ISSI
INNOVATIVE SCIENTIFIC SOLUTIONS, INC

Motorized Zoom Lens Controller

Operation Manual (Version 1.5)
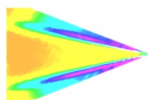
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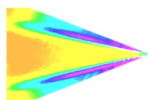Sales: issi-sales@innssi.com
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CE   FC   Made in
             U.S.A.

Revision Date: 1/20/2022

Description

The ISSI Motorized Zoom Lens Controller (LC-1S) is a control device for motorized zoom lenses or CCTV lenses. The LC-1S can operate lenses with motorized or auto-iris (DC and Video type). The device is operated via a graphical user interface and allows for preset positions of the lens to be saved and then recalled at any time. It can also be integrated into existing software via TCP/IP API commands in Linux, Windows and macOS operating systems. The presets will save the position of the zoom, focus and aperture. Since the LC-1S is an Ethernet device, it can be networked with other LC-1Ss or Ethernet devices. This makes communication and physical cable connections much simpler than traditional serial lens controllers and also allows them to be operated over a longer distance than serial devices. The IP address of the LC-1S can be configured to match the local network gateway and also can be configured to work behind routers.

Specifications

Nominal Power Consumption	1W
Max Power Consumption (6V lens)	Lens Dependent
Input	6.5-28VDC (12VDC power adapter included)
Lens Voltage Range (Motorized Functions)	*Customizable
Weight	160g
Interface	10/100 Mbps Ethernet
Lens inputs	1
Presets	**Programmable
Software	Windows GUI, TCP/IP API
Warranty	1 year
ECCN	EAR99

* Voltage input for motorized lens functions can be specified and set before delivery

** for lenses with preset potentiometers only

Only to be used with the supplied power supply from the manufacturer

Environmental Specifications

Uses	Indoor, Outdoor
Altitude	2,000 m
Operating Temperature	2- 60 ˚C
Relative Humidity	80% (up to 31˚C), 50% (40˚C)

Do not submerge in water or use in wet environments
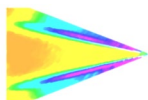
Connections

The Motorized Zoom Lens Controller features a single lens input for the motorized functions and a 4-pin connector for DC/Video auto-iris control. Power and Ethernet are supplied directly to the LC-1S control box via the supplied cables.

LC-1S Control Box Back Panel

Power	Device is powered on
Ethernet	Ethernet communication connection
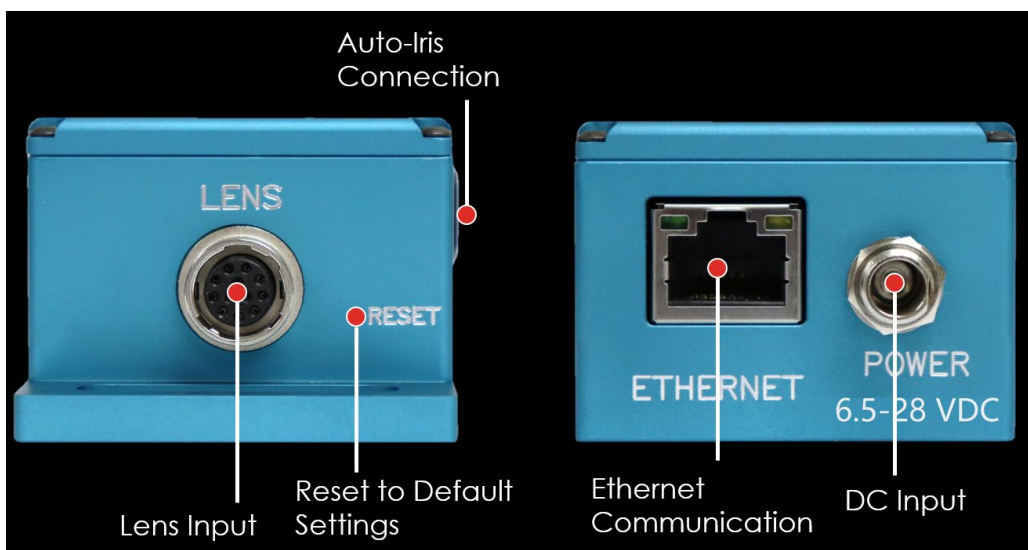
LC-1S Control Box Front Panel

