

ILT5000

Instruction Manual



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TECHNOLOGIES

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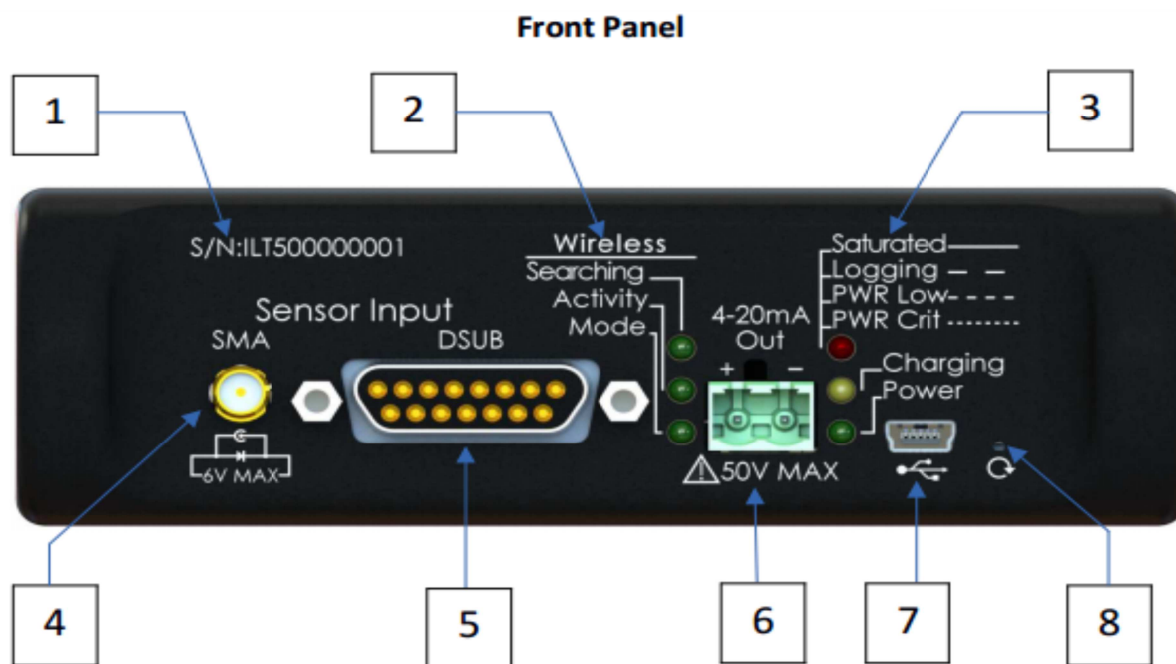
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ILT5000 Research Radiometer/Picoammeter Start Up Manual

1. Equipment Overview

- A. **Carrying case** – contains ILT5000 meter, antenna, USB cable, and detector if applicable.
- B. **ILT5000 meter** – Ten decade autoranging radiometer.
- C. **Wireless Antenna** – Adjustable angle whip antenna for wireless communication.
- D. **USB cable** – Used for charging, and software communication.
- E. **4-20mA terminal block** – Wiring terminal for monitoring of PLC current levels.
- F. **DataLight III software**- Our extensive DataLight III light measurement software is available for Windows PC, Tablet and MAC computers on our website:
<https://www.intl-lighttech.com/sites/default/files/software/ILT-DataLightIII-Software-Suite...>

2. Quick Reference Guide



1. S/N: Unique serial number of the ILT5000 meter.

2. Wireless: Wireless Indicator LED and descriptions for the corresponding LED. Indicates the status of wireless communication.

Searching: Blinking indicates no network is connected. Off indicates connected to network.

Activity: Flashing to indicate wireless data transfer.

Mode: Blinking slow indicates good IP address.

Blinking fast indicates no IP address.

3. Meter: Status Indicator LED and descriptions for the corresponding LED.

Saturated: Steady signal indicates the sensor is saturated (light level too strong)
Consider adding a neutral density filter or increasing the distance from the source.

Logging: Slow Flash, Indicates data is being recorded

Power Low: Medium flash, Indicates low battery

Power Critical: Fast flash, Readings may not be reliable, Unit should not be run on battery power. Connect to USB hub, wall jack, or Computer.

