



ICT CHARGER SERIES

INSTRUCTION MANUAL



INNOVATIVE CIRCUIT TECHNOLOGY LTD.

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IMPORTANT SAFETY INSTRUCTIONS

SAVE THESE INSTRUCTIONS. THIS MANUAL CONTAINS IMPORTANT SAFETY AND OPERATING INSTRUCTIONS.

WORKING IN THE VICINITY OF A LEAD-ACID BATTERY IS DANGEROUS. BATTERIES GENERATE EXPLOSIVE GASES DURING NORMAL BATTERY OPERATION. FOR THIS REASON IT IS OF THE UTMOST IMPORTANCE THAT EACH TIME BEFORE USING YOUR CHARGER, YOU READ AND FOLLOW THE INSTRUCTIONS PROVIDED EXACTLY.

- ▶ **CAUTION!** This charger is intended for lead acid batteries only.

- ▶ Never charge a frozen battery.

- ▶ Study all battery manufacturer's specific precautions such as removing or not removing cell caps while charging and recommended rates of charge.

- ▶ To reduce the risk of explosion, follow these instructions and those marked on the battery, and never have an open flame or spark in the vicinity of the battery.

- ▶ Never place the charger directly above or below the battery. Gases and fluids from the battery can corrode and damage the charger.

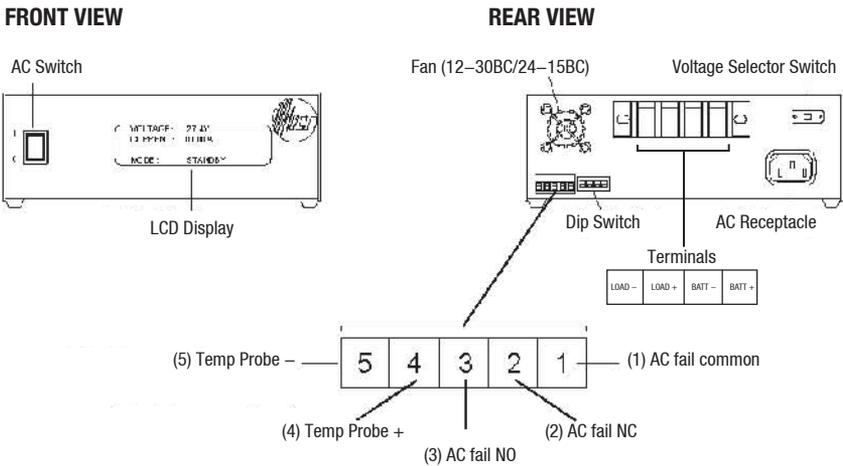
- ▶ Do not operate the charger in restricted ventilation or closed-in areas.

- ▶ Be sure voltage selector is in the correct voltage position before connecting AC power.

PRODUCT DESCRIPTION

The ICT Charger Series is microprocessor controlled and operates as a DC backup system, designed to regulate the battery charging cycle while maintaining power to the load. These instructions will assist you in setting up your charger and understanding how it operates.

Figure 1 The ICT Charger Series, External View



TEMPERATURE COMPENSATION

This feature always charges the battery to the correct levels regardless of ambient temperature. Battery temperatures must be limited to -20°C to $+50^{\circ}\text{C}$. Outside of these temperatures damage to the battery may occur.

SETUP

- ▶ Set the voltage selector switch to the correct input voltage (115 VAC or 230 VAC).
- ▶ Set the DIP switch at the rear of the charger to the correct charge rate using the Battery Selection Tables in this manual.
- ▶ Connect the 12V or 24V (depending on model) equipment to the load terminals on back of unit.
- ▶ Connect the lead acid battery to the battery terminals on back of unit.
- ▶ If the temperature probe option was ordered (ICT-TSP-10), plug it into pin 4 and 5 of P10 on back of unit, with the probe end as close to the battery post as possible.
- ▶ Connector P10 pins 1, 2 & 3 are dry contact relay terminals for sensing an AC failure. Pin 1 is common, Pin 2 is normally closed and Pin 3 is normally open when power is off. When AC power is available the relay is energized.
- ▶ Plug the enclosed power cord into the AC receptacle on back of unit, plug the other end into a 115 or 230 VAC outlet.
- ▶ Turn AC switch on front panel to **ON** position.
- ▶ The terminals of the charger must be inaccessible in the final installation. Install only where direct access is not available, such as a protective rack, enclosure or restricted access location. An insulating barrier may also be used to cover the terminals.

CHARGER FEATURES

- ▶ Fully automatic microprocessor–controlled three stage charge cycle for fast and optimum battery charging.
- ▶ Charges a wide range of lead–acid batteries.
- ▶ Charge current can be set for optimal charging of a wide range of batteries.
- ▶ Undervoltage lockout ensures the battery is never over–discharged. 12V models are preset to 10.0VDC and 24V models are preset to 20.0VDC (preset by internal pot).
- ▶ Timer backup feature helps prevent overcharging the battery.
- ▶ Periodic refresh feature recharges battery every 20 days to keep battery active and fully charged.
- ▶ Graphical LCD display shows the voltage level, current level and charging status.
- ▶ Buzzer alarm when AC power fails and battery is attached (can be disabled).
- ▶ AC good output for external monitoring.
- ▶ Reverse polarity protection on battery input.