| Lens	Connection for lens adapter
Reset	Reset/Recovery switch

On the back panel, the power and Ethernet communication connections are made. The lens connection and reset switch are located on the front panel. The side panel contains the auto-iris 4-pin connector. If the IP address is changed and forgotten, the reset switch will set the device back to its default IP address of **192.168.2.251**. Use a paper clip to reset the device, holding for 2 seconds. Restart the software and the LC-1S will connect with its default IP address.
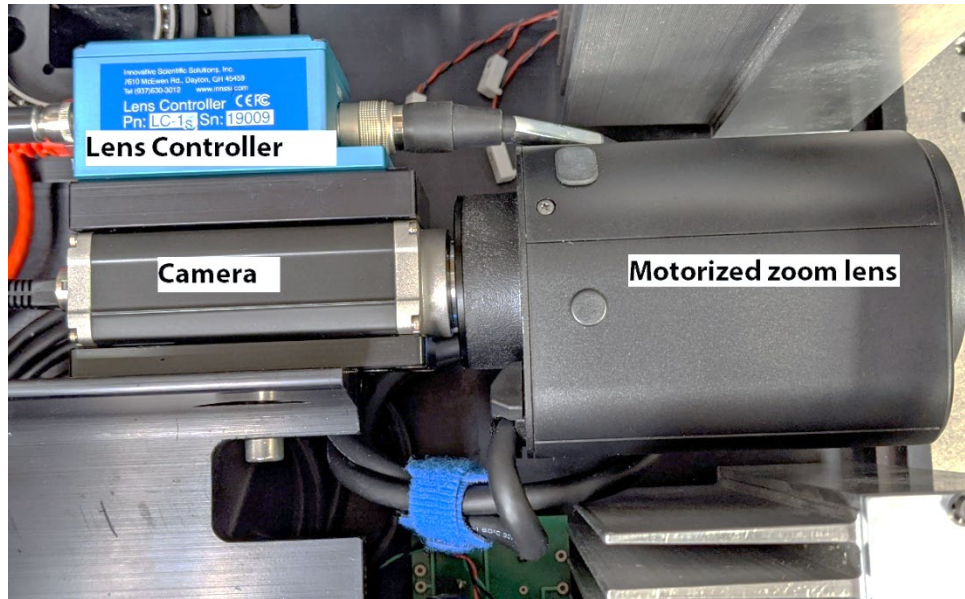

Lens Connection / Reset / Auto-iris   **Ethernet / Power Connection**
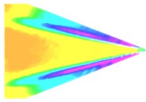
Installation and Operation

The LC-1S is designed to be integrated into camera housings and enclosures. The controller features a slotted mounting bracket to easily mount to a camera body or adapter.


The LC-1S control box has a small slotted bracket to countersink M3x5 hex bolts for mounting. If the camera being used with the LC-1S has no mounting holes to mount the LC-1S control box, a bracket will need to be made to bolt the control box. It should be mounted within 6-inches (150-mm) of the lens connection on the camera.

Line up the mounting bracket to the camera body mounting holes. If your camera has different mounting holes, secure with customized bracket to fit the camera. Place the M3x5 hex bolt in place and tighten each using M3 hex wrench. Three M3x5 bolts are supplied with the hardware kit.

Next connect the lens to the camera via the c-mount connection and secure. For larger lenses, the lens itself may need to be mounted securely to avoid damage of the lens connection on the camera.
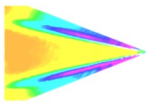
After the lens is securely mounted, make the lens connections to the LC-1S for motorized functions and auto-iris functions. The 4-pin auto-iris connector should be mounted securely to the 4-pin receptacle on the side of the LC-1S and the screw and lock connector for motorized lens functions should be attached to the connected labeled **LENS**.

Note: *If your lens has a motorized iris, the motorized functions will be controlled via the main lens cable and no DC iris cable will be connected.*

Before connecting to power, move the auto-iris switch on the top of the lens controller to the appropriate position. Move the switch with a paperclip or small screwdriver. Verify the auto-iris type
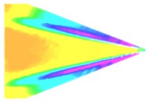
for the lens being connected to the LC-1S. For DC auto-iris lenses, the switch should be moved to the **DC** position and for Video auto-iris lenses, the switch should be moved to **VIDEO**. If connecting to a motorized iris lens, the switch position does not matter.


Auto-Iris Switch

The LED will indicate the position of the auto-iris switch. **DO NOT** connect a **DC** iris lens with the switch in the **VIDEO** position or vice versa. This may cause damage to the lens iris.

With the LC-1S control box is secured and the auto-iris switch in the correct positon, connect the power adapter to universal power (110-240 VAC). Plug the power adapter to the LC-1S control box in the receptacle labeled **POWER**. Seat the plug so it is fully inserted into the power receptacle. Screw the locking connector clockwise until tight. When mounting the control box, do not position it so that the power plug is difficult to plug in or unplug.

Connect the Ethernet cable to the NIC of the control computer or local network switch. Connect the other end of the Ethernet cable to the **ETHERNET** receptacle on the LC-1S. The green and orange lights on the Ethernet receptacle will flash once communication has been established.
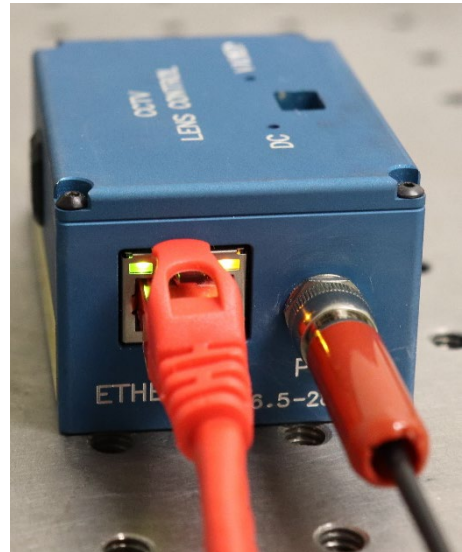
The LC-1S is a low voltage DC device. There are no earthing requirements.

There are no special requirements for ventilation of the LC-1S.

There are no special requirements due to sound generation.

Maintenance

Inspect all connections and ensure they are free of debris that could prevent electrical contact from being made. Make sure no debris is present that could cause an electrical short. Always disconnect the device from power when performing routine maintenance inspections.
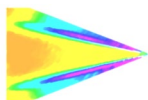
Network Setup

The network on the PC NIC (network interface card) needs to be properly configured for communication over the network. To do this, navigate to the *'Network Connections'* page on the control panel where the local networks of the computer is displayed. Right-click on the network where the LC-1S is connected and select *'Properties.'*

From the *'Local Area Connection X Properties'* window, click on *'Internet Protocol Version 4 (TCP/IPv4)'* and then press the *'Properties'* button, now useable. This will open the *'Internet Protocol Version 4 (TCP/IPv4) Properties'* window. This is where the IP addresses are entered so that LC-1S can be reached over the local network. The settings needed for communication are **IP Address** and **Subnet mask**.

The IP address of the NIC should use the following conventions:

IP Format: **Network.Network.Subnet.Host**

- LC-1S IP: 192.168.2.251
- NIC IP: 192.168.2.XXX
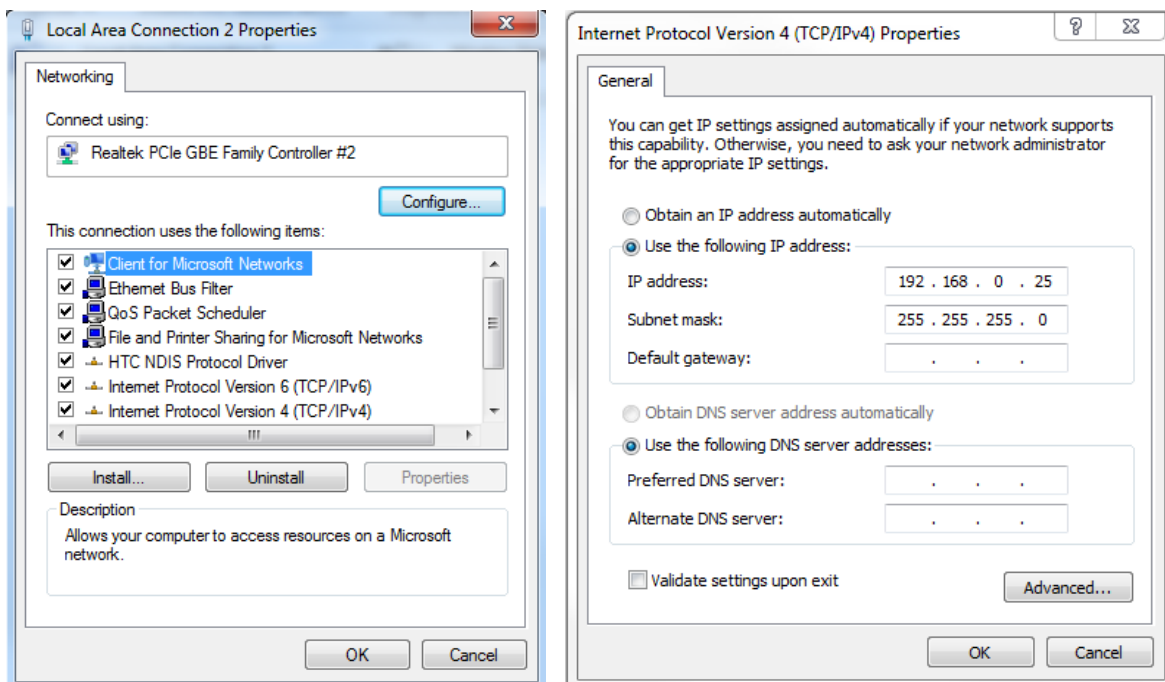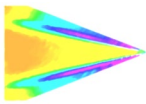
The NIC IP address should have the same network and subnet addresses but a unique host, the last line of the IP address. The host can be any value 1-254 but different from the host address of the LC-1S. The subnet mask should be set to match that of the LC-1S which, by default is 255.255.255.0. The **Default Gateway** and all other fields can be left blank.
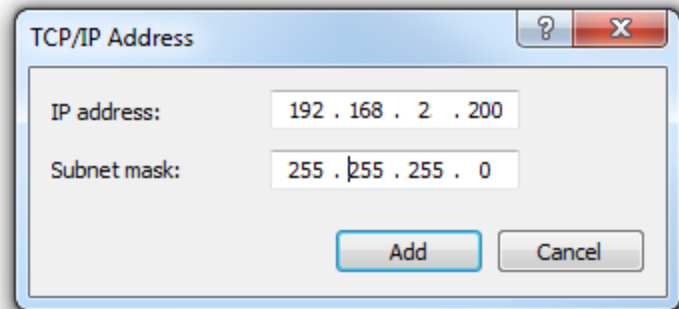
Additional subnetworks can be configured for the same NIC. In the *'Internet Protocol Version 4 (TCP/IPv4)'* window, the **Advanced** button will open the *'Advanced TCP/IP Settings'* window. IP addresses of any subnetwork can be added for that NIC here. If multiple devices are being used on the same network and they have differing subnetworks, this option provides communication for all devices without the need to change IP addresses for each device.

*Note: Verify that lens controller default subnetwork (192.168.2.XXX) is configured on the NIC as well as any other subnetwork that may be used to communicate with the LC-1S. Failure to do so will prevent the software interface from finding any connected LC-1S.

If the lens controller is not connected properly a connection error (below) will be displayed. First, reset the device via the reset switch which will restores the default IP address.
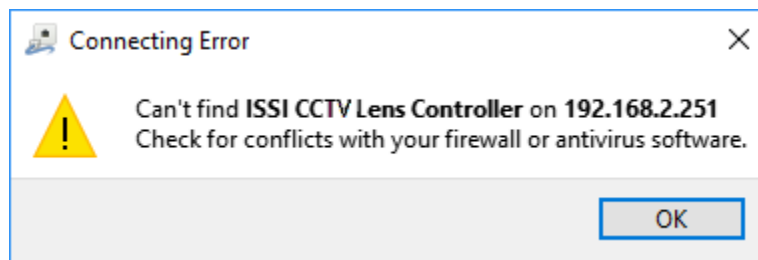
If connection problems persist, check the connection of the Ethernet cable between the computer NIC and the LC-1S. To check that there is a physical connection, ping the IP address of the LC-1S from the Command Prompt. To do this, open the command prompt window and enter: ***Ping XXX.XXX.XXX.XXX –t***
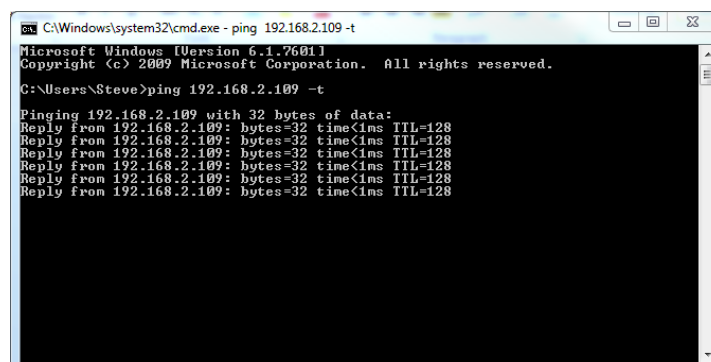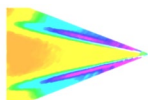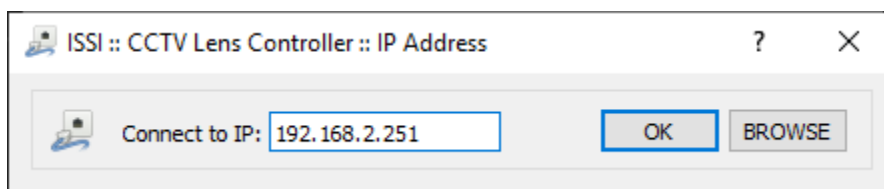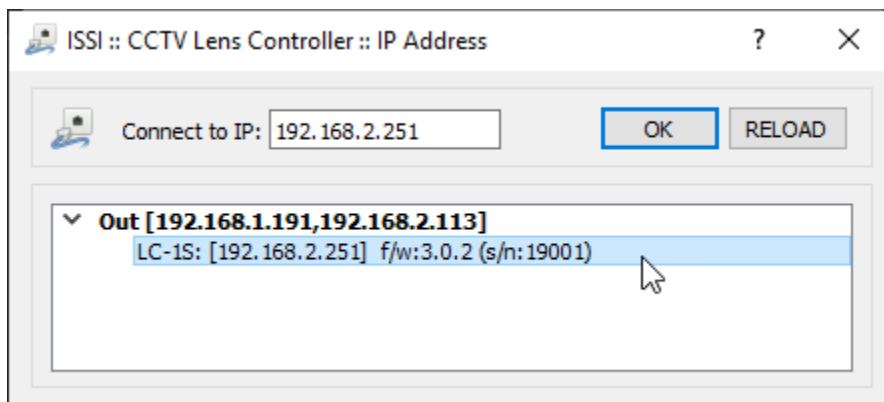
Software Operation

Open the software for the LC-1S from the desktop and it will ask for the IP of the connected LC-1S. Enter the IP address of the LC-1S connected to the network.


If the IP address is unknown, press '**Browse**' to search through all IP addresses on the network under the subnetwork(s) of the NIC.


Once the lens controller is connected, it will ask the iris type of the connected lens. The physical switch on the top of the LC-1S should be switched to the correct iris type as described earlier. The LC-1S is in continuous operation of the lens while connected.
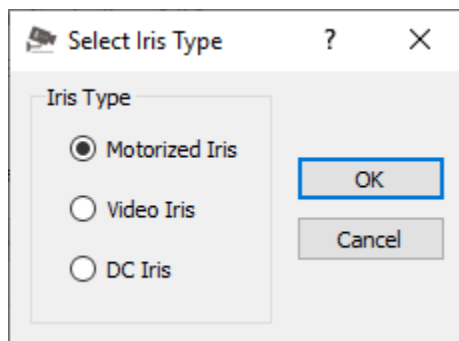


Select the iris type of the lens and click OK.
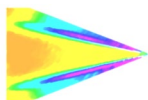
Once connected, the will show the current position of each motor of the lens if the lens contains preset potentiometers. For the preset capability, this determines the minimum and maximum motor positions.   If no preset potentiometers exist on the lens, the LC-1S will not be able to save and recall preset positions. The firmware version, serial number and IP address are displayed at the bottom of the GUI. To communicate with multiple LC-1Ss over this network (through a network switch), open up another instance of the program on the desktop. To do this, the IP address of each device will need to be individually set.
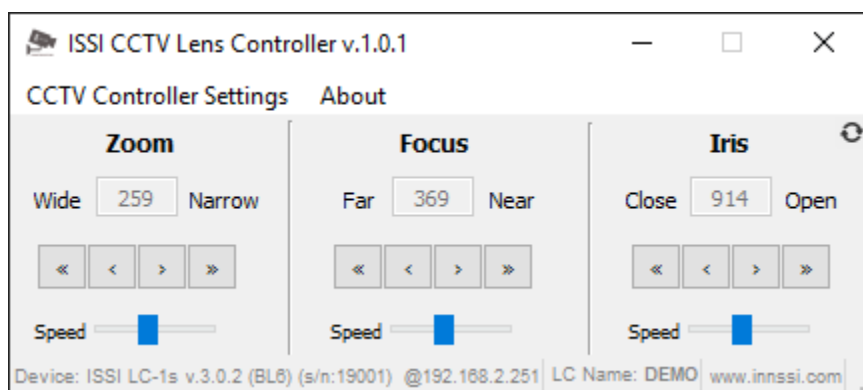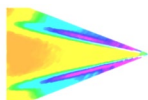

Motorized Iris Lens
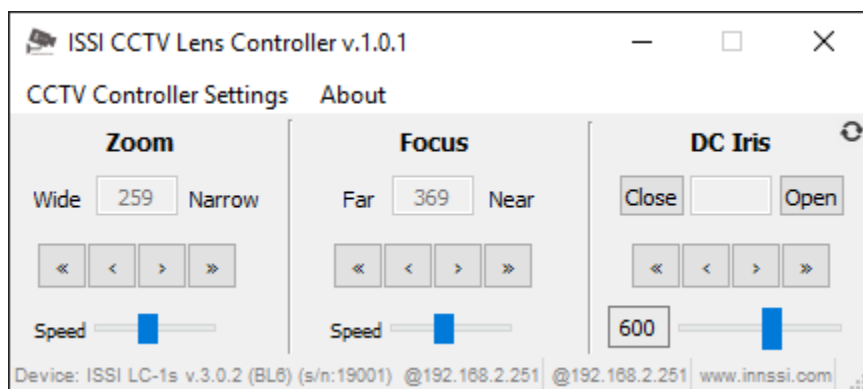
DC Iris Lens

Video Iris Lens

10
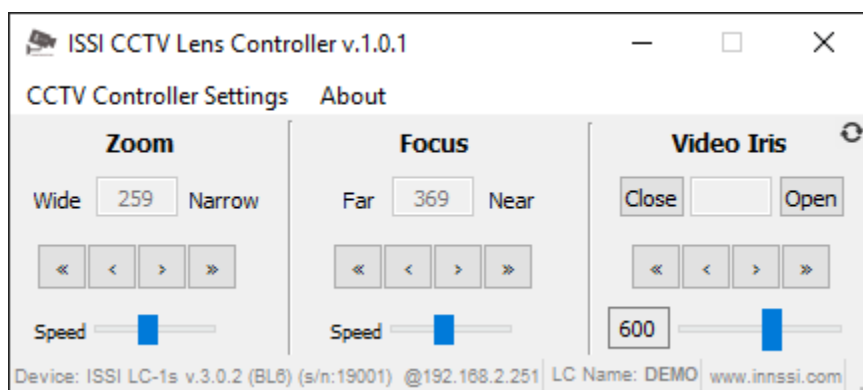
The user interface displays the current positions of the Zoom, Focus and Iris. Note that if the lens does not contain preset potentiometers, 0 will be displayed for each value since no position on the lens can be measured. There are two sets of arrows below this which are used to move the position of the motor. The single-arrow moves one step increment and the double-arrow moves 2x one step size for coarse adjustments. Motor speed can be adjusted using the slider bar below each lens function.

Midpoint Setting (Auto-Iris Lenses Only)

The midpoint of the auto-iris needs to be manually set for stable iris control. This adjusts the voltage of the auto-iris by use of a digital potentiometer to its optimum point. If too high or low, the iris will drift open or closed. Set at its optimum point, the iris will remain fixed in the set position until changed. A guess and check method is used to set the midpoint.

Begin by setting the midpoint using the iris slider (or mouse scroll wheel) or by entering a number in the box to its left.

Open or close the iris. If the iris slowly or quickly opens or closes, the midpoint has not been reached. Adjust the midpoint value and check the iris operation again. Repeat until the iris position remains at the set position when changed. Verify by aiming the camera and lens at a target with good contrast.

See video instruction: LC-1S Auto-Iris Midpoint Setting

Clicking the arrows will move the zoom, focus or iris in one direction. The single arrow is a single step while the double arrow is a double step.
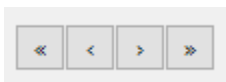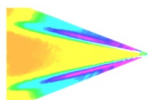
For auto-iris lenses, clicking open or close will fully open and fully close the iris with one click.
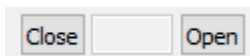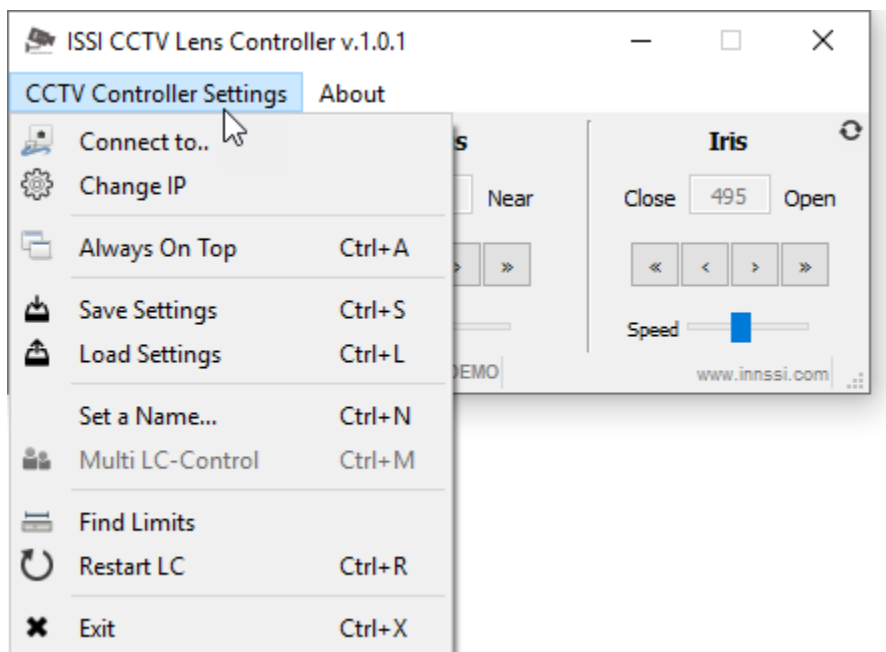
The speed of each motorized function can be set using the slider below it.

Settings

To connect to a different lens controller, select '**Connect to**' from the **Settings** menu.

Once connected, the IP address, mask and gateway (if being used through a router) of the lens controller can be changed if desired. Under the **Change IP** window the settings can be updated. If networking multiple devices the IP address of each LC-1S must be unique.
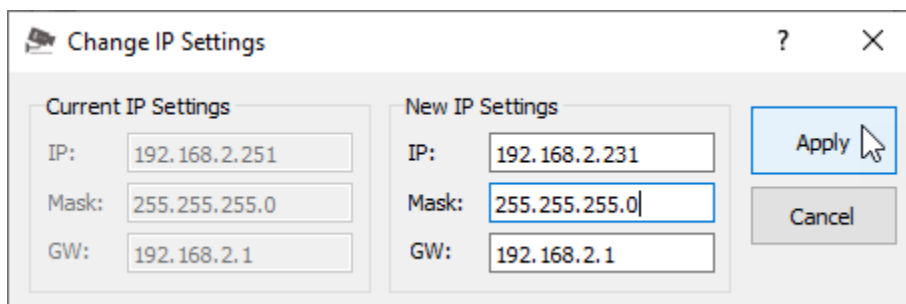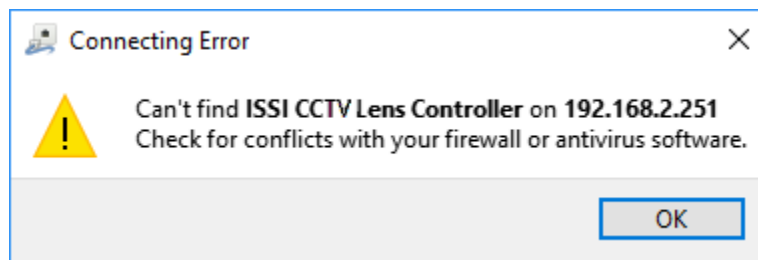

If the toolbar is red, that means it is not a valid IP address. Type in the desired IP address and click **Apply** to implement.

The new IP address will automatically be connected:
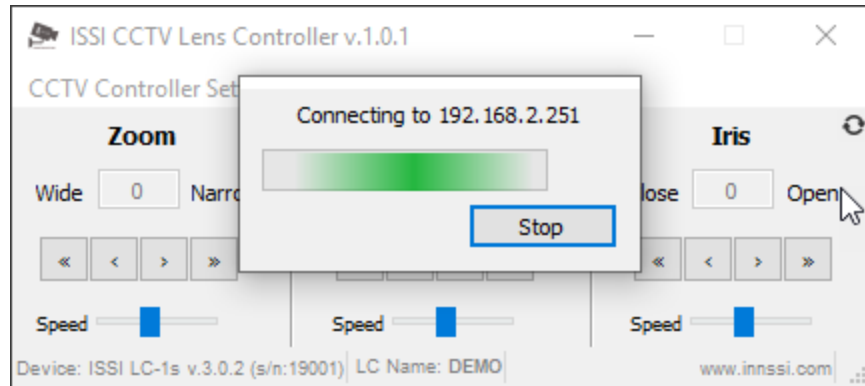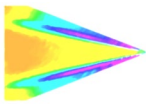
If the IP address does not change and the following message is displayed after the IP is changed, it may need to be run as administrator.


When the IP address is changed, the software will automatically attempt to switch communication to the new address. If it can't find that address, it is likely to be because the IP address previously used is stored on the computer and needs to be cleared before the new address can take hold. The timeout for this to occur by itself can sometimes be 10-20 seconds. To do this, there are two options:

1. Run the lens control software as the administrator
2. Clear the list of IP addresses in the computer through the command prompt (shown below):

Open the Command Prompt (Start > Search > cmd) as administrator:
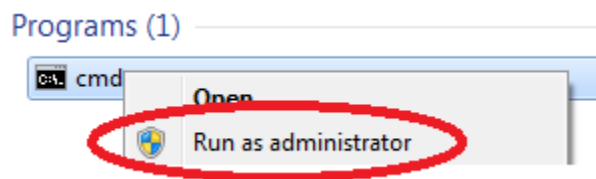
Once the command prompt is open, type **"arp –a"** to display the IP address and Physical Address of all devices on the local network.
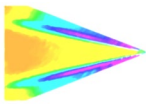
```
C:\Windows\system32\cmd.exe

C:\Users\Steve>arp -a

Interface: 192.168.1.25 --- 0xc
  Internet Address      Physical Address      Type
  192.168.1.1           6c-41-6a-48-78-2b     dynamic
  192.168.1.2           6c-62-6d-a6-65-26     dynamic
  192.168.1.3           14-18-77-6f-9d-76     dynamic
  192.168.1.22          b4-b5-2f-d9-f3-4f     dynamic
  192.168.1.30          14-dd-a9-d5-e8-9f     dynamic
  192.168.1.32          00-1d-73-19-ef-86     dynamic
  192.168.1.40          00-21-b7-ba-0a-84     dynamic
  192.168.1.42          00-1e-c9-d5-05-91     dynamic
  192.168.1.43          00-11-1c-f6-31-7b     dynamic
  192.168.1.44          7c-05-07-8a-5d-d8     dynamic
  192.168.1.48          c0-7c-d1-fc-98-68     dynamic
  192.168.1.53          00-1f-bc-09-39-03     dynamic
```

To clear the table so the lens controller IP is reset to the new address entered, type **"arp –d"**. Running the lens control software as administrator will automatically clear the ARP table.

```
C:\Windows\system32>arp -d
```

Always on Top makes the LC-1S software always appear as the front window for all windows open on the desktop.

The save and load settings are used to save positions and recall them on each motor of the lens. When the lens parameters are at their desired location, those positions on each motor can be saved and later recalled. To save new settings, select **Save Settings** and enter a name for those lens settings. Settings are saved to the computer in which the interface is open, not the lens controller itself.
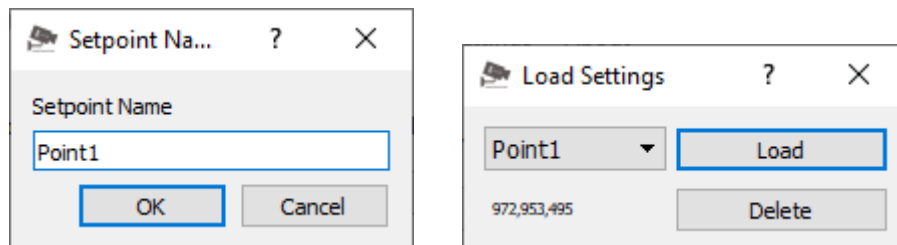
To recall those lens settings, select **Load Settings** and the lens will return each motor to those positions. The lens focal length, position of the focus motor and F number will be displayed for each saved set point.
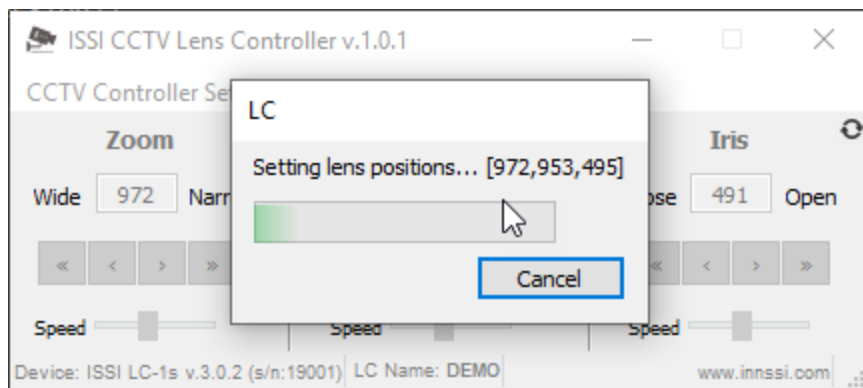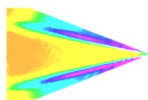
When the position of the lens is being set, the above status window will show the progress.

Keyboard Commands

For faster access to preset positions, keyboard commands can be used to recall saved positions. If a preset is saved with any single digit integer (0-9) it can be recalled by the command *Ctrl+0, 2……9*. Individually recall these commands by holding *Ctrl* + the number of the preset. To recall these presets, they must have the name of the single digit integer being recalled. For example, if a preset is saved as 1, then pressing Ctrl+1 will recall that preset.

Set Name will allow a device name to be entered for the connected lens controller. If multiple lens controllers are being used over the same network, this will aid in distinguishing them.


This name will then be displayed in the bottom right corner of the user interface.
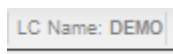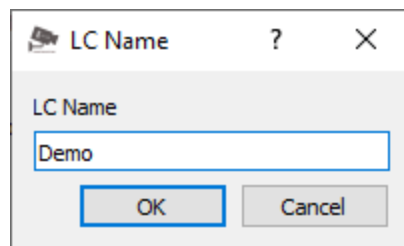
Restart LC will perform a software reset. This should be used to fix connection problems or if the software becomes unresponsive.

Find Limits will find the limits of the lens. This should be done when a lens is first connected. This can also be used if the lens limits need to be re-learned for lenses will multiple focal range settings or if a software or firmware update was made.

Exit will disconnect from the lens controller and exit the program.
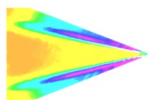
Firmware Upgrade

Firmware can be upgraded over the Ethernet connection. When a firmware update is available, download from the ISSI website (https://innssi.com/motorized-zoom-lens-control/) and save. The firmware update tool can be found in the '**About**' menu. Firmware updates will be issued as needed and will always be posted to the ISSI website under the ISSI products page in the download section for the LC-1S. Always use the software version recommended for the firmware.
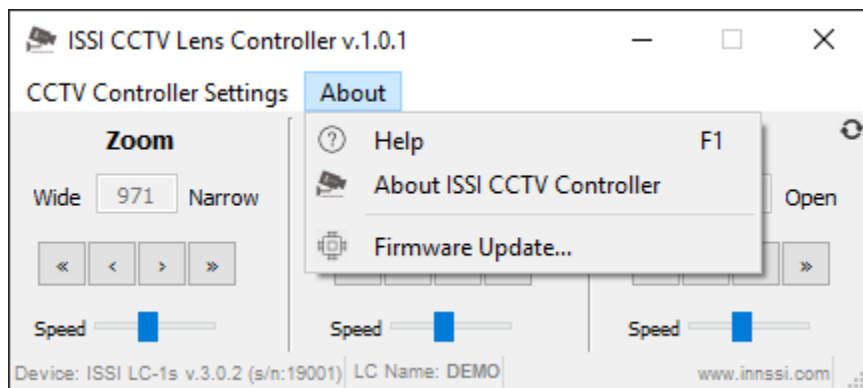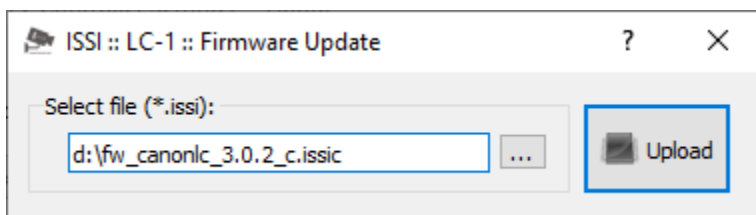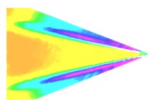

Click on **Firmware Update** to open the window to select the firmware file to upload.
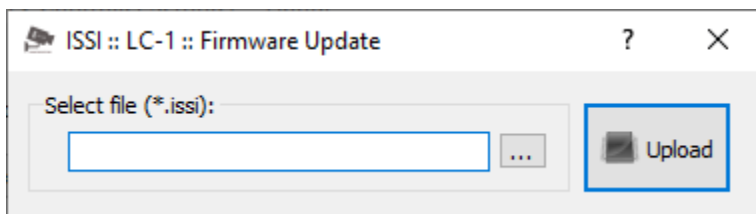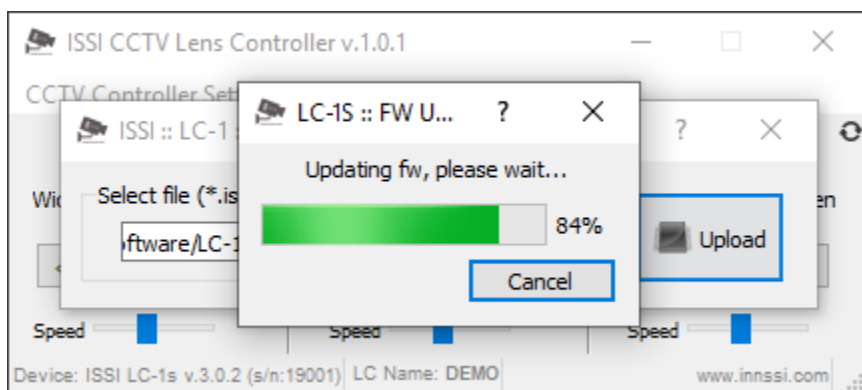

Select the file to upload.

Once the file is loaded into the Firmware Upload tool, click **Upload**.
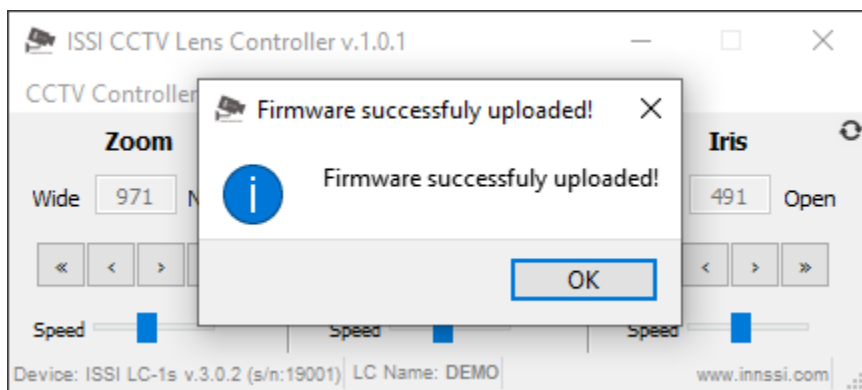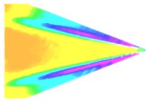
The following window will appear when the firmware update is in progress

Once the firmware is successfully uploaded, the following message will appear.

Troubleshooting

Communication

The lights on the Ethernet port should be flashing if communication is established. If the device is locked and the lights are not flashing, it is locked in firmware upgrade mode.


Firmware Upgrade

If the lens controller firmware update fails to initialize, it may appear that the lens controller is locked and communication can't be established. Start by pinging the IