CHARGER SERIES

INTRODUCTION

The ICT Charger Series is microprocessor controlled and operates as a battery monitoring system, programmed to regulate the three–stage battery charging cycle while maintaining load performance. This application note describes the features and operation of the series. For more detailed information or to discuss your application with us, please feel free to contact ICT using the information at the end of this document.

This information applies to models ICT22012–12BC, ICT22012–20BC, ICT22012–30BC, ICT22024–5BC, ICT22024–10BC and ICT22024–15BC.

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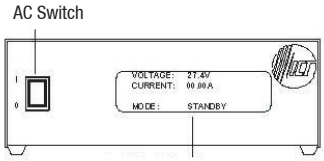
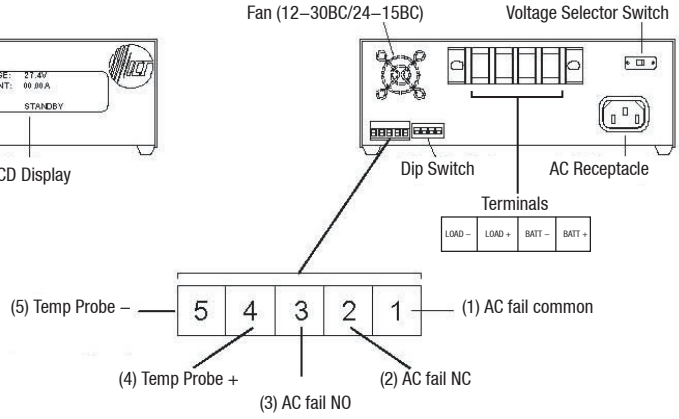
FRONT VIEW



REAR VIEW



EXTERNAL DESCRIPTION

LCD Display

Displays voltage level, current level and charging status.

Temperature Probe Input

This is the input for the optional temperature compensation probe. Allows charging of the battery to the correct level independent of ambient temperature.

DIP Switch

Selects maximum charging current, as well as disables the audible AC fail alarm.

Voltage Selector Switch

This switch selects 120 or 220Vac input voltage.

AC Good Remote Sense Output

For monitoring unit operation.

Terminals

High quality terminal block with screw type connectors.

Innovative Circuit Technology Ltd.
26921 Gloucester Way
Langley, British Columbia
Canada V4W 3Y3

Tel.604.856.6303
Fax.604.856.6365
technical@ict-power.com
www.ict-power.com

DN-104-C

CHARGER SERIES

FEATURES

- 120 / 220 VAC input selectable.
- Lighted AC rocker switch.
- 80% efficiency.
- Heavy duty screw terminal connectors.
- Separate terminal connectors for load and battery.
- DIP switch selectable maximum charging current.
- Fully automatic microprocessor–controlled three stage cycle for fast and optimum battery charging.
- Charges a wide range of lead–acid batteries.
- Current limited charging prevents battery damage.
- Relay protection of output.
- Under–voltage lockout ensures the battery is never over–discharged.
- Timer backup feature prevents overcharging the battery under any circumstances.
- Periodic refresh feature recharges battery every 20 days to keep battery active and fully charged.
- Front panel LCD display shows charging status.
- Switch selectable buzzer alarm when AC power fails and battery is attached.
- AC Remote sense output for monitoring unit operation.

Optional temperature compensation

- Always charges the battery to the correct levels independent of ambient temperature.
- Charging is limited from –20C to +50C (–4F to 122F) to prevent battery damage.

DESCRIPTION OF OPERATION

The battery is charged in three stages:

1. In Stage One, the battery is charged by a constant current based on the DIP switch setting. This current is maintained by controlling the voltage applied to the battery.

2. During Stage Two, a fixed voltage is applied the charging cycle is completed.

3. When the battery is completely charged, the charger switches to Stage Three, where a float voltage is applied to keep the battery fully charged.

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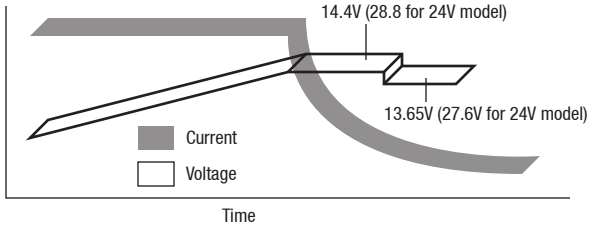
DESCRIPTION OF OPERATION (continued)



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 is attached (READY light on)

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

- The current charging the battery drops to the preset level (set by dip switch) indicating a full charge
- The charger has been in charge mode for twenty hours

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

SETUP PROCEDURE

1. Set the voltage selector switch to the correct input voltage (115 or 230 VAC)
2. Set the DIP switch at the rear of the charger to the correct charge rate using the Battery Selection Tables on the following page
3. Connect the 12V (or 24V) equipment to the load terminals at rear of unit
4. Connect the lead acid battery to the battery terminals at rear of unit
5. If the temperature probe option was ordered, plug it into the receptacle in the rear of the unit, with the probe end as close to the battery post as possible
6. Plug the enclosed power cord into the AC receptacle on the back of the unit, plug the other end into a 115 or 230 VAC outlet
7. Turn AC switch on front panel to ON position

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FREQUENTLY ASKED QUESTIONS

Question: How long will it take to recharge my battery?

To calculate the time required to charge a battery that is 90% depleted use the following formula.

t = 1.25 x (Cap / I)

t = Recharge Time in hours
Cap = Battery Capacity in Ah
I = Max Charging Current in Amps (see section 6.1)

For the time it takes to fully charge the battery add two to four hours onto the recharge time calculated to allow for stage 3 (float charge) to bring the battery to its maximum terminal voltage. Then add two to four hours to allow for the float charge to top up the last 10–20%.

Question: My application needs a little higher current (or voltage). Can these products be used in parallel or series?

The outputs of these products are fully isolated, so they can be connected in series or parallel without damage. However, using this product in parallel is not recommended and will provide no benefit because each product individually decides what charge stage to be in based on battery current and voltage as well as other factors. When two products are hooked in parallel, one will always have a slightly higher output voltage and be the dominant unit. The other unit will not be contributing any current, usually remaining in float stage or switching in and out of charge mode.

If charging a higher voltage battery bank is required, these products can be connected in series. Each charger should have both positive and negative terminals connected to the battery bank. If there are two 12V batteries in series to form a 24V bank, each 12V charger should be connected across one of the batteries. Connecting the two chargers in series without the center connection to the battery would result in incorrect charging.

It is also important to make sure the majority of the system load is off of the complete bank. If some of the load is taken off of the entire bank (in our example, 24V), and then a tap off of part of the bank (eg 12V) then the charger and battery in that part will be stressed unequally resulting in reduced system life.

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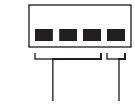
DIP SWITCH CONFIGURATIONS

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.

	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



 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.

NOTES

1. Always turn the Charger off before making any changes to the circuit. For example, turn the Charger off when changing the battery.

2. To avoid unnecessary current drain, do not leave the battery connected to the Charger with AC power off for long periods of time.

3. Avoid drawing a continuous load current greater than 30 Amps from the battery to avoid damaging the internal protection relay.

4. Adjustment of the output voltage using the internal potentiometer is not recommended, as it will also affect the voltage levels while charging a battery.

5. The ICT Charger Series is designed to operate over a wide range of temperatures, but the service life of a battery is shortened considerably when used at temperatures over 30 degrees Celsius. Never attempt to charge a frozen battery.

6. 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.

7. To reduce noise, the line cord ground prong must connect to a solid earth ground.

8. The charger should be installed in a dry, cool, and well–ventilated location.

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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					

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