --•- | Hi PFM Res Temp | The Power Factor Module's temperature is too high. If the temperature reaches a preset point, the UPS shuts down. | Verify the rooms environmental controls (HVAC) are functioning correctly and maintaining a reasonable room temperature. Ensure the input air vents at the front of the unit and the fan exhaust at the back of the unit are not blocked. Ensure the unit is not overloaded. If the alarm condition continues, bypass the UPS and turn the UPS switch off. Contact your service representative. |
| R | •-• | Probe Missing | A temperature probe is missing or damaged. | The UPS may shut down. Contact your service representative. |
| S | ••• | High AC Input | The input voltage is higher than the alarm setting. | Verify and correct the reason for excessive input voltage being applied to the UPS. Verify setup parameter 62 is set correctly. |
| T | - | Call Service | The UPS has detected a problem that requires service. | The UPS shuts down. Contact your service representative. |
| W | •-- | Fan Alarm | The fan has stopped. | If the UPS has already shut down, call for service to have the cooling fan replaced. If the UPS has not shut down, bypass the UPS and turn the UPS switch off before calling your your service representative. |

Alarm and Inverter Logs

Your FERRUPS UPS makes an entry in its logs every time it sounds an alarm or switches to inverter (battery power). This information can be helpful in diagnosing problems.

You can view the Alarm and Inverter Logs from either the UPS control panel or a terminal or computer that you have connected to the RS-232 port (see “Connecting a Terminal or Computer to the RS-232 Port” on page 70).

Reading the Alarm Log from a Control Panel

The Alarm Log is parameter 25. To display the Alarm Log from a control panel, follow these steps:

| | |
|-----------------|---------------------|
| Press this key: | Display shows: |
| [DISPLAY] | Display: |
| [2][5] | Display: 25 |
| [ENTER] | 25 Alarm Log |

The display scrolls through the 20 most recent entries in the Alarm Log. If you have not had 20 alarm conditions, the display scrolls through the entries FERRUPS has recorded. You can use the number keys as you view this scrolling display:

| | |
|-----------------|---|
| Use this key: | To do this: |
| [0] | Pause the scrolling and start it again. |
| [1] through [9] | Go to the next log entry. |

Each log entry consists of four pieces of information: the alarm code, the date (month/day) of the alarm, the time (in 24-hour time) and the duration (in hours and minutes).

For instance, one entry might look like this:

B 0205 1017 0005

In this example, “B” means the alarm was “Near Low Battery” (see page 108); if alarm B was active, there would be an asterisk (*) after “B.” “0205” means the alarm occurred on February 5 (2/5). “1017” means the alarm occurred at 10:17 a.m. “0005” means the alarm condition lasted for 0 hours and 5 minutes.

Reading the Inverter Log from a Control Panel

The Inverter Log is parameter 24. To display the Inverter Log, follow these steps:

Press this key:
 [DISPLAY]
 [2][4]
 [ENTER]

Display shows:
Display:
Display: 24
24 Inverter Log

The display scrolls through the 20 most recent entries in the Inverter Log. If the inverter has not run 20 times, the display scrolls through the entries the UPS has recorded. You can use the number keys as you view this scrolling display:

Use this key:
 [0]
 [1] through [9]

To do this:
 Pause the scrolling and start it again.
 Go to the next log entry.

Each entry includes four pieces of information: the inverter code, the date (month/day) of the inverter run, the time (in 24-hour time) and the duration (in hours and minutes). For instance, one entry might look like this:

L 0205 0951 0015

In this example, "L" means the the UPS went to inverter because it lost AC input power; if the inverter was still running, there would be an asterisk (*) after the "L." "0205" means the inverter ran on February 5. "0951" means the inverter ran at 9:51 a.m. "0015" means the inverter ran for 0 hours and 15 minutes.

