Smart Logging Power Configurations

Whether an indoor laboratory experiment or an extensive outdoor system, ICT can provide several power configuration options to suit any application. As with the sensor cable configuration of any system, the simplicity of the ICT power configurations is enhanced by the powerful versatility of the 3-wire Databus that is used for both power and data.

Power Configuration 1 - Mains Power to SL5 Logger and Databus

The SL5 data logger is installed with a 6V 7.2Ah battery that is suitable for powering all standard meteorological sensors and various other sensors in the ICT product line. The charging port of the SL5 will accept unregulated DC input voltages between 8 and 35 volts.

In the most basic setup, the SL5 logger can be used to power a set of sensors from its own internal battery and then recharged periodically. If mains power is available close to the SL5 logger, it can simply be powered or recharged with either a CH1 or CH7 charger. In this situation, the logger can be left permanently connected to the charger.

While the CH1 charger is only designed for connection to the SL5 charging port, the CH7 charger can also be connected to the Databus hubs to provide power to sensors that require a supply voltage greater than the 6V logger battery. The CH7 charger can power loads up to 2.5A. Figure 1 shows the connection of the CH7 charger to both the SL5 data logger and the Databus hub.

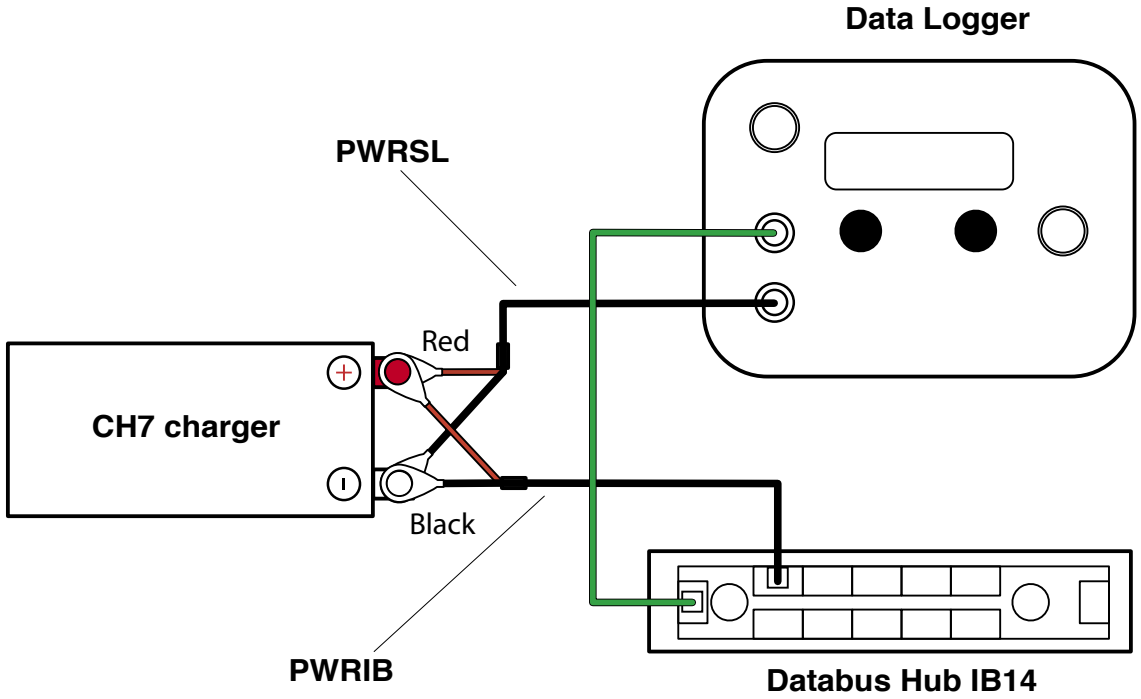

Figure 1.

The cables used in conjunction with the CH7 charger are as follows:

PWRSL – connects the CH7 charger to the data logger.
PWRIB – connects the CH7 charger to the interface hub.

Power Configuration 2

Solar Power to SL5 Logger

When the system is located in a remote location where mains power is not available, the SL5 logger battery can be kept at an optimum charge state with the addition of a solar panel that can connect directly to the charging port. (See Figure 2) Since the charging port of the SL5 has a battery charging circuit integrated into the design, no regulator is required on the solar panel.

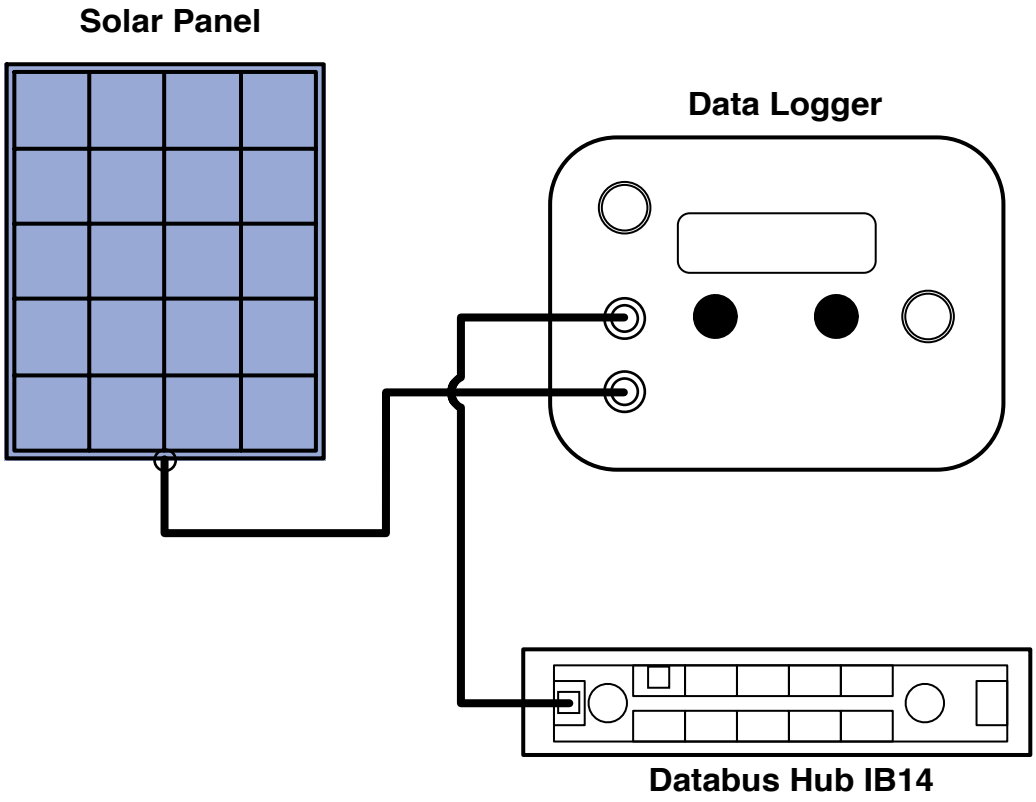

Figure 2.

ICT Solar panels are supplied with the appropriate 2 pin connector for direct connection to the SL5 charging port. This configuration is only suitable for sensors that can operate at 6V.

Power Configuration 3

Solar Panel to Auxiliary Battery

While all ICT sensor interfaces operate in the voltage range of 5 – 28V, many of the sensors supplied by ICT operate at voltages higher than the 6V internal battery of the data logger.

For these sensors to operate correctly, an auxiliary 12V battery must be connected to the system. The solar panel can then be connected to charge the auxiliary battery and the auxiliary battery is in turn used to keep the logger battery charged. The auxiliary battery also connects to the Interface hub to supply 12V for sensors that require it.

