



**Innovative Circuit  
Technology Ltd.**



**DC UPS Series 2**  
**INSTRUCTION MANUAL**  
855-146-200

**Models:**  
**ICT24012-15IBD**  
**ICT24012-15IBDM**  
**ICT24012-30IBDM**

 **WARNING**

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**Risk of serious personal injury or damage to equipment and property! Always observe the following:**

- Operate the supply from a grounded 3-pin 120Vac or 230Vac outlet (50 or 60Hz) with a branch circuit breaker rated 20A or less
- Ensure battery polarity is correct before connecting
- Replace battery fuse with same type and rating of part
- Do not attempt to charge a frozen battery
- Handle batteries with care, do not short circuit battery terminals

 **CAUTION**

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**Risk of personal injury or damage to equipment! Always observe the following:**

- Install in an indoor environment, keep sources of moisture away from unit
- Ensure the total power consumption of the load does not exceed the rated capacity of the unit output
- Do not block air inlet or outlet openings in the unit

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## INTRODUCTION

The ICT DC-UPS series of integrated backup dc power systems provide reliable dc power to a radio while precisely maintaining an internal back-up battery using an intelligent fast-charge algorithm. The wide ranging power factor corrected input supports operation worldwide while the built in battery is automatically connected to the output to provide instant backup power to the radio should the AC input power fail. A built in Low Voltage Disconnect (LVD) relay will protect the battery from over discharge after prolonged periods of backup operation when AC power is off. Features include:

- Dedicated independently controlled backup battery port with LVD relay and Intelligent 3-stage fast charge algorithm
- Built in 14.4Ahr sealed AGM battery with external battery protection fuse
- Zero transfer time for battery back-up of DC output when AC fails
- Wide range Power Factor corrected AC input supports operation world wide
- Optional front panel graphic display indicates output current, voltage, and charge rate
- Floating Form-C alarm contact output supports remote monitoring of unit operation

DC UPS Series 2 Model <sup>1</sup>	Output Voltage <sup>2</sup>	Max Output Current to Load	Continuous Output Current
ICT24012-15IBD	13.65V	15.0A <sup>3</sup>	12.0A
ICT24012-15IBDM	13.65V	15.0A	12.0A
ICT24012-30IBDM	13.65V	30.0A	30.0A

### Optional Configurations:

A variety of custom radio covers are available to incorporate popular Land Mobile Radios as part of a complete DC-UPS Series 2 powered base station. Contact ICT for additional information and availability.

Use With Radio	Complete DC UPS Series 2 Station (Standard Model)	Complete DC UPS Series 2 Station (with front Display)
XTL1500, XTL2500, XTL5000	CS240-15IBD/MOT12	CS240-15IBDM/MOT12

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<sup>1</sup> A suffix letter "M" at the end of the model number is added to denote versions with optional front graphic meter display

<sup>2</sup> Default AGM Float Voltage

<sup>3</sup> Max output current at less than 10% duty cycle

Use With Radio	Complete DC UPS Series 2 Station (Standard Model)	Complete DC UPS Series 2 Station (with front Display)
MOTOTRBO XPR4350/4380, XPR4550/4580, XPR4300, XPR4500	CS240-15IBD/MOT13	CS240-15IBDM/MOT13
APX 4500	CS240-15IBD/MOT17	CS240-15IBDM/MOT17
TK5720/5820, TK7160/8160, TK7180/8180	CS240-15IBDG/KEN11	CS240-15IBDGM/KEN11

## INSTALLATION

Perform a quick physical check of the unit as it is being taken out of the box to ensure it has not been damaged during shipping. Check for the included parts and accessories shipped with your unit:

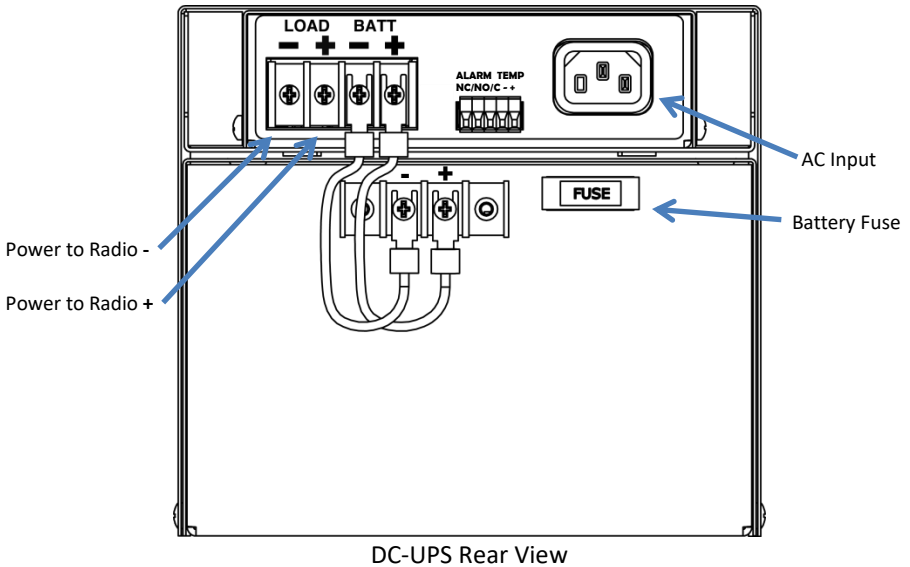
- 5 pin Form-C alarm connector plug (installed on unit)
- Power cord (North America 120V 15A)
- Output connector covers (installed on connectors)
- Battery Fuse (15A ATO type for 15A models, 30A ATO type for 30A model)
- Instruction Manual

### **WARNING**

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**Risk of serious personal injury or damage to equipment and property! Always observe the following!**

- Do not tie any of the LOAD and BATT terminals together, as this will bypass internal circuitry
  - Make a Ground connection to only a single LOAD or BATT terminal if required. Do not ground both LOAD and BATT as this will bypass internal circuitry
  - The internal LVD relay switches the BATT + terminal. Do not connect the battery + to any other terminal
  - AC input wiring to the charger must be protected using an outlet with a branch rated circuit breaker of 20A or lower value
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DC-UPS Rear View

**Mounting:**

Install the unit in a dry, cool, well ventilated location with restricted access to the back dc output terminals.

**Connect the DC-UPS:**

**Connect the external alarm monitoring** wiring to the Form-C alarm contact output if desired, using 22-26AWG wire clamped in the removable Alarm/Temp plug. (See Alarm Output Contacts table, below)

ALARM Pin	Name	Description
1	NC	Alarm State Normally Closed contact
2	NO	Alarm State Normally Open contact
3	C	Alarm output common

Alarm Output Contacts

The remote battery temperature compensation probe input is not normally used on DC-UPS units as they are typically used in indoor room temperature conditions. If a unit is to be operated in extreme temperature locations > 30°C, or < 10°C connect the optional temperature sensor probe (ICT-TMP) to the two TEMP inputs on the back panel connector. (Polarity does not matter) Connect the sensor probe to the battery box back panel using the adhesive backed clip supplied with the probe. The unit will then automatically adjust the output

voltage to better match the battery charging requirements at a given temperature.

**Wire the radio** to be powered by the DC-UPS directly to the LOAD +/- output terminals on the back panel. Remove the snap on connector cover and use appropriately sized wire with crimped on spade lugs sized to mate with the output terminal block.

**Check that the BATT DIP switch** settings on the charger back panel are in the factory default mode for the built in battery.

Model:	SW1	SW2	SW3	SW4
ICT24012-15IBD	1 (Up)	1 (Up)	1 (Up)	0 (Dn)
ICT24012-30IBD	1 (Up)	1 (Up)	0 (Dn)	0 (Dn)

**Check that all connections** to the charger are correct and tight; re-install the snap on connector cover

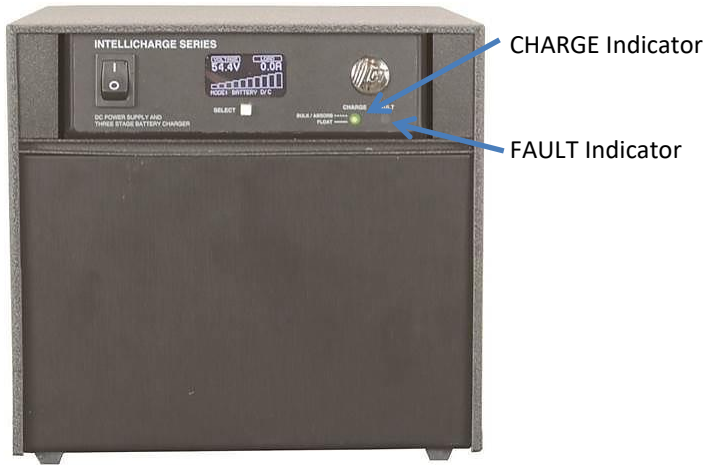
**Connect the AC power cord**, with the front panel switch in the off position.

**Install the Battery Fuse** (15A ATO type on 15IBD, 30A ATO type on 30IBD unit) supplied with the unit. Push into the back panel FUSE socket

## OPERATION

With the unit mounted, wired, and powered as described in the INSTALLATION section, perform the following check. Turn the front panel power switch to the ON position and check that the green CHARGE indicator on the front panel is flashing, indicating the battery is charging, or is lit continuously indicating the battery is charged.

On units equipped with the optional front graphic display check that the display is lit, and the output voltage reads approximately 13.65V to 14.4V. Press the SELECT button to switch the display to read the battery voltage and current. Note that the charge voltage and current will vary as the battery charges and the unit performs a charge cycle.



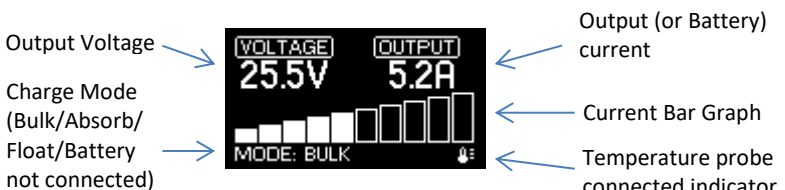
DC-UPS Front View (optional meter display shown)

The unit is now ready to power the radio, and charge the backup battery. If AC power should fail (or be switched off) the internal LVD relay will keep the battery connected to the LOAD output, to ensure there is no interruption in output power. Once the battery discharges to the LVD disconnection point the internal LVD relay will open the BATT+ lead to prevent over-discharging the battery. When AC power returns the unit will close the LVD contactor, and initiate a battery charge cycle.

Example Backup Time: The internal 14.4Ahr battery with an average radio draw of approximately 3A will typically maintain radio operation for about 2.5 to 3 hours when fully charged.

### Optional Front Graphic Display

An optional metering display is available on some DC-UPS models to show output voltage, output load current and battery current, plus an indication of the charge mode (Bulk, Absorb, or Float, or Battery not connected), Temperature Probe connection, and any faults or warnings. The typical home screen is as shown. Press the button below the display to turn on the display, and toggle the display between output load current and battery current measurements. Each step of the bar graph represents approximately a 10% increment in current. Note that the display will turn off after about 15 minutes from last use.



## Status Indicators and Alarms

The 2 LEDs on the front panel and the Form-C alarm contacts on the back indicate the status of the charger:

Alarm or Notification	Trigger Condition	LOAD Output	BATT LVD	Red FAULT LED	Green CHARGE LED
<b>Input AC OK, battery charging</b>	Normal operation, battery charging	Enabled	CLOSED	-	BLINK
<b>Input AC OK, battery charged</b>	Normal operation, battery fully charged	Enabled	CLOSED	-	ON
<b>AC Under-voltage Warning</b>	Triggers when Input Voltage drops below approx. 90Vac	Enabled	CLOSED	ON	-
<b>AC Fail</b>	AC fails or front switch is off (Battery above LVD level)	Battery power only	CLOSED	ON	OFF
<b>Battery Low</b> (when AC Off)	Triggers when battery voltage falls below the LVD threshold	OFF	OPEN	ON	OFF
<b>System Fault</b>	Indicates internal circuit fault - Clears when all fault conditions are cleared.	Battery power only	CLOSED	ON	OFF
<b>Battery Over Voltage Fault</b> (AC present)	Triggers when the battery voltage exceeds the internal OVP threshold for 3s	Enabled	OPEN	ON	OFF
<b>DC Overvoltage Shutdown</b>	Triggers when the Load output voltage rises above <b>16.5</b> for <b>3s</b> . Clears when Input power cycled off/on	Battery power only	CLOSED	ON	OFF
<b>Over-temperature Shutdown</b>	Triggers when internal temperature is too high. Clears when back to normal range.	Battery Power only	CLOSED	ON	OFF

The form-C alarm contact will be triggered for any condition that lights the red FAULT LED, or shuts down the output of the unit.



**EMC Note:** This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules and ICES 003. 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 RF technician for help.

## PRODUCT SPECIFICATIONS

AC Input (IEC C 14 connector): 100 to 254Vac 50/60Hz

Peak Efficiency (typical): 90%

	ICT24012-15ID	ICT24012-30ID
Output Voltage range ( <i>Operating point set by battery charge cycle</i> )	12 – 15.5V	12 – 15.5V
Max Output Current Limit at nominal rated output	15A	30A
Continuous Load Current Rating at nominal rated output	12A	30A
Output Power ( <i>Cont., at nominal V</i> )	165W	360W
Input Current ( <i>max at 100Vac</i> )	2.0A	4.3A
Idle DC Power Draw <sup>4</sup>	<200mW	<200mW
3-Stage Charge Parameters (at 25°C, +/- 100mV)		
Absorb V: (AGM)	14.55V	14.55V
Float V: (Default charge setting)	13.65V	13.65V
Temperature Compensation of V absorb and V float (with optional remote temp sensor ICT-TMP)	-30mV/°C	-30mV/°C
LVD Threshold V	11.0V	11.0V
LVD Reconnect Threshold V	12.5V	12.5V

Alarm Output: Form-C contact, 0.5A  
60Vdc max

DC Output Connector: Terminal Block, M4  
Screws, 9mm spade max  
width

Alarm Connector: 3 pins on 5 pin removable  
plug, cage clamp type 16 –  
28AWG

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<sup>4</sup> AC mains power off; backup battery connected; LVD open

Bat Temp Sensor Connector: 2 pins on 5 pin plug

Battery Size: 12V, 14.4Ahr AGM

Operating Temperature Range: -30C to +60°C<sup>5</sup>

Storage Temperature Range: -20 to +60°C<sup>6</sup>

Humidity: (Operating) 10 – 90% (non-condensing)  
 (Storage) 5 – 95% (non-condensing)

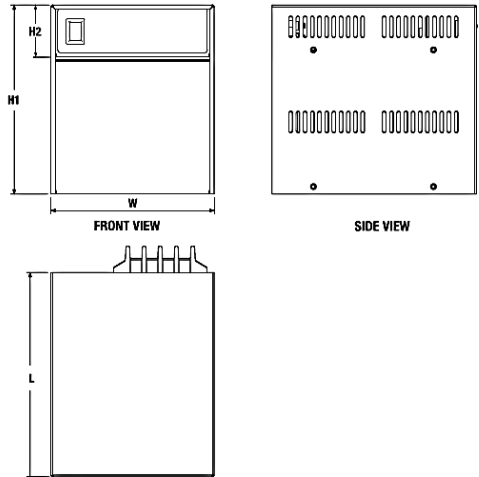
Cooling: Convection

Regulatory Compliance: Designed to meet  
 UL/CSA60950-1, Meets  
 FCC Part 15 Class B limits

Dimensions:

DIMENSIONS IN INCHES (MILLIMETRES)

L	W	H1	H2
7.6 (193)	7.1 (180)	6.6 (168)	1.8 (46)



Weight (lbs/kg): 17lbs/7.7kg

<sup>5</sup> De-rate output 1% per °C above 50°C. Install optional battery temperature sensor ICT-TMP for operation at > 30°C, or < 10°C

<sup>6</sup> Ensure battery is fully charged if unit is to be stored at < 0°C

## **ICT LIMITED WARRANTY**

ICT Limited Warranty is only intended for the benefit of the original Purchaser of this product. This Warranty is not transferable or assignable without the prior written permission of ICT. ICT's sole obligation and liability under this warranty is limited to either repairing or replacing defective products at the sole discretion of ICT. When repairing or replacing the products, ICT may use products or parts that are new, equivalent to new or re-conditioned. Parts repaired or replaced during the warranty period will be under warranty for the remainder of the warranty period.

The warranty period on ICT products purchased new from ICT is two years. The warranty period for a repaired product or part thereof is ninety (90) days or the remainder of the unexpired term of the new product warranty period, whichever is greater. Repair or replacement of a defective product or part does not extend the original warranty coverage period.

No claim will be accepted unless written notice of the claim is received by ICT in accordance with ICT's Return Material Authorization (RMA) procedure, as soon as reasonably possible after the defect is discovered. A valid product serial number must be provided with the RMA claim to prove eligibility. The RMA form is available on the ICT website at [www.ict-power.com/support/warranty-repair/](http://www.ict-power.com/support/warranty-repair/).

The Purchaser shall at their own risk and cost return the defective product to ICT's factory or designated repair center once an RMA is issued by ICT. Return of the products to the customer after repair is completed shall be prepaid by ICT unless otherwise mutually agreed between the parties. Products shipped to ICT which have incurred freight damage will not be covered by this Warranty and any repairs or replacement parts, components or products needed will be invoiced in the full current price amount and returned freight collect to Purchaser. It is the Purchaser's responsibility to check the product upon receipt for any damage during shipping and to contact the carrier or shipper regarding such damage. Product that is returned as defective, which is determined to operate within published specifications will be returned to the Purchaser freight collect.

Warranty commences on the date the product is shipped from the ICT manufacturing facility, or in the case of purchase through an authorized ICT reseller, not more than ninety (90) days after original shipment of this product by ICT.

ICT assigns to Purchaser any warranties which are made by manufacturers and suppliers of components of, or accessories for, the ICT product and which are assignable. ICT makes no representations as to the effectiveness or extent of such warranties, assumes no responsibility for any matters which may be

warranted by such manufacturers or suppliers and extends no additional coverage under this Warranty to such components or accessories.

In no event shall ICT be liable for any special, indirect or consequential damages such as, but not limited to, loss of use, business or goodwill, loss of revenue, or loss of profits, which may result, either directly or indirectly, from defects in products provided by ICT.

This Warranty will be void if the product has been subjected to misuse, neglect, accident, exposure to environmental conditions not conforming to the products' limits of operation, improper installation or maintenance, improper use of an electrical source, defects caused by sharp items or by impact pressure, a force majeure event, has been modified or repaired by anyone other than ICT or its authorized representative, has been subjected to unreasonable physical, thermal or electrical stress, improper maintenance, or causes external to the unit including but not limited to general environmental conditions such as rust, corrosive atmospheres, sustained temperatures outside the specified operating range of the equipment, exposure to power surges and/or electrical surges, improper grounding, mould or dust, animal or insect damage, water damage or immersion in liquid of any kind, or if the serial number has been altered, defaced, or removed.

ICT does not control the installation and use of any ICT product. Accordingly, it is understood this does not constitute a warranty of performance or a warranty of fitness for a particular purpose.

This Warranty represents the entire agreement between ICT and Purchaser with respect to the subject matter herein and supersedes all prior verbal or written communications, representations, understandings or agreements relating to this subject.

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