Table 21. Inverter Codes

| Inverter Code | Meaning | Explanation |
|---------------|-------------|---|
| T | System Test | UPS went to inverter to test the batteries. |
| B | Brownout | AC input voltage was too low. |
| L | Line Loss | AC input power was lost. |
| M | Manual | The inverter was started manually. |
| F | Frequency | Input frequency was too high or too low. |
| R | Reset | A system reset was performed. |

Reading the Alarm Log from a Terminal or Computer

To display the Alarm Log on a terminal or computer, you can use the `alarmlog` or `logs` command (see “Entering Commands from a Terminal or Computer” page 76). These commands display up to 20 log entries in a table. For example, the log might look like this table:

| Active | EventDate | EventTime | Duration | Code/Event |
|----------------|------------|-----------|----------|---------------|
| No | 08/25/1993 | 11:25:32 | 00:00:45 | J=User Test |
| Alarm | | | | |
| No | 08/24/1993 | 12:13:18 | 00:01:08 | A=Low Battery |
| No | 08/24/1993 | 12:05:07 | 00:08:11 | B=Near Low |
| Battery | | | | |

The table shows whether the alarm is active now (Active), the date and time of each alarm, how long it lasted (Duration), and what caused the alarm (Code/Event).

You can also display parameter 25 to view the Alarm Log; this display is the same as the control panel display.

Reading the Inverter Log from a Terminal or Computer

To display the Inverter Log on a terminal or computer, you can use the `inverterlog` or `logs` command (see “Entering Commands from a Terminal or Computer” on page 76). These commands display up to 20 log entries in a table. For example, the log might look like this:

| Active | EventDate | EventTime | Duration | Code/Event |
|--------|------------|-----------|----------|-----------------|
| No | 08/25/1993 | 11:25:32 | 00:00:45 | M=Manual turnon |
| No | 08/24/1993 | 12:13:18 | 00:01:08 | L=Line fault |

The table shows whether the UPS is running on inverter (battery power) now (Active), the date and time that the UPS ran on battery power, the length of time the UPS ran on battery power (Duration), and the reason (Code/Event).

You can also display parameter 24 to view the Inverter Log; this display is the same as the control panel display.

Service and Support

If you have any questions or problems with the UPS, call your **Local Distributor** or the **Eaton Customer Support Center** at one of the following telephone numbers.

Available Support Services:

- Onsite Service Technician scheduling
- Technical product information or troubleshooting
- RMA or parts request processing
- Purchase of replacement batteries or service contracts

Eaton Customer Support Center

United States: **1-800-356-5737** or **1-919-845-3683**

Canada: **1-800-461-9166 ext 260**

All other countries: **Call your local service representative**

Please have the following information ready when you call the Help Desk:

- Model number
- Serial number
- Version number (if available)
- Date of failure or problem
- Symptoms of failure or problem
- Customer return address and contact information

If repair is required, you will be given a Returned Material Authorization (RMA) Number. This number must appear on the outside of the package and on the Bill Of Lading (if applicable). Use the original packaging or request packaging from the Eaton Customer Support Center or distributor. Units damaged in shipment as a result of improper packaging are not covered under warranty. A replacement or repair unit will be shipped, freight prepaid for all warrantied units.



NOTE For critical applications, immediate replacement may be available. Call the **Eaton Customer Support Center** for the dealer or distributor nearest you.

Chapter 10 Warranty

Two-Year Limited Warranty (US and Canada)

Eaton UPS Models: 9120, 9125, 9130, 9135, 9140, and FERRUPS® up to 3.1 kVA

WARRANTOR: The warrantor for the limited warranties set forth herein is Eaton Corporation, an Ohio Corporation company (“Company”).

LIMITED WARRANTY: This limited warranty (this “Warranty”) applies only to the original End-User (the “End-User”) of any Eaton 9120, 9125, 9130, 9135, 9140, and FERRUPS up to 3.1 kVA Products (individually and collectively, the “Product”) purchased on or after June 1, 2004, and cannot be transferred. This Warranty applies even in the event that the Product is initially sold by Company for resale to an End-User.

LIMITED WARRANTY PERIOD: The period covered by this Warranty for Product installed [and currently located] in the fifty (50) United States, the District of Columbia, and Canada is twenty-four (24) months from the date of purchase, or thirty (30) months from the date of shipment.

WHAT THIS LIMITED WARRANTY COVERS: The warrantor warrants that the Product and battery (individually and collectively, the “Warranted Items”) are free from defects in material and workmanship. If, in the opinion of Company, a Warranted Item is defective and the defect is within the terms of this Warranty, Company’s sole obligation will be to repair or replace such defective Warranted Item (including by providing service, parts and labor, as applicable), at the option of Company.

PROCEDURES FOR REPAIR OR REPLACEMENT OF WARRANTED ITEMS: The Warranted Item will be repaired or replaced at a Company site or such other location as determined by Company.

If the Warranted Item is to be replaced by Company, and the End-User supplies a credit card number or purchase order for the value of the replacement Product, Company will use commercially reasonable business efforts to ship (via standard ground shipment and at no cost to the End-User) the replacement Warranted Item to the End-User within one (1) business day after Company receives notice of the warranty claim. In such case, the End-User must return (at Company’s expense) the defective Warranted Item to Company in the same packaging as the replacement Warranted Item received by the End-User or as otherwise instructed by Company. If Company does not receive the defective Warranted Item, Company will either charge the End-User’s credit card, or send the End-User an invoice (which the End-User agrees to pay), for the value of the replacement Product.

If the Warranted Item is to be replaced by Company, but the End-User is unwilling or unable to supply a credit card number or purchase order for the value of the replacement Product, Company will use commercially reasonable business efforts to ship (via standard ground shipment and at no cost to the End-User) the replacement Warranted Item to the End-User within one (1) business day after Company receives the defective Product from the End-User.

In any case, Company will provide shipping instructions and will pay its designated carrier for all shipping charges for return of defective equipment and replacement of Warranted Items. Any returned Warranted Item or parts that are replaced may be new or reconditioned. All Warranted Items returned to Company and all parts replaced by Company shall become the property of Company.

WHAT THIS LIMITED WARRANTY DOES NOT COVER: This Warranty does not cover any defects or damages caused by: (a) failure to properly store the Product before installation, including the charge of batteries no later than the date indicated on the packaging; (b) shipping and delivery of the Product if shipping is FOB Factory; (c) neglect, accident, abuse, misuse, misapplication, or incorrect installation; (d) repair or alteration not authorized in writing by Company personnel or performed by an authorized Company Customer Service Engineer or Agent; (e) improper testing, operation, maintenance, adjustment, or modification of any kind not authorized in writing by Company personnel or performed by an authorized Company Customer Service Engineer or Agent; or (f) use of the Product under other than normal operating conditions or in a manner inconsistent with the Product's labels or instructions.

This Warranty is not valid if the Product's serial numbers have been removed or are illegible. Any Warranted Items repaired or replaced pursuant to this Warranty will be warranted for the remaining portion of the original Warranty subject to all the terms thereof.

Company shall not be responsible for any charges for testing, checking, removal, or installation of Warranted Items.

COMPANY DOES NOT WARRANT EQUIPMENT NOT MANUFACTURED BY COMPANY. IF PERMITTED BY THE APPLICABLE MANUFACTURER, COMPANY SHALL PASS THROUGH SUCH MANUFACTURER'S WARRANTIES TO END-USER.

COMPANY DOES NOT WARRANT SOFTWARE, INCLUDING SOFTWARE EMBEDDED IN PRODUCTS, THAT IS NOT CREATED BY COMPANY. WITHOUT LIMITING THE FOREGOING, COMPANY SPECIFICALLY DOES NOT WARRANT SOFTWARE (SUCH AS LINUX) THAT WAS CREATED USING AN "OPEN SOURCE" MODEL OR IS DISTRIBUTED PURSUANT TO AN OPEN SOURCE LICENSE.

THIS WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY OFFERED BY COMPANY WITH RESPECT TO THE PRODUCTS AND SERVICES AND, EXCEPT FOR SUCH FOREGOING WARRANTY COMPANY DISCLAIMS ALL OTHER WARRANTIES INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY, TITLE, NON-INFRINGEMENT, AND FITNESS FOR A PARTICULAR PURPOSE. CORRECTION OF NON-CONFORMITIES IN THE MANNER AND FOR THE PERIOD OF TIME PROVIDED ABOVE SHALL CONSTITUTE COMPANY'S SOLE LIABILITY AND END-USER'S EXCLUSIVE REMEDY FOR FAILURE OF COMPANY TO MEET ITS WARRANTY OBLIGATIONS, WHETHER CLAIMS OF THE END-USER ARE BASED IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY), OR OTHERWISE.

LIMITATION OF LIABILITY: The remedies of the End-User set forth herein are exclusive and are the sole remedies for any failure of Company to comply with its obligations hereunder. In no event shall Company be liable in contract, in tort (including negligence or strict liability) or otherwise for damage to property or equipment other than the Products, including loss of profits or revenue, loss of use of Products, loss of data, cost of capital, claims of customers of the End-User or any special, indirect, incidental, or consequential damages whatsoever. The total cumulative liability of Company hereunder whether the claims are based in contract (including indemnity), in tort (including negligence or strict liability) or otherwise, shall not exceed the price of the Product on which such liability is based.

Company shall not be responsible for failure to provide service or parts due to causes beyond Company's reasonable control.

END-USER'S OBLIGATIONS: In order to receive the benefits of this Warranty, the End-User must use the Product in a normal way; follow the Product's user's guide; and protect against further damage to the Product if there is a covered defect.

OTHER LIMITATIONS: Company's obligations under this Warranty are expressly conditioned upon receipt by Company of all payments due to it (including interest charges, if any). During such time as Company has not received payment of any amount due to it for the Product, in accordance with the contract terms under which the Product is sold, Company shall have no obligation under this Warranty. Also during such time, the period of this Warranty shall continue to run and the expiration of this Warranty shall not be extended upon payment of any overdue or unpaid amounts.

COSTS NOT RELATED TO WARRANTY: The End-User shall be invoiced for, and shall pay for, all services not expressly provided for by the terms of this Warranty, including without limitation, site calls involving an inspection that determines no corrective maintenance is required. Any costs for replacement equipment, installation, materials, freight charges, travel expenses or labor of Company representatives outside the terms of this Warranty will be borne by the End-User.

OBTAINING WARRANTY SERVICE: In the USA, call the Customer Reliability Center 7x24 at 800-356-5737. Outside of the USA, contact your local Eaton product sales or service representative. For comments or questions about this Warranty, write to the Customer Quality Representative, 3301 Spring Forest Road, Raleigh, North Carolina 27616 USA.

Two-Year Limited Warranty (US and Canada)

Eaton UPS Models: 9155, 9170+ and FERRUPS® 4.3–18 kVA

WARRANTOR: The warrantor for the limited warranties set forth herein is Eaton Corporation, an Ohio Corporation company (“Company”).

LIMITED WARRANTY: This limited warranty (this “Warranty”) applies only to the original End-User (the “End-User”) of any Eaton 9155, 9170+, and FERRUPS 4.3–18 kVA Products (individually and collectively, the “Product”) purchased on or after June 1, 2004, and cannot be transferred. This Warranty applies even in the event that the Product is initially sold by Company for resale to an End-User.

LIMITED WARRANTY PERIOD: The period covered by this Warranty for Product installed [and currently located] in the fifty (50) United States, the District of Columbia, and Canada is twenty-four (24) months from the date of purchase, or thirty (30) months from the date of manufacture of product for parts coverage, and ninety (90) days from the date of Product purchase for labor coverage, as further clarified in the following sections.

WHAT THIS LIMITED WARRANTY COVERS: The warrantor warrants that the Product and battery (individually and collectively, the “Warranted Items”) are free from defects in material and workmanship. If, in the opinion of Company, a Warranted Item is defective and the defect is within the terms of this Warranty, Company's sole obligation will be to repair or replace such defective Warranted Item (including by providing service, parts and labor, as applicable), at the option of Company, and such repair or replacement shall be at either the End-User's location, Company's site, or such other location as determined by Company. All Warranted Items returned to Company and all parts replace by Company shall become the property of Company. Expenses for any labor to repair the Warranted Item beyond the initial ninety (90) days are the sole responsibility of the End-User.

PROCEDURES FOR REPAIR OR REPLACEMENT OF WARRANTED ITEMS: When shipment is required of End-User: When Company determines that the Warranted Item will be repaired or replaced at a Company site or such other location, and the End-User must ship to Company the defective Warranted Item, the following procedures are required.

WARRANTY

If the Warranted Item is to be replaced by Company, and the End-User supplies a credit card number or purchase order for the value of the replacement Product, Company will use commercially reasonable business efforts to ship (via standard ground shipment and at no cost to the End-User) the replacement Warranted Item to the End-User within one (1) business day after Company receives notice of the warranty claim. In such case, the End-User must return (at Company's expense) the defective Warranted Item to Company in the same packaging as the replacement Warranted Item received by the End-User or as otherwise instructed by Company. If Company does not receive the defective Warranted Item, Company will either charge the End-User's credit card, or send the End-User an invoice (which the End-User agrees to pay), for the value of the replacement Product.

If the Warranted Item is to be replaced by Company, but the End-User is unwilling or unable to supply a credit card number or purchase order for the value of the replacement Product, Company will use commercially reasonable business efforts to ship (via standard ground shipment and at no cost to the End-User) the replacement Warranted Item to the End-User within one (1) business day after Company receives the defective Product from the End-User.

In any case, Company will provide shipping instructions and will pay its designated carrier for all shipping charges for return of defective equipment and replacement of Warranted Items. Any returned Warranted Item or parts that are replaced may be new or reconditioned. All Warranted Items returned to Company and all parts replaced by Company shall become the property of Company.

WHAT THIS LIMITED WARRANTY DOES NOT COVER: This Warranty does not cover any defects or damages caused by: (a) failure to properly store the Product before installation, including the charge of batteries no later than the date indicated on the packaging; (b) shipping and delivery of the Product if shipping is FOB Factory; (c) neglect, accident, abuse, misuse, misapplication, or incorrect installation; (d) repair or alteration not authorized in writing by Company personnel or performed by an authorized Company Customer Service Engineer or Agent; (e) improper testing, operation, maintenance, adjustment, or modification of any kind not authorized in writing by Company personnel or performed by an authorized Company Customer Service Engineer or Agent; or (f) use of the Product under other than normal operating conditions or in a manner inconsistent with the Product's labels or instructions.

This Warranty is not valid if the Product's serial numbers have been removed or are illegible. Any Warranted Items repaired or replaced pursuant to this Warranty will be warranted for the remaining portion of the original Warranty subject to all the terms thereof.

Company shall not be responsible for any charges for testing, checking, removal, or installation of Warranted Items.

COMPANY DOES NOT WARRANT EQUIPMENT NOT MANUFACTURED BY COMPANY. IF PERMITTED BY THE APPLICABLE MANUFACTURER, COMPANY SHALL PASS THROUGH SUCH MANUFACTURER'S WARRANTIES TO END-USER.

COMPANY DOES NOT WARRANT SOFTWARE, INCLUDING SOFTWARE EMBEDDED IN PRODUCTS, THAT IS NOT CREATED BY COMPANY. WITHOUT LIMITING THE FOREGOING, COMPANY SPECIFICALLY DOES NOT WARRANT SOFTWARE (SUCH AS LINUX) THAT WAS CREATED USING AN "OPEN SOURCE" MODEL OR IS DISTRIBUTED PURSUANT TO AN OPEN SOURCE LICENSE.

THIS WARRANTY IS THE SOLE AND EXCLUSIVE WARRANTY OFFERED BY COMPANY WITH RESPECT TO THE PRODUCTS AND SERVICES AND, EXCEPT FOR SUCH FOREGOING WARRANTY COMPANY DISCLAIMS ALL OTHER WARRANTIES INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTIES OF MERCHANTABILITY, TITLE, NON-INFRINGEMENT, AND FITNESS FOR A PARTICULAR PURPOSE. CORRECTION OF NON-CONFORMITIES IN THE MANNER AND FOR THE PERIOD OF TIME PROVIDED ABOVE SHALL CONSTITUTE COMPANY'S SOLE LIABILITY AND END-USER'S EXCLUSIVE REMEDY FOR FAILURE OF COMPANY TO MEET ITS WARRANTY OBLIGATIONS, WHETHER CLAIMS OF THE END-USER ARE BASED IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY), OR OTHERWISE.

LIMITATION OF LIABILITY: The remedies of the End-User set forth herein are exclusive and are the sole remedies for any failure of Company to comply with its obligations hereunder. In no event shall Company be liable in contract, in tort (including negligence or strict liability), or otherwise for damage to property or equipment other than the Products, including loss of profits or revenue, loss of use of Products, loss of data, cost of capital, claims of customers of the End-User or any special, indirect, incidental, or consequential damages whatsoever. The total cumulative liability of Company hereunder whether the claims are based in contract (including indemnity), in tort (including negligence or strict liability) or otherwise, shall not exceed the price of the Product on which such liability is based.

Company shall not be responsible for failure to provide service or parts due to causes beyond Company's reasonable control.

END-USER'S OBLIGATIONS: In order to receive the benefits of this Warranty, the End-User must use the Product in a normal way; follow the Product's user's guide; and protect against further damage to the Product if there is a covered defect.

OTHER LIMITATIONS: Company's obligations under this Warranty are expressly conditioned upon receipt by Company of all payments due to it (including interest charges, if any). During such time as Company has not received payment of any amount due to it for the Product, in accordance with the contract terms under which the Product is sold, Company shall have no obligation under this Warranty. Also during such time, the period of this Warranty shall continue to run and the expiration of this Warranty shall not be extended upon payment of any overdue or unpaid amounts.

COSTS NOT RELATED TO WARRANTY: The End-User shall be invoiced for, and shall pay for, all services not expressly provided for by the terms of this Warranty, including without limitation, site calls involving an inspection that determines no corrective maintenance is required. Any costs for replacement equipment, installation, materials, freight charges, travel expenses, or labor of Company representatives outside the terms of this Warranty will be borne by the End-User.

OBTAINING WARRANTY SERVICE: In the USA, call the Customer Reliability Center 7x24 at 800-356-5737. Outside of the USA, contact your local Eaton product sales or service representative. For comments or questions about this Warranty, write to the Customer Quality Representative, 3301 Spring Forest Road, Raleigh, North Carolina 27616 USA.

Load Protection Guarantee (US and Canada)

Eaton UPS Models 3105, 5110, 5115, 5125, 5130, 9120, 9125, 9130, 9135, 9140, 9150, 9155, 9170+, and FERRUPS

GUARANTOR: The Guarantor for the load protection guaranty set forth herein is Eaton Corporation, an Ohio Corporation company (“Company”).

LIMITED GUARANTY: This load protection guaranty (this “Guaranty”) applies only to the original End-User (the “End-User”) of any Eaton 3105, 5110, 5115, 5125, 5130, 9120, 9125, 9130, 9135, 9140, 9150, 9155, 9170+, and FERRUPS Products (individually and collectively, the “Product”) and cannot be transferred. This Guaranty applies even in the event that the Product is initially sold by Company for resale to an End-User.

WHAT THIS GUARANTY COVERS: For the lifetime of the Product, Guarantor promises to repair or replace, at Guarantor’s option, the equipment (valued up to the limits shown below*) that is damaged by an AC power line surge, spike, or other transient when properly connected to Guarantor’s uninterruptible power system (“UPS”). Reimbursement for or restoration of data loss excluded. This Guaranty applies only if all of the following circumstances arise:

1. The UPS is plugged into properly grounded and wired outlets, using no extension cords, adapters, other ground wires, or other electrical connectors;
2. The installation of the UPS complies with all applicable electrical and safety codes described by the National Electrical Code (NEC);
3. The UPS was used under normal operating conditions and in accordance with all labels and instructions; and
4. The UPS was not damaged by accident (other than AC power line transient), misuse, or abuse.

***Cumulative Limits to be paid by Guarantor under this Load Protection Guaranty:**

- ▶ \$25,000 for Eaton UPS Model 3105
- ▶ \$150,000 for Eaton UPS Models 5110, 5115, 5125, and 5130
- ▶ \$250,000 for Eaton UPS Models 9120, 9125, 9130, 9135, 9140, 9150, 9155, 9170+, and FERRUPS products

WHAT THIS GUARANTY DOES NOT COVER: Any reimbursement or repair to End-User’s equipment does not include reimbursement for or restoration of any data loss. This Guaranty does not cover any defects or damages caused by: (a) failure to properly store the Product before installation, including the charge of batteries no later than the date indicated on the packaging; (b) shipping and delivery of the Product if shipping is FOB Factory; (c) neglect, accident, abuse, misuse, misapplication, or incorrect installation of Product; (d) repair or alteration of Product not authorized in writing by Company personnel or performed by an authorized Company Customer Service Engineer or Agent; (e) improper testing, operation, maintenance, adjustment, or modification of any kind to the Product not authorized in writing by Company personnel or performed by an authorized Company Customer Service Engineer or Agent; or (f) use of the Product under other than normal operating conditions or in a manner inconsistent with the Product’s labels or instructions.

This Guaranty is not valid: (a) unless the End-User returns to Company the Warranty Registration Card within thirty (30) days of purchase; or (b) if the Product’s serial numbers have been removed or are illegible.

Company shall not be responsible for any charges for testing, checking, removal, or installation of any items.

LIMITATION OF LIABILITY: THE REMEDIES OF THE END-USER SET FORTH HEREIN ARE EXCLUSIVE AND ARE THE SOLE REMEDIES FOR ANY FAILURE OF COMPANY TO COMPLY WITH ITS OBLIGATIONS HEREUNDER. EXCEPT AS OTHERWISE PROVIDED FOR IN THIS GUARANTY, IN NO EVENT SHALL COMPANY BE LIABLE IN CONTRACT, IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY), OR OTHERWISE FOR DAMAGE TO PROPERTY OR EQUIPMENT OTHER THAN THE PRODUCTS, INCLUDING LOSS OF PROFITS OR REVENUE, LOSS OF USE OF PRODUCTS, LOSS OF DATA, COST OF CAPITAL, CLAIMS OF CUSTOMERS OF THE END-USER OR ANY SPECIAL, INDIRECT, INCIDENTAL, OR CONSEQUENTIAL DAMAGES WHATSOEVER. THE TOTAL CUMULATIVE LIABILITY OF COMPANY HEREUNDER WHETHER THE CLAIMS ARE BASED IN CONTRACT (INCLUDING INDEMNITY), IN TORT (INCLUDING NEGLIGENCE OR STRICT LIABILITY) OR OTHERWISE, SHALL NOT EXCEED THOSE SET FORTH ABOVE.

Company shall not be responsible for failure to provide repair or replacement under this Guaranty due to causes beyond Company's reasonable control.

END-USER'S OBLIGATIONS: In order to receive the benefits of this Guaranty, the End-User must use the Product in a normal way; follow the Product's user's guide; and protect against further damage to the Product if there is a covered defect.

OTHER LIMITATIONS: Company's obligations under this Guaranty are expressly conditioned upon receipt by Company of all payments due to it (including interest charges, if any). During such time as Company has not received payment of any amount due to it for the Product, in accordance with the contract terms under which the Product is sold, Company shall have no obligation under this Guaranty.

COSTS NOT RELATED TO GUARANTY: The End-User shall be invoiced for, and shall pay for, all services not expressly provided for by the terms of this Guaranty, including without limitation, site calls involving an inspection that determines no corrective maintenance is required. Any costs for replacement equipment, installation, materials, freight charges, travel expenses, or labor of Company representatives outside the terms of this Guaranty will be borne by the End-User.

TO MAKE A CLAIM: In the USA, call the Customer Reliability Center 7x24 at 800-356-5737. Outside of the USA, contact your local Eaton product sales or service representative. For comments or questions about this Load Protection Guaranty, write to the Customer Quality Representative, 3301 Spring Forest Road, Raleigh, North Carolina 27616 USA.

WARRANTY

Alarm Code Summary

See "Troubleshooting" on page 107 for more information.

| | | | | | |
|---|------|------------------|---|------|------------------|
| A | •– | Low Battery | L | •–•• | Check Charger |
| B | –••• | Near Low Battery | M | –– | Check Battery |
| C | –•–• | High Battery | N | –• | Check Inverter |
| D | –•• | Low Runtime | O | ––– | Memory Check |
| E | • | Low AC Output | P | •––• | Emergency PwrOff |
| F | ••–• | High AC Output | Q | ––•– | Hi PFM Res Temp |
| G | ––• | Output Overload | R | •–• | Probe Missing |
| H | •••• | Hi Ambient Temp | S | ••• | High AC Input |
| I | •• | Hi Heatsink Temp | T | – | Call Service |
| J | •––– | User Test Alarm | W | •–– | Fan Alarm |
| K | –•– | Hi Transfmr Temp | | | |



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