The cables used to connect the auxiliary battery are illustrated in Figure 3 and are as follows:

CBEXSP - Connects from the aux battery to the solar panel 2 pin connector
CBEXIB – Connects from the aux battery to anywhere on the databus hub
CBEXIBS – Connects from the databus hub to the data logger charging port

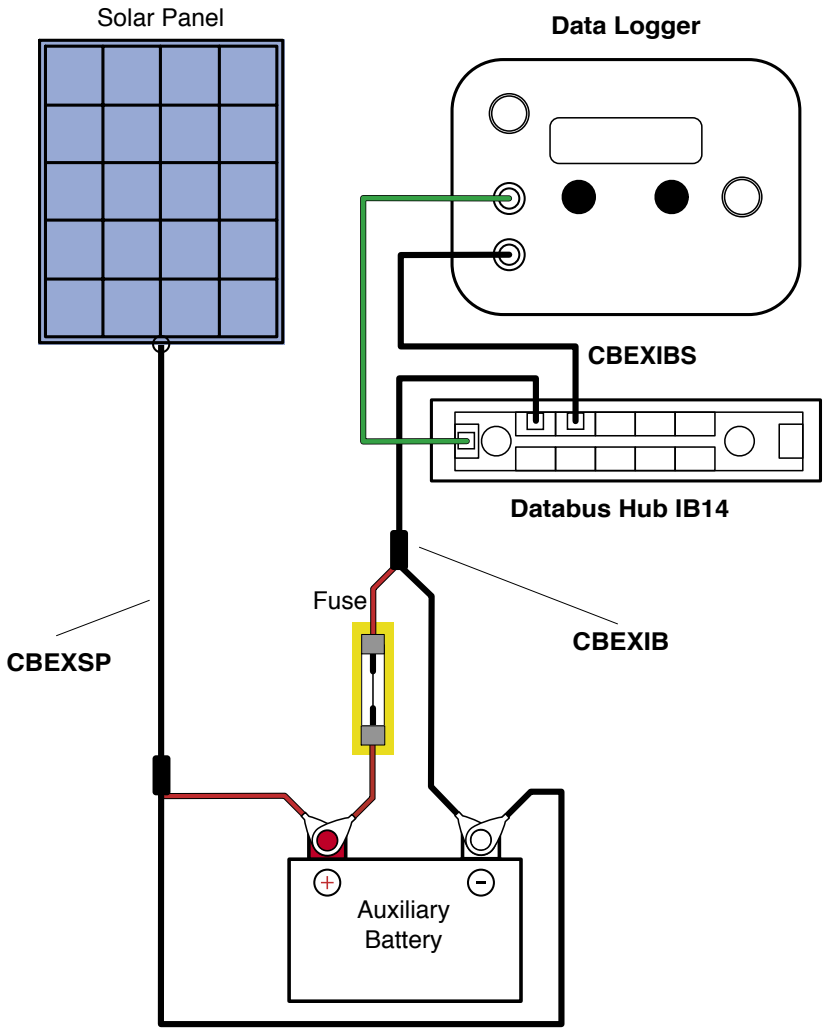

Figure 3.

In this setup, the cable that connects the auxiliary battery to the Databus hub is fused to protect the battery from any faults that may occur with the sensors. The fuse rating will depend on the sensors connected to the system and should be rated at least 1.5 times the maximum load current.

Since there is no regulator incorporated into this configuration, there is a limitation of 20W as the maximum power for the solar panel when an 80Ah battery is being used. Solar panels with a power rating greater than 20W require the use of a solar regulator so as not to damage the battery by overcharging.

In general, when the rated peak charging current in amperes of the solar panel is less than approximately 1.5% of the battery capacity in ampere-hours, a regulator is not typically necessary. As an example, a 20W panel can safely charge an 80Ah battery as shown below:

BPSX20 Peak current = 1.2amps = 1.5% of an 80 amp hour battery.

Similarly, at 0.59 Amps peak current, a 10W panel can safely charge a 40Ah battery

BPSX10 Peak current = 0.59amps = 1.5% of a 40 amp hour battery.

Power Configuration 4

Regulated Solar Panel to Auxiliary Battery

In some setups, the power requirements of the system will require a solar panel with a power output greater than 20 watts. In this case, a regulator is required in the system to protect the battery from being overcharged. There are several types of regulators that can be used but Figure 4 details the inclusion of a solar regulator that includes separate solar panel, battery and load connections.

The cables used to connect the solar regulator are illustrated in Figure 4 and are as follows:

CBEXRBT – connects the solar regulator to the auxiliary battery.
CBEXRIB - connects the solar regulator load output to the databus.