4. SMA: detector input (for connection on Non ILT sensor and current generating devices)

Warning: 6V maximum input. Exceeding 6V will damage the circuitry of the ILT5000 board.

5. D-sub: 15-Pin detector input (For connection of any ILT “D” style detector). All non ILT current sources and detector should only be connected to the SMA connector to the left.

6. 4-20mA out: Output terminal for connection to a PLC. (Warning: Improper wiring can cause board damage. It is highly recommended that a 4-20mA isolation device be used to ensure the ILT5000 is isolated from the current loop power and programmable-logic-controller. Do not exceed 50V max. Refer to section 15, 4-20mA Loop Configuration for additional instructions).

7. USB: USB connector for software control, Data logging, power and charging internal batteries.

8. Reset: Internal computer board reset button. (In case of rare computer lock up)

9. Power: Indicates the unit has been turned on, using the power button on the rear of the meter.

10. Charging: Yellow charging LED is illuminated when meter is charging.

Rear panel of the ILT5000:

11. Power switch: Turns meter off and on

Turn meter ON (“up” position) prior to starting the software or connecting to a PC for the first time. The unit must be on, and the USB cabled connected, for applications to locate the device and to install device drivers. If the internal battery has sufficient charge, this will light the green Power LED on the front panel and blink the red LED indicator once. If the unit is not sufficiently charged connect it via the supplied USB cable to a PC or other USB2.0 power source.

Turn meter OFF (“down” position) when not in use to prevent battery drain. Note that the battery can still charge via the USB connector when the meter is placed in the **OFF** position.

12. SMA antenna connector: Connects the ILT supplied antenna. Required for wireless setup and communication.

3. Antenna

The ILT5000 comes with an external antenna. Attach the antenna to the rear of the device prior to initializing wireless communication. ILT recommends the Antenna is removed when in storage or during transport to reduce the risk of damage.

NOTE:

There are two connection points where the antenna can mount. Be sure to mount the antenna at the rear of the device, at the antenna symbol and not at the front “SMA” sensor input.

4. Internal Battery Pack

Inside the ILT5000 is a 3.7V 4400mAh rechargeable Lithium-Ion battery pack. A full charge is obtained in approximately 12 - 14 hours, with a new fully charged battery pack lasting a minimum of 12 hours.

NOTE: The battery pack in the ILT5000 is expected to last for many years. (greater than 300 charge cycles) Battery packs should only be changed by trained personnel. Changing of the battery pack by non-ILT personnel voids the warranty and can cause damage to the pc board.

5. Low Level Current Measurement

The ILT5000 can measure as low as 10 femtoamps (and up to 1 milliamp) of current. The following are guidelines for best results when measuring very low signals:

- Use the “User Dark” (aka “Zero”) function of the various DataLight software offerings to ensure the unit is properly zeroed in the same environment where measurements will be taken.
- Make use of the DataLight software “Noise Reduction” and “Sample Time” features to provide additional over-sampling
- Allow extended settling time for extremely low signals (<10pA)

NOTE: The ILT5000 has a built in shielding cage to stabilize the high gain circuit during measurements, however environmental factors can still be a source of error when measuring these extremely low signals. ILT recommends using quality shielded cables and allowing for extended test time durations. Additional shielding of the sensor and meter housing may also be needed depending on the measurement environment and current level under test.

6. Saturation

The ILT5000 provides an autorange mechanism allowing it to measure from 10 femptoamps to 1 milliamp of current. While autoranging or using the various fixed current ranges (settable via the various DataLight software offerings), the ILT5000 can experience saturation. When the ILT circuit becomes saturated, the ILT5000 saturation LED will illuminate with a steady red output. ILT “D” type sensors have been designed to assure a safe current value is supplied to the ILT5000. All non ILT sensors should be connected via the SMA connector.

7. Reverse Bias

The ILT5000 can supply 5V or 0V through the D-sub or SMA connector on the front panel. This bias voltage is often used to supply the necessary voltage to sensors containing PMT's, Vacuum Phototubes. The 5V bias is also used on silicon sensors to increase the response time. (I.E. the SED033 and SED100 silicon sensors are often biased when used for flash measurements.)

NOTE:
Sensors can be damaged if inadvertently biased. For example the ILT SED005 (GaAsp), SED623, SED624 and SED625 (thermopiles) should not be supplied with 5V bias.

8. Response time:

The ILT5000 is capable of sampling as fast as 20 micro seconds and recording measurements as fast as 100 readings per second (100 Hz) when saving data to the internal memory. Depending on the application that is running, user programmed settings and light levels the response times will vary.

9. Flash: The ILT5000 can take a measurement as fast as 20 microseconds and the internal capacitors can store a charge at an even faster, allowing the ILT5000 to take not only integrated flash measurements but to also plot the rise and intensity of flashes using our Datalight III software.

10. Trigger: TTL, for synchronization of measurement. Currently not available.

The ILT5000 does not include a trigger measurement configuration.

11. Dark and Zero settings:

Each ILT5000 is pre-programmed with the factory dark (“zero”) setting with no sensor attached in a low noise environment. Because ambient environments differ, ILT software allows the user to program and select the “user dark”. Using the user dark feature will allow the customer to subtract small amounts of current generated from their environment. Because the ILT5000 is a highly sensitive device, User Dark settings may be required for improved accuracy in low light / current level measurements.

12. ILT5000 initial set up:

12A. Software Installation: The first step is to download the software d on the ILT website:

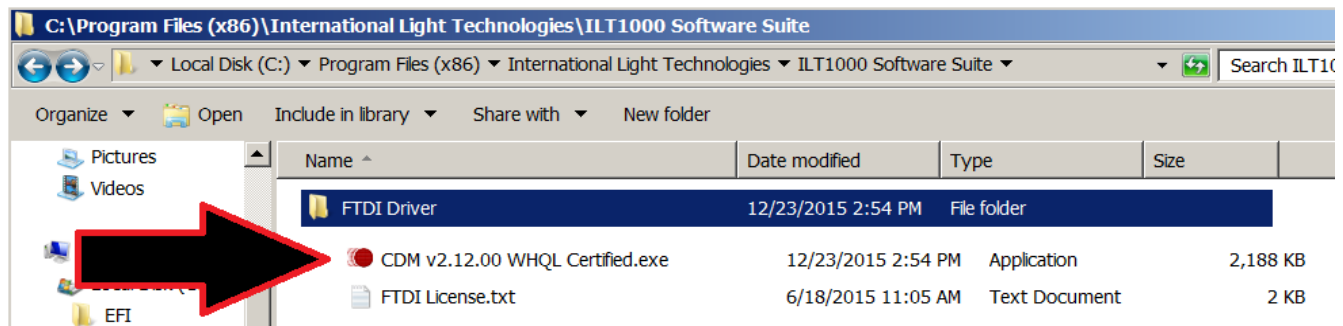
<http://www.intl-lighttech.com/support/software> (see the “DataLight III Software Suite...” link).

The download will include a Windows Installer file with a .msi extension. When the msi file is executed, you are brought through a simple set of “Next”, “Next”, “Finish” steps. At the completion, a DataLight folder will be placed on the desk top with the available app.s located inside the folder.

NOTE:

If you are restricted from or have trouble downloading the ILT software, please email: ilsales@intl-lighttech.com and we will gladly email you a copy.

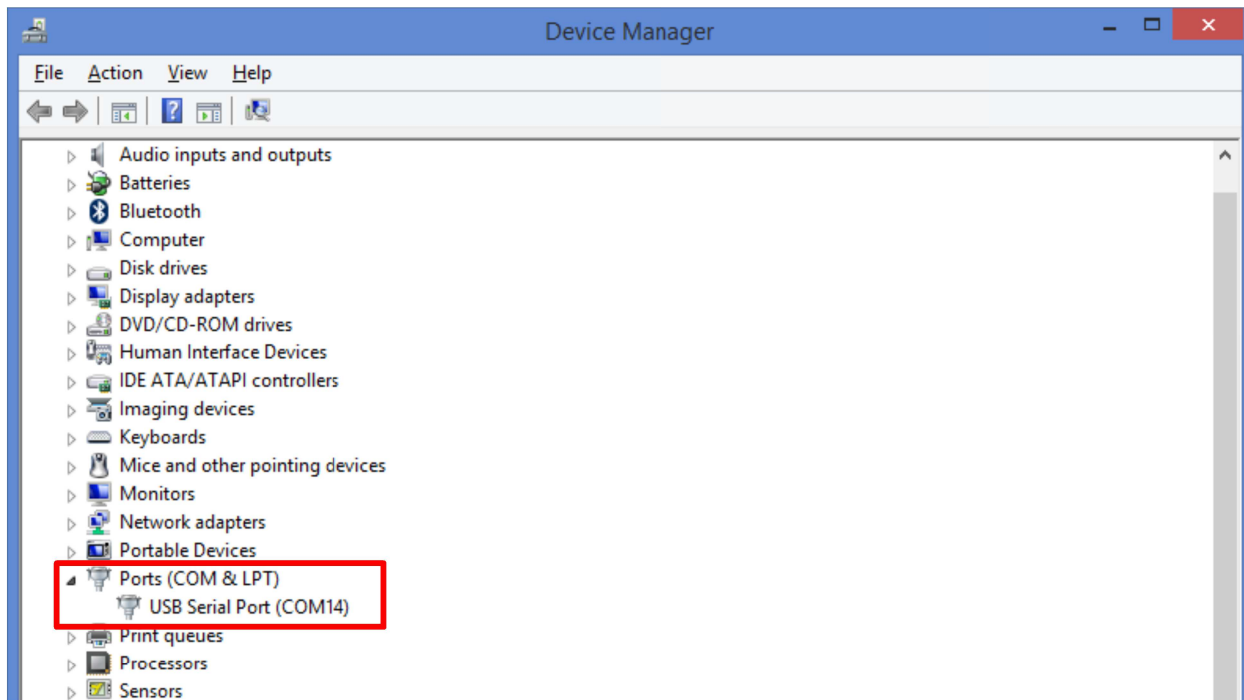
12 B. Device driver installation:(in most computers the FTDI Drivers are not already present). After installation of DataLight III, device drivers are saved in C, Program Files (x86), International Light Technologies, Datalight III, FTDI Driver. Double click on the CDM executable file to install the drivers.



13. Verifications

13A. USB Com Port Verification: After the drivers are installed, turn on the ILT5000, plug the USB cable into the computer and ILT5000 ports. Wait a few minutes to allow comp port assignment.

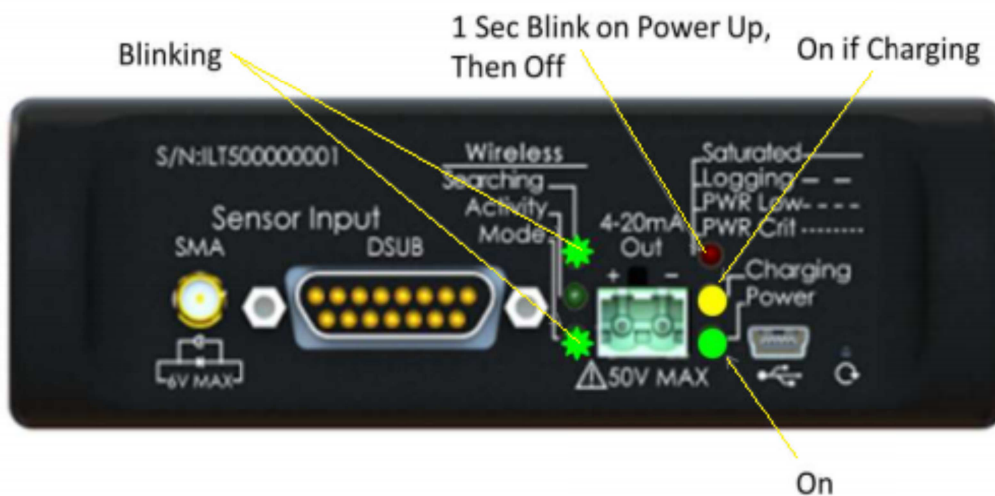
When the device is properly loaded, a “USB Serial Port” will show up in Device Manager under “Ports (COM & LPT)” as seen in the image below.



13B. Status Verification of the ILT5000 :

For an ILT5000 that has not yet been configured for wireless operation, the status indicator LED's should be displaying the following:

Indicator LED	Display
Wireless: Searching	Fast Blink
Wireless: Activity	Off
Wireless: Mode	Slow Blink
Saturated/Logging/PWR Low/PWR Crit	1 Second Blink on applying power, otherwise turned off
Charging	On if battery requires charging Off if the battery is fully charged
Power	On

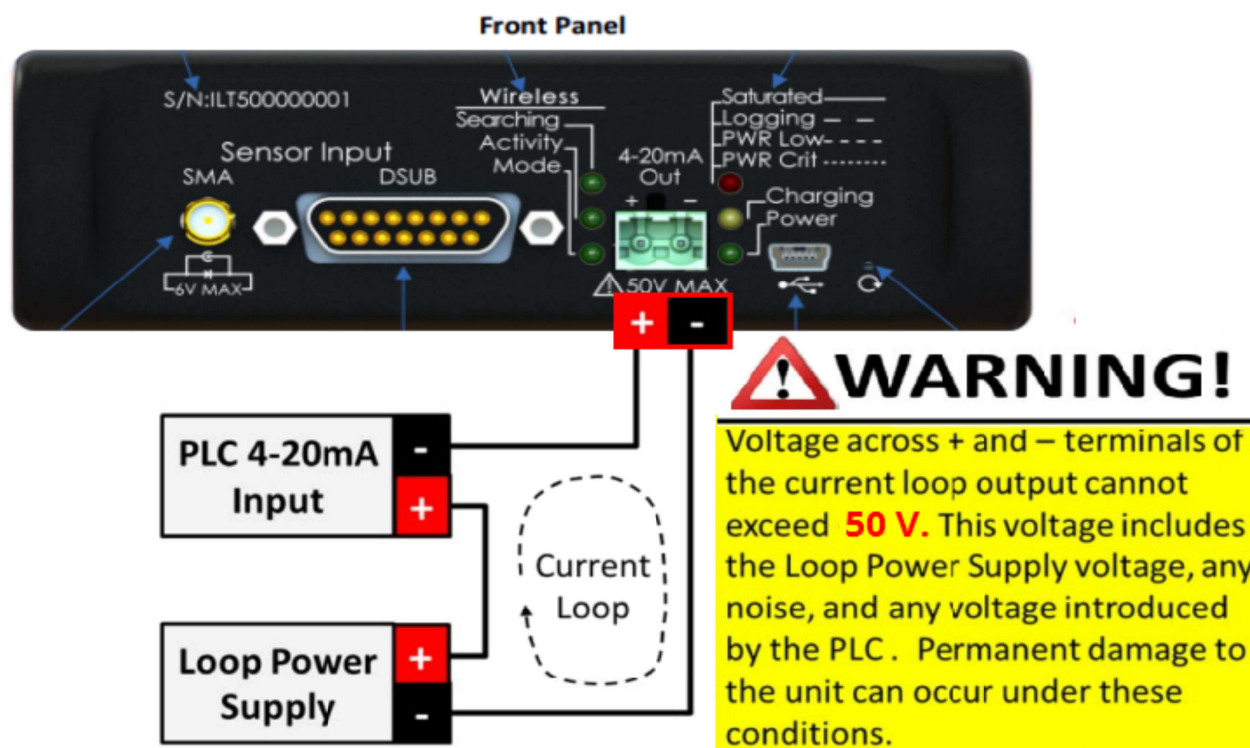


14. Final Verification:

- A. Assure your ILT5000 is turned on.
- B. Plug the ILT5000 into any available USB port. (for small tablets with a MICRO USB port an OTG cable may be required)
- C. Wait a few seconds for the ILT5000 to be recognized.
- D. Open the DataLight III folder on the desk top
- E. Click on the Meter Icon. (note: the software will scan all USB ports and connect automatically to the ILT5000(s) and start taking measurements) See Datalight III manual for advise on settings, creating cal factors, adding graphs etc.

15. 4-20mA Loop Configuration:

A. **Warning:** Please note the warning below when connecting the 4-20mA output to a new or existing current loop. The preferred loop voltage is 15VDC, but can be set as high as 24VDC. While the unit does provide protection against reverse polarity and voltage noise/spikes, voltages above 50V will damage the unit.



B. Connection: The 4-20mA current loop is connects as illustrated above. The Loop Power Supply provides the power for the current loop, and the ILT5000 controls the level of current that flows through the loop.

C. 4-20mA Current Loop Modes

There are four modes of output that are supported by the ILT5000, as follows:

15A. 4-20mA Current Loop Modes

There are four modes of output supported by the ILT5000, as follows:

4-20mA Current Loop Mode	“CLI” Command to Invoke Mode	Current Relationship
Log (default mode)	<code>setcurrentloop log</code>	4-20mA Current = $(\text{LOG}_{10}(\text{Detector Current}) + 11) * 1 + 5$ Detector Current = $10^{((\text{4-20mA Current} - 5) / 1 - 11)}$
Linear with Min and Max	<code>setcurrentloop [min detector current in picoamps] [max detector current in picoamps]</code>	4-20mA Current = 4mA at [min] Detector Current 4-20mA Current = 20mA at [max] Detector Current 4-20mA Current is linear in between [min] and [max]
Linear with Midpoint	<code>setcurrentloop midpoint</code>	4-20mA Current = 12mA at Detector Current when <code>setcurrentloop</code> command was sent. 4-20mA Current = 4mA at 0 Detector Current 4-20mA Current = 20mA at 2x the Detector Current when <code>setcurrentloop</code> command was sent. 4-20mA Current is linear in between
Manual Current Loop Setting	<code>setcurrentloop [0-24]</code>	No relationship. 4-20mA Current is set to whatever the <code>setcurrentloop</code> command defined, i.e. <code>setcurrentloop 8</code> sets the 4-20mA Current to 8mA.

16. NetConfig pre-configuration: Prior to running NetConfig:

- The antenna must be attached to the rear of the ILT5000. (see antenna on page 3)
- The power switch on the rear of the ILT5000 must be in the ON position.
- The ILT5000 must be paired with the computer to be used. (see ILT5000 initial set up on page 6)
- The ILT5000 batteries must be charged or the meter must be powered by USB.
- DataLight II software must be loaded on the computer. (see installation on page 7)

16A. Running NetConfig

Open the “ILT DataLight II” folder on the Desktop. Double click on “NetConfig”. This will bring up the following screen:

The screenshot shows the NetConfig application window with the following settings:

- File** menu
- Network Configuration** tab (selected)
- Network Name / SSID**: roving1 (dropdown menu)
- Password / Security Key**: ***** (text field)
- IP Address** section:
 - ☒ Use DHCP to Automatically Acquire IP Address, Network Mask, and Gateway
 - IP Address**: 0.0.0.0
 - Network Mask**: 255.255.255.0
 - Gateway**: 0.0.0.0
- UDP Port** section:
 - Text: "This value must be unique, among meters, to simultaneously access multiple devices from the same host."
 - Meter sends data on this UDP Port**: 2000
- Save to File** section:
 - ☒ Save IP and Port to File (for light monitoring apps to automatically find device on network)
- Buttons**: Refresh, Configure

16B Configure the network configurations:

The **Network Name / SSID** field defaults to "roving1". This field contains a drop-down of all the wireless networks visible to the ILT5000. You can either select from the list or enter a network SSID that is not on the list (this may be the case where the network SSID is known, but that network is not currently visible to the ILT5000).

Set the **Password / Security Key** field as appropriate. This field will be left blank if the network is operating "in the clear". The ILT5000 will automatically determine the appropriate security protocol (WEP, WPA, and WPA2 are supported).

Set the **IP Address**. This can either be accomplished by:

- Using DHCP, which will automatically fill in the IP Address, Network Mask, and Gateway during the configuration process.
- Manually entering the IP Address, Network Mask, and Gateway

NOTE:

The DataLight II Software does not currently support automatic discovery of ILT5000's. As a result, if using DHCP will result in IP Addresses that change frequently (this is dependent on your network policy) it is recommended that fixed/manual IP Addresses be used (check with your IT staff regarding policy for manually setting IP addresses).

[Optionally] you can modify the **UDP Port** such that it is particular to the ILT5000 being configured, i.e. each ILT5000 configured has a different UDP Port. This UDP port number is used for sending information to the DataLight II Software applications. Different port numbers are required if multiple ILT5000's are to be monitored, simultaneously, with multiple instances of DataLight II Software applications (i.e. "Meter"), running on the same computer. For example the first ILT5000 may use UDP Port 2001, the second ILT5000 may use 2002, etc.

NOTE:

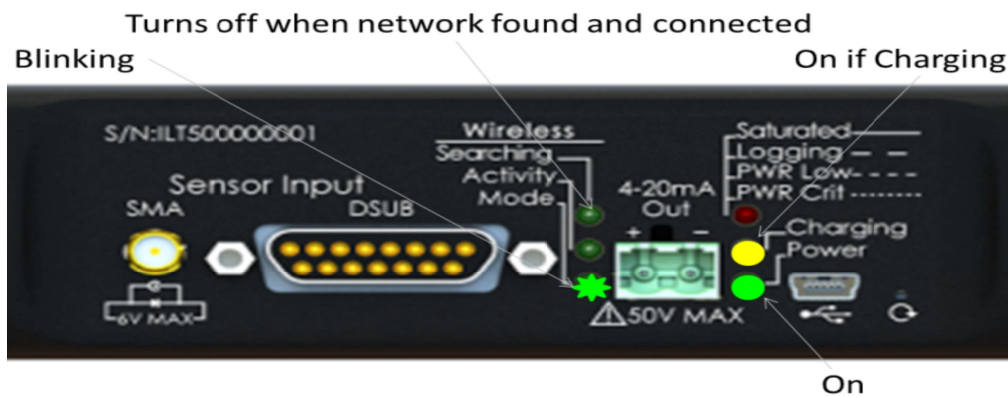
Ensure the UDP Port is not set to 2000. Some ILT5000 may have this as a default value. This must be changed to a number other than 2000 for proper operation.

16C. Save to File[Optionally, and by Default]: This feature will save the IP address and Port information to: Documents\ILT\Inventory\wireless device list.csv. This file is automatically accessed by the "Meter" program when looking for meters.

16D. Click the Configure button on the Network Configuration tab.

This will configure the device save the IP and UDP Port information for use later by Meter.

If the ILT5000 was configured to connect to an existing wireless network during software installation, the "Wireless: Searching" LED on the ILT5000 front panel should turn off within a minute, after the network is found and the IP Address is established.



16E. Test the new connection:

Move to the "Status" tab to see the new network settings including the **Wireless Signal Strength**.

Assuming the computer running NetConfig is connected to the same network as the newly configured ILT5000 meter, Move to the "Diagnostics" tab:

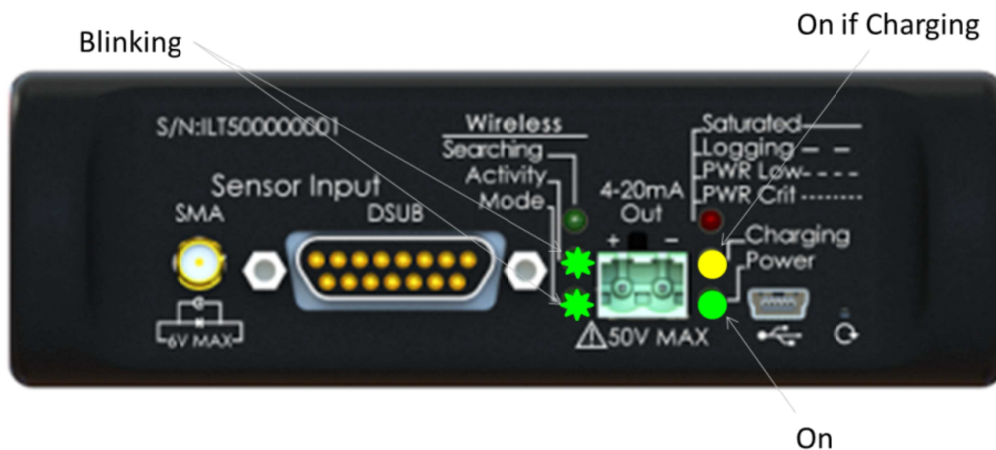
- Select **Ping Light Meter from this Host**
 - Because the meter was just configured, this might take 2 or 3 tries to establish the new network route and connection.
- Select **Send "getdatetime" command to Light Meter**
 - Upon success, the Meter returns the current date and time. An example of a successful results is: 02/25/2015 21:13:00 1424898780

If any failures are detected, both diagnostics above will provide hints to remedy the issue. The second diagnostic may request a firewall exception to send and/or receive the UDP traffic.

1. Close the "NetConfig" application with File->Exit
2. Test the wireless connection with "Meter"
 - Disconnect the USB cable between the computer and the ILT5000
 - Run the "Meter" program from within the "ILT DataLight II" Desktop folder.

- If you used the “Save to File” option within NetConfig, the “Meter” application will automatically find the ILT5000 IP Address and UDP port within this file.
- If you did not use the “Save to File” option within NetConfig, you can either:
 - Enter the IP Address, UDP Port pair within Documents\ILT\Inventory\wireless device list.csv (it is best to use “Save to File” at least once establish the file and note the format of the data).
 - Create a “Meter” shortcut on the desktop and append the IP Address and UDP port information to the “Target” field within the “Shortcut” tab, i.e. Target:
`C:\Program Files (x86)\International Light Technologies\ILT5000 Software Suite\ILT-Meter.exe"
192.168.1.100 2002`

When “Meter” is running and wirelessly connected to the ILT5000 device, the Wireless: Activity indicator on the ILT5000 front panel should blink to indicate that there is data communication between the computer and the device.



17. Care and Handling

The ILT5000 internal board is a sensitive electronic device. Due to risk of board damage, only trained personnel should attempt opening the housing on the ILT5000. Opening the ILT5000 by non-ILT personnel voids all warranties and may adversely affect the calibration of the meter.

Operating Temperature: -40 to 85°C (Calibrated Irradiance 0-40°C) ILT meters and sensors have a recommended operating range of 0 to 40°C to best assure the accuracy of the calibrated measurements.

Humidity: 0-95% non-condensing.

ESD: Use basic ESD precautions and practices when handling the device. It is advisable to discharge any static buildup by touching a grounded conductive surface before making contact with devices or its connectors.

Cleaning: No chemicals or liquid solution should be used to clean the ILT5000 housing. The ILT5000 housing is made of durable anodized aluminum housing, however, the housing does not provide a sealed barrier to protect the internal components from moisture.

Submersion: The ILT5000 housing is not rated for submersion.

Calibration: ILT typically recommends an annual calibration for all equipment. Per ISO17025, the customer may, through their own QC process, create their own calibration cycle.

Service: Before returning any equipment to ILT for service (including warranty evaluations) customer should visit the ILT website and obtain an RMA:

<http://www.intl-lighttech.com/services/return-material-authorization/rma-form>

17. Warranty

The equipment you have purchased from International Light, Inc. has been expertly designed and was carefully tested and inspected before being shipped. If properly operated in accordance with the instructions furnished, it will provide you with excellent service. The equipment is warranted for a period of twelve (12) months from date of purchase to be free of defects in material or workmanship. This warranty does not apply to damage resulting from improper set up, accident, alteration, abuse, loss of parts or repair by other than International Light Technologies. The equipment will be repaired or replaced, at our option, without charge to the owner for parts or labor incurred in such repair. This warranty shall not apply unless the equipment is returned for our examination with all transportation charges prepaid to International Light Technologies, 10 Technology Drive, Peabody, MA 01960. International Light Technologies has no other obligation or liability in connection with said equipment.