



# Application Note

## ICT DIGITAL SERIES POWER SUPPLIES Battery Backup and Parallel Operation

### OVERVIEW

The new ICT Digital Series is a high-current, high-efficiency DC power supply for wireless communications, broadband, industrial power, transportation, process control and DC in-building applications. It provides 1350 watts of output power in 12, 24 or 48 volts DC, and features a space saving 1RU design with 90 to 93% percent efficiency. The isolated design allows operation in positive or negative ground installations. Power factor correction helps further reduce power consumption. The Intelligent Power Control interface on the front panel displays system status, and allows the output voltage, current limit settings and the LVD disconnect and reconnect voltage set points to be adjusted quickly and accurately. The interface can be password protected.

TCP/IP Ethernet is available for remote monitoring and control of the power supply, and an available Battery Backup function provides float charging and automatic revert with an adjustable low-voltage disconnect. With the TCP/IP option installed, the power supply can be remotely monitored and controlled using a standard web browser. ICT Smart Parallel Operation allows up to six Digital Series power supplies to provide up to 8000 watts of output power.

### BATTERY BACKUP/LVD FUNCTION

The Digital Series Battery Backup option (models with 'B' designation) is intended for use in a single power supply installation, where the load is connected to the main output bus bars of the power supply, and a battery is connected to the positive BAT output terminal of the power supply (see diagram 1 and 1A for negative and positive ground examples).

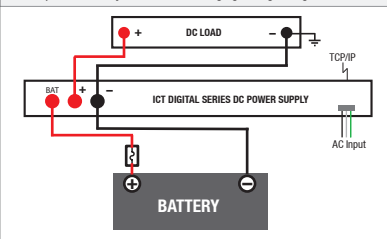


Battery Backup Terminal With Automatic Revert and LVD

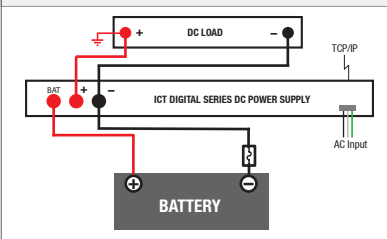
The BAT terminal provides a current limited charge up to the maximum rated output of the supply. When AC fails, the load is automatically and seamlessly transferred to the battery so that the load is not interrupted. When AC returns, the power supply picks up the load, and resumes charging the battery to an optimal state of charge. A built-in low voltage disconnect (LVD) protects the battery voltage from dropping too low, thereby avoiding damage to the battery. The voltage disconnect and reconnect set points can be adjusted by the user.

The intelligent battery backup option has been designed so that once AC power is restored, the constant voltage, constant current output of the Digital Series will simultaneously charge the battery and supply the load, thereby maintaining uptime while restoring the battery to its optimum state of charge as quickly as possible.

**Diagram 1 – Negative Ground Sites**  
ICT Digital Series With Battery Backup/LVD Option powers DC loads, provides float charging of battery, automatic revert when AC fails, and LVD to protect battery from over discharging in negative ground sites.



**Diagram 1A – Positive Ground Sites**  
ICT Digital Series With Battery Backup/LVD Option can be used in positive ground sites. Refer to Technical Note and Owner's Manual for important installation information.



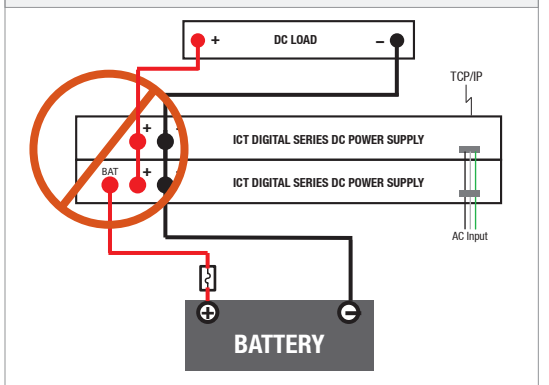
### TECHNICAL NOTE

Battery current through the BAT terminal on power supplies with the battery backup option must not exceed the maximum current limit rating of the Digital Series power supply. Always use a suitably rated over current protection device and disconnect in line with the BAT terminal.

The battery backup option is designed and rated to be used in a single power supply application. A 'B' version Digital Series should not be paralleled with one or more additional power supplies, otherwise damage may occur due to the potential for too much current to flow through the LVD relay (see Diagram 2).

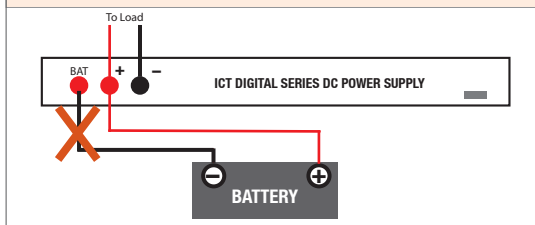
**Diagram 2**

A Digital Series power supply using the battery backup option should not be connected in parallel to two or more additional power supplies. This could result in damage due to too much current flowing through the LVD of the power supply with the BAT terminal.



### Warning:

Never connect the BAT terminal of the power supply to the negative output of a battery. The BAT terminal is connected internally through the LVD relay to the positive terminal of the power supply. Damage may result. Always connect the battery + terminal to the BAT (+) connector of the power supply.



### TECHNICAL NOTE:

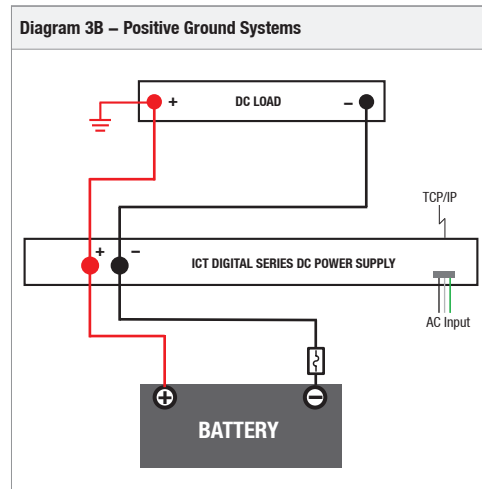
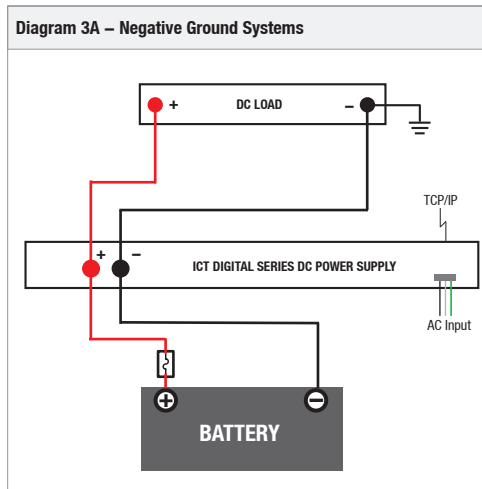
When using the LVD in a positive ground system (Diagram 1A), do not ground the positive terminal of the battery. System must only have a single ground connection, normally located at the power distribution or load point. An additional ground connection at the battery will allow current to bypass the LVD contactor, preventing the disconnection of the battery during a low voltage event.



## DIGITAL SERIES FOR CHARGING

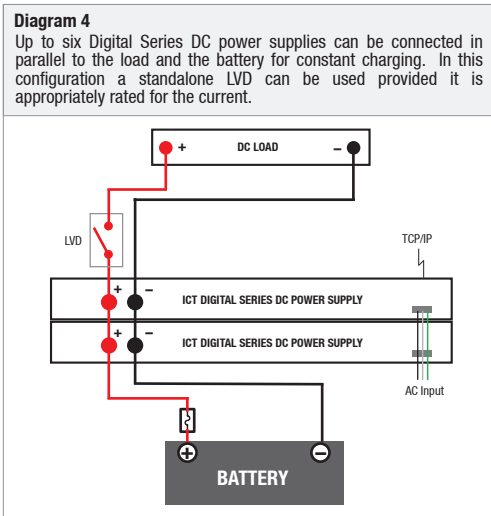
For installers who want the high-availability benefits of connecting their loads directly to the battery, the ICT Digital Series power supply makes an ideal dedicated charging system (see Diagram 3). The battery and DC load can be directly connected to the main output terminals of the power supply.

Since the ICT Digital Series features a fully isolated design, it can be installed in either positive ground or negative ground configurations (see Diagram 3A and 3B).



## PARALLEL OPERATION - Creating a Scalable DC Power System

The ICT Digital Series power supply can be connected in parallel, up to a maximum of six units, to create a scalable high power system capable of producing 8000 watts of output power for running DC loads directly, or for high current battery charging (see diagram 4).



### MASTER/SLAVE



The Digital Series utilizes Smart Parallel operation. When equipped with the TCP/IP Ethernet option, each Digital Series is connected with a jumper cable, and load balancing is completely automatic and optimized. Additionally, the user can select one Digital Series power supply to be the Master, which then monitors and controls all remaining power supplies in the stack. Features such as output voltage adjust and current limit setting can be done from the Master, which in turn will adjust all remaining Slave units.

The TCP/IP Ethernet connection allows the LAN port of the Master unit to communicate with the entire power system, and remote monitoring and control of the entire stack is achieved quickly and easily.

#### WARNING:

Units connected in parallel should not use the Battery Backup/LVD option, as there is a risk that the potential current could be higher than the rating of the low voltage disconnect relay, causing potential damage. Users wishing to use paralleled Digital Series power supplies should use an external LVD that is appropriately rated for the total current load of the system (see Diagram 4).