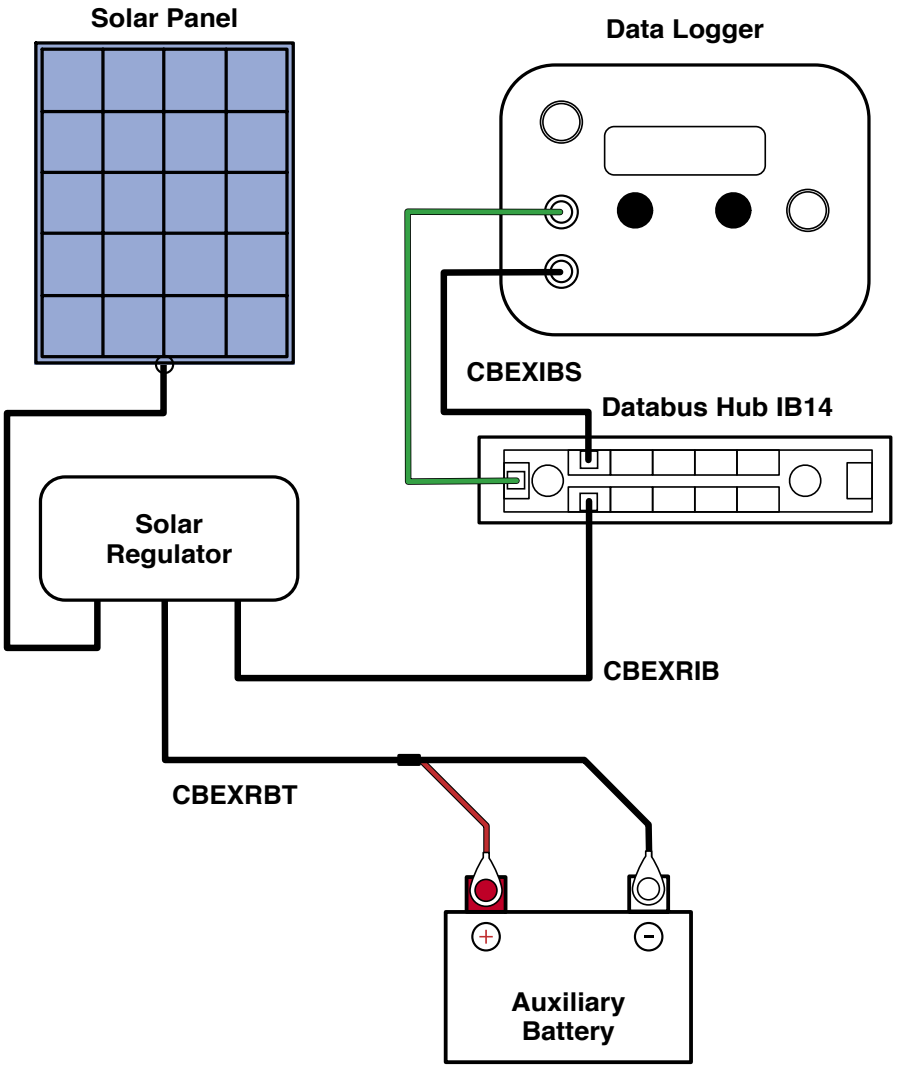

Figure 4.

In this case, no fuse is required for the load since the regulator incorporates its own overload protection. The SL5 logger is charged from the load output of the regulator via a cable from the databus hub. The solar panel connects directly to the solar regulator.

Caution: Customers should note that these types of regulators have auto-voltage sensing to determine whether a 12V or 24 V battery is connected. For the auto-voltage sensing to function properly, the regulator inputs and outputs must be connected in strict sequence. Customers should refer to the regulator instruction manual for correct sequence.

In some cases, customers may choose to select their own solar panel and regulator. If a simple three terminal regulator is chosen (ie, without a separate load output), the logger and load are connected to the auxiliary battery and the cable supplying the load is fused as in Figure 5.