PRODUCT NOTES

- ▶ Always turn the Charger off before making any changes to the circuit. For example, turn the AC power off when changing the battery.
- ▶ To avoid unnecessary current drain, do not leave the battery connected to the Charger with AC power off for long periods of time.
- ▶ Avoid drawing a continuous load current greater than 30 Amps from the battery to avoid damaging the internal protection relay.
- ▶ Adjustment of the output voltage using the internal potentiometer is not recommended, as it will also affect the voltage levels while charging a battery.
- ▶ While the ICT Charger Series is designed to operate over a wide range of temperatures the service life of a battery is shortened considerably when used at temperatures over 30°C. Never attempt to charge a frozen battery.
- ▶ Although it is possible to charge batteries more quickly using a higher charging current, (as set by the DIP switches) it is not recommended. High current charging can cause excess heating of the battery resulting in a shorter service life. Please consult the battery specifications for manufacturer's recommendations.
- ▶ To reduce noise, the line cord ground prong must connect to a solid earth ground.
- ▶ The charger should be installed in a dry, cool, and well ventilated location.
- ▶ When connecting a battery to the charger, be sure to provide suitable over current protection at the battery terminals to protect the wiring.

PRODUCT SPECIFICATIONS

Table 1 Product Specifications

	ICT22012-12BC	ICT22012-20BC	ICT22012-30BC	ICT22024-5BC	ICT22024-10BC	ICT22024-15BC
Input Voltage Range	90–130/ 180–265 VAC	90–130/ 180–265 VAC	90–130/ 180–265 VAC	100–130/ 180–265 VAC	100–130/ 180–265 VAC	100–130/ 180–265 VAC
Output Voltage	13.8 VDC +/- 1.2 V	13.8 VDC +/- 1.2 V	13.8 VDC +/- 1.2 V	27.6 VDC +/- 1.2 V	27.6 VDC +/- 1.2 V	27.6 VDC +/- 1.2 V
Output Current (Continuous)	10.0 Amps	17.0 Amps	25.0 Amps	4.5 Amps	8.0 Amps	13.0 Amps
Output Current (Peak)	12.0 Amps	20.0 Amps	30.0 Amps	5.5 Amps	10.0 Amps	15.0 Amps
Current Limiting	12.5 Amps	20.5 Amps	31.0 Amps	6.0 Amps	10.5 Amps	16.0 Amps
Recommended Battery Range	8–200 AH	16–360 AH	24–500 AH	4–100 AH	8–180 AH	12–250 AH
Line Regulation	0.20% (90–130 VAC)	0.20% (90–130 VAC)	0.20% (90–130 VAC)	0.20% (100–130 VAC)	0.20% (100–130 VAC)	0.20% (100–130 VAC)
Load Regulation	0.80% (1.0–12 Amps)	0.80% (1.0–20 Amps)	0.80% (1.0–30 Amps)	0.85% (1.0–4.5 Amps)	0.85% (1.0–8.0 Amps)	0.85% (0.5–13 Amps)
Output Ripple (Max)	20 mV RMS	20 mV RMS	20 mV RMS	25 mV RMS	25 mV RMS	27 mV RMS
Efficiency (Typical)	82%	82%	80%	80%	85%	85%
Operating Temperature	-20 to +40°C	-20 to +39°C	-20 to +40°C	-20 to +40°C	-20 to +40°C	-20 to +40°C
Output Fuse	15 Amps	25 Amps	40 Amps	10 Amps	15 Amps	20 Amps
Safety Approvals	CSA 107.2–01 and UL1012					

DESCRIPTION OF OPERATION

The ICT Charger Series is designed to function as a DC backup system. When AC power is available, the battery is charged and the load is powered at the same time. When AC power is not available, the load is powered by the battery.

The battery is charged in three stages. In Stage One, the battery is charged by a constant current based on the DIP switch settings. This current is maintained by varying the voltage applied to the battery.

During Stage Two, a fixed voltage is applied to the battery as it completes charging. When the battery is completely charged, the charger switches to Stage Three, where a float voltage is applied to keep the battery fully charged (see Figure 2 below).

The battery will start charging when one of the following conditions occurs:

- AC power is applied to the charger with the battery connected.
- The charger is plugged in and then the battery is connected.
- Twenty days has elapsed with AC power applied to the charger

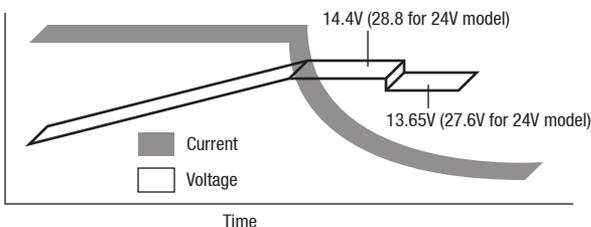
and the battery attached (**STANDBY** mode).

The battery will stop charging under either of the following conditions:

- The current charging the battery drops to a preset level indicating full charge.
- The charger has been in charge mode (**CHARGING** mode) for twenty hours.

The battery is protected against damage from over discharge, overcharge, and reverse connection. The charger has a fused input, current limiting, and various microprocessor and software protection features to ensure complete reliability.

Figure 2 The ICT Charger Series, Charging Profile



USER SWITCHES

The DIP switches allow the user to select the maximum charging current to the battery. The effects of the switches are shown in the table below.

Table 2 The ICT Charger Series, User Switch Descriptions

	ICT22012-12BC	ICT22012-20BC	ICT22012-30BC	ICT22024-5BC	ICT22024-10BC	ICT22024-15BC
	8AH/1.0A	16AH/2.0A	24AH/3.0A	4AH/0.6A	8AH/1.0A	12AH/1.5A
	16AH/2.0A	24AH/3.0A	48AH/6.0A	8AH/1.2A	16AH/2.0A	24AH/3.0A
	24AH/3.0A	40AH/5.0A	80AH/10.0A	12AH/1.8A	24AH/3.0A	40AH/5.0A
	40AH/5.0A	56AH/7.0A	112AH/14.0A	20AH/2.5A	32AH/4.0A	46AH/7.0A
	48AH/6.0A	72AH/9.0A	144AH/18.0A	24AH/3.0A	40AH/5.0A	72AH/9.0A
	56AH/7.0A	96AH/12.0A	160AH/20.0A	28AH/3.5A	48AH/6.0A	80AH/10.0A
	64AH/8.0A	112AH/14.0A	176AH/22.0A	32AH/4.0A	56AH/7.0A	96AH/12.0A
	80+AH/10.0A	136+AH/17.0A	200+AH/25.0A	36+AH/4.5A	64+AH/8.0A	104+AH/13.0A



Charge Rate
Buzzer
Selectors Enabled



Switches that are in the **UP** position are **ON**



Switches that are in the **DOWN** position are **OFF**



Not Relevant

NOTE: The recommended Amp-Hour (AH) value is meant to be a guideline, as the actual required charging current will vary by battery manufacturer. Consult your battery specification to find the maximum charging current for your battery.

TROUBLESHOOTING

Indicator Lights do not turn on:

- ▶ Check all power connections.
- ▶ Check battery connections for correct polarity.

No output with AC power on:

- ▶ Check for correct input voltage setting (115 or 230VAC).
- ▶ Check power connections.
- ▶ Disconnect battery.

No output with AC off and battery attached:

- ▶ Check that battery is connected with the correct polarity.
- ▶ Battery may be heavily discharged.
(Undervoltage lockout) Recharge the battery.

Battery takes too long to charge:

- ▶ Check that DIP switch settings are correct.
- ▶ As batteries age they become less efficient. Try new battery.

LIMITED WARRANTY

ICT Ltd. warrants to the original consumer purchaser that this product shall be in good working order, free from defects in materials and workmanship, for a period of one (1) year from the date of purchase. Should failure occur during the above stated time period, then ICT will, at its option, repair or replace this product at no additional charge except as set forth below. All parts, whether for repair or replacement, will be furnished on an exchange basis. All exchange pieces become the property of ICT. This limited warranty shall not apply if the ICT product has been damaged by unreasonable use, accident, negligence, disaster, service, or modification by anyone other than the ICT factory.

Limited warranty service is obtained by delivering the product during the above stated one (1) year warranty period to an authorized ICT dealer or ICT factory and providing proof of purchase date. If this product is delivered by mail, you will insure the product or assume risk of loss or damage in transit, and prepay shipping charges to the factory.

Every reasonable effort has been made to ensure that ICT product manuals and promotional materials accurately describe ICT product specifications and capabilities at the time of publication. However, because of ongoing improvements and updating of ICT products, ICT cannot guarantee the accuracy of printed materials after the date of publication and disclaims liability for changes, errors or omissions.

If this ICT product is not in good working order, as outlined in the above warranty, your sole remedy shall be repair or replacement as provided above. In no event will ICT be liable for any damages resulting from the use of or the inability to use the ICT product, even if an ICT employee or an authorized ICT dealer has been advised of the possibility of such damages, or for any claim by any other party.

ICT reserves the right to make changes without further notice to any products or documentation for improvement of reliability, function, or design.

ICT Ltd. does not recommend use of its products in life support applications wherein a failure or malfunction of the product may directly or indirectly threaten life or cause injury. The user of ICT products, which are to be used in life support applications as described above, assumes all risks of such use and indemnifies ICT against all damages.