ICL SERIES BATTERY CHARGERS
USER MANUAL

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ORIGINAL SAFETY AND OPERATING INSTRUCTIONS

This manual is for the Delta-Q Technologies ICL Series (900, 1200, & 1500) Industrial Battery Chargers. Read and comprehend this document fully before handling or working with any ICL Series battery chargers. Important safety, operating, and installation instructions are included. As well, this manual includes a link to a list of fault codes and error codes that help engineers take steps quickly to resolve issues.

Read this information in its entirety before using your Delta-Q Technologies charger. Save these instructions.

For technical support, contact the manufacturer or distributor of your vehicle or machine, as their version of this charger may require unique operating instructions. For additional product documentation, see www.delta-q.com/resources.

Warning

Use the charger only with a charging algorithm that is appropriate to the specific battery type and capacity. Other usage may cause personal injury and damage. Lead acid batteries may generate explosive hydrogen gas during normal charging. Keep sparks, flames, and smoking materials away from batteries. If this charger is used with lithium-ion type batteries, an integrated battery management system (BMS) must be used. The BMS must ensure that, in all operating modes, the battery cells are protected from inappropriate levels of voltage, current, temperature, and state of charge. Do not operate the charger in a closed-in area or restrict ventilation. Never charge a frozen or non-rechargeable battery. Observe all battery manufacturers' precautions (e.g., maximum charge rates and if cell caps should be removed while charging).

Danger

Risk of electric shock. Connect charger power cord to an AC outlet that has been properly installed and grounded in accordance with all local codes and ordinances. A grounded AC outlet is required to reduce the risk of electric shock—do not use ground adapters or modify the plug. Do not touch uninsulated portions of the output connector or uninsulated battery terminals. Disconnect the AC supply before making or breaking the connections to the battery. Do not open or disassemble the charger. Do not operate this charger if the AC supply cord or DC output cord is damaged or if the charger has received a sharp blow, been dropped, or is damaged in any way. Refer all repair work to the manufacturer or qualified personnel. This charger is not intended for use by persons (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge on electrical systems and battery charging, unless they have been given supervision or instruction concerning use of the charger by a person responsible for their safety. Children should be supervised to ensure they do not play with the charger.

Instructions importantes concernant la sécurité

Conserver ces instructions. Ce manuel contient des instructions importantes concernant la sécurité et le fonctionnement.

Attention

Utiliser le chargeur seulement avec un algorithme approprié au type et capacitie spécifique de batterie. D´autres types de batteries pourraient éclater et causer des blessures ou dommages. Les batteries au plomb peuvent produire des gaz explosifs en service normal. Ne jamais fumer près de la batterie et éviter toute étincelle ou flamme nue à proximité des batteries. Si ce chargeur est utilisé avec des batteries au lithium-ion, un système de gestion des batteries intégrés doit être utilisé. Le système de gestion des batteries doit assurer que dans tous les modes de fonctionnement, les cellules de la batterie sont protégées contre les niveaux inappropriés de tension, de courant, de température et d'état de charge. Fournissez une ventilation adéquate du chargement. Ne chargez jamais une batterie gelée ou non rechargeable. Prendre connaissance des mesures de précaution spécifiées par le fabricant de la batterie, p. ex., vérifier s´il faut enlever les bouchons des cellules lors du chargement, et les taux de chargement.

Danger

Risque de décharge électrique. Ne pas toucher les parties non isolées du connecteur de sortie ou les bornes non isolées de la batterie. Toujours connecter le chargeur à une prise de courant mise à la terre. Déconnectez la source CA avant de faire ou défaire les connections à la batterie en chargement. Ne pas utiliser le chargeur si le cordon d’alimentation CA est endommagé ou si le chargeur est abîmé suite à une chute ou autre incident. Ne pas ouvrir ni désassembler le chargeur – référer toute reparation aux personnes qualifiées. Cet appareil n’est pas destiné à un usage par des personnes (dont les enfants) avec des facultés motrices, sensorielles ou mentales réduites, ou ayant une expérience et des connaissances insuffisantes, à moins qu’elles sont sous la supervision ou reçoivent les instructions sur l’utilisation de l’appareil d’un répondant garant de leur sécurité. Les enfants devraient être surveillés afin qu’il ne jouent en aucun temps avec l’appareil.

SAFE OPERATING INSTRUCTIONS

- The charger contains up to 25 selectable charging algorithms stored in its internal memory to charge batteries. These algorithms are specific to each manufacturer and model of battery. Your equipment supplier or charger distributor is responsible for ensuring the active charge algorithm matches the battery pack charging requirements. Contact them with any questions about which algorithm to select for each battery pack.
- The charger may become hot during charging. Use hand protection to safely handle the charger when charging.
- To maintain safe operations, the unit automatically reduces its output power if the temperature rises above set thresholds, or if the AC input voltage is too low.
- If power is interrupted, and then returns, the charger restarts and continues to operate without hazard to the user, or damage to the batteries.
- Unplug the charger from both AC and DC sources when cleaning, moving, or conducting any maintenance or repair on the charger. No user serviceable parts are inside. Do not remove the cover due to the risk of electrical shock.
- Do not expose the charger to oil, dirt, mud, or direct heavy water spray when cleaning the vehicle or machine.
- All connectors between the battery charger and the battery should be regularly inspected for corrosion and contamination as these can cause overheating and can be a fire hazard.
- If the detachable AC input power cord set or DC output cord is damaged, do not use the charger until they are replaced with cord sets appropriate to your region and application.
- When mated with a Delta-Q Technologies sealed AC cord, the charger meets IP66 specifications, making it dust-tight and protected against powerful water jets. If a cord set with an unsealed connector is used, the plug and connector must be periodically inspected to ensure the contacts are clean and dry.
    - If this charger is provided with an AC cord set and the power plug does not match the power outlet, contact the equipment manufacturer, distributor, or Delta-Q Technologies for the correct AC cord set terminating with a 3-prong plug suitable for your region's grounded power outlet.
    - In North America (and other 120V AC regions), the AC cord must be a 3-conductor UL Listed/ CSA approved detachable cord set at least 1.8m in length (≥ 6 feet), minimum 16 AWG and rated SJT; rated 105˚C min, and terminated with 125V, 13A, or greater connector.

    - In Japan, the AC cord must be a 3-conductor PSE approved detachable AC cord set, rated 105˚C, and terminated with 100V, 15A, or greater connector.
    - In 220-240VAC regions, the AC cord must be a 3-conductor safety-approved cord set, with 1.5mm² conductors (min.), rated appropriately for industrial use. The cord must be terminated on one end with a grounding type input plug appropriate for use in the country of destination; both plug and connector should be rated 250V, 10A, or greater.
- Extension cords must be 3-wire cords no longer than 30m (100') at 10 AWG or 7.5m (25') at 16 AWG, per UL guidelines.

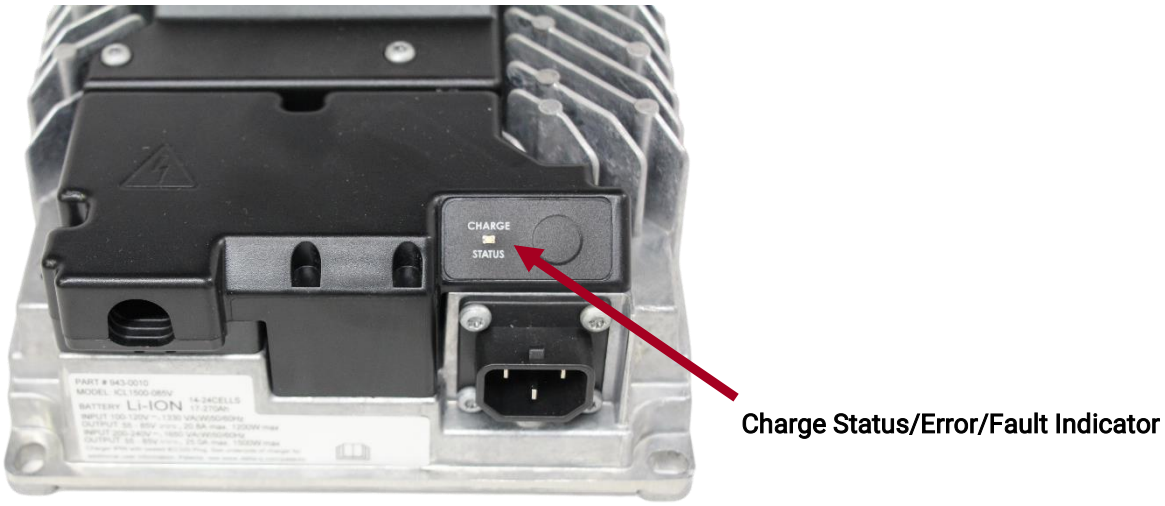
EMC DECLARATION

The ICL Series 900, 1200, and 1500 models have been tested and found to comply with the limits for a **Class B** digital device, pursuant to part 15 of the FCC Rules for the United States and the ICES Regulations for Canada. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

CHARGER INTERFACE

Not all ICL Series chargers have the same user interface (UI). The following is an example:



The **Charge Status/Error/Fault Indicator** behavior is described as follows:

Status	LED Operation
No AC	OFF
Charging: battery at low state of charge	Slow GREEN breathing
Charging: battery at high state of charge	Fast GREEN breathing
Charge Complete	Solid GREEN
Error	Rapid AMBER flashing
Fault	Solid RED

CHARGING ALGORITHMS

Almost every model of battery has different charging requirements and each application may add to those requirements. Delta-Q Technologies has established over 200 charge algorithms for the most common motive deep cycle batteries. These algorithms are designed to get the longest battery life and meet a variety of application environments.

All ICL chargers have charging algorithms even if the charger does not have a UI. The algorithms are specific to each manufacturer and model of battery. Your equipment supplier or charger distributor is responsible for ensuring the active charge algorithm matches the battery pack charging requirements. Contact them for information on selecting and/or changing the charging algorithm or any questions regarding the default algorithm, the other algorithms on the charger, and which algorithm to select for each battery pack.

FAULT AND ERROR CODES

Visit the Delta-Q Technologies support website at https://support.delta-q.com and search for **fault and error codes** to review recommended actions.

IDENTIFYING THE CHARGER SERIAL NUMBER

The serial number is printed on the front of the charger. Use this number when requesting technical support.

ACRONYMS

The following table provides acronym definitions used within this guide.

Term	Definition
AC	Alternating Current
AWG	American Wire Gauge
BMS	Battery Management System
CFM	Cubic Feet Per Minute
DC	Direct Current
EMC	Electromagnetic Compliance
FCC	Federal Communications Commission
HV	High Voltage
HW	Hardware
ICES	Interference-Causing Equipment Standard
ID	Identification
kW	Kilowatt
LED	Light Emitting Diode
LIN	Local Interconnect Network
LV	Low Voltage
MB	Megabyte
MCU	Microcontroller - also abbreviated uC or µC
NMT	Network Management
SJTW	Hard Service Cord
SW	Software
TBD	To Be Determined
UL	Underwriters Laboratories
USB	Universal Serial Bus
V	Volt
VAC	Volts Alternating Current

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