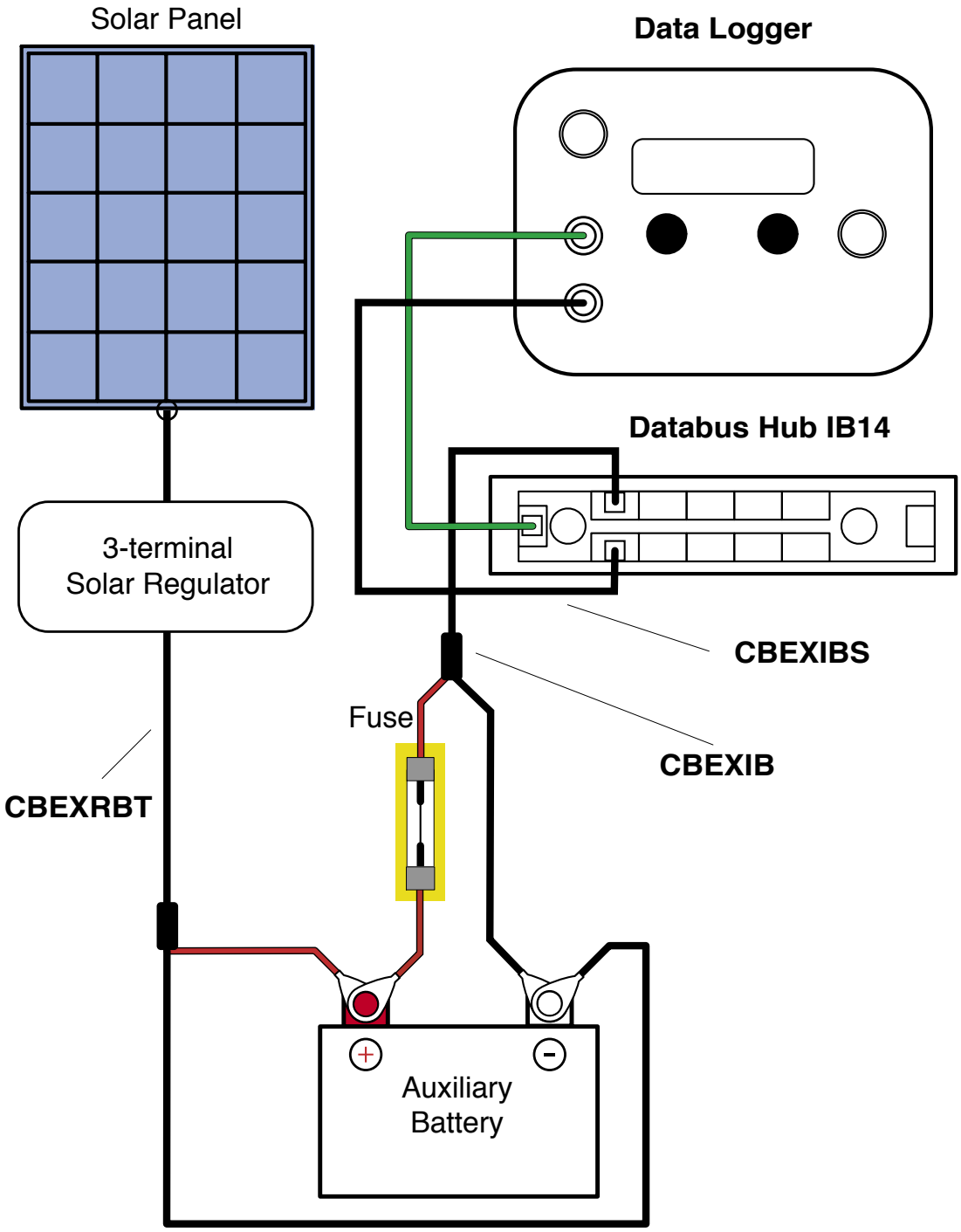

Figure 5.

Power Configuration 5

Second Auxiliary or Satellite Battery

The ICT product range includes a variety of sensors such as sapflow and thermal conductivity sensors that incorporate heater elements into their design. While all sensor interfaces have been designed to use a minimum amount of power to maximise battery lifespans, sensors that include heater elements will by their nature present a higher than normal load to the sensor interface that powers it.

In systems with relatively short cable runs (<30m) using standard 20 AWG cable from the Auxiliary battery to the sensor or databus hub, power supply to these sensors is not usually a problem. However, if an extension cable run is relatively long (>30m), the electrical resistance of the cable can cause a voltage drop from the 12V power supply resulting in the sensor not being powered properly. The actual maximum length of the extension cable will be dependent on the specific sensor load. Please refer to "**Power Calculations for ICT Data Logging systems**" to estimate your specific system load or measure the voltage drop directly using a voltmeter.

There are two methods available to mitigate the effects of voltage drops. The simplest method is to increase the conductor size of the extension cable that connects the sensor/interface back to auxiliary battery. This issue is discussed further in the document titled **Databus Extension Cables.**

The second method is to connect another auxiliary battery and solar panel charging system to the interface hub at the end of the long extension cable where the high current sensor is located. This setup is illustrated in Figure 6 below. To determine the battery capacity you will need, see the power calculations data sheet.

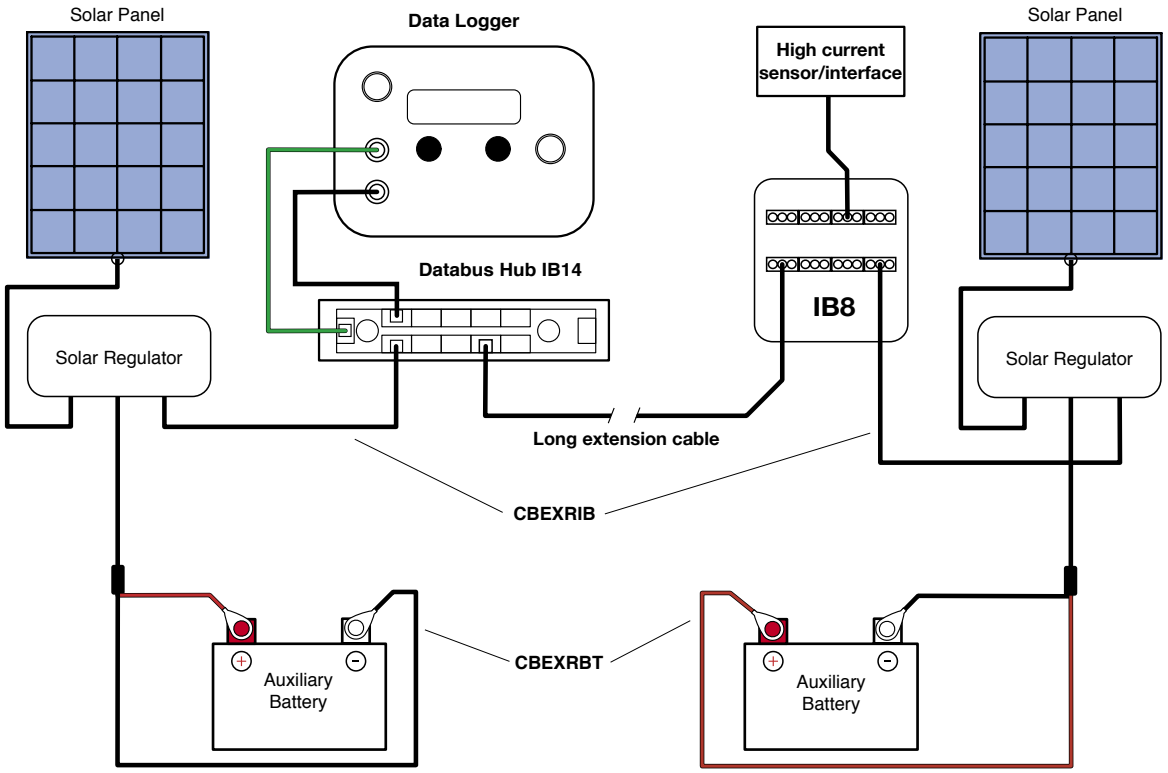

Figure 6.

ICT International Pty Ltd
PO Box 503, Armidale, NSW 2350, Australia
Ph: [61] 2-6772-6770 Fax: [61] 2-6772-7616
E-mail: sales@ictinternationl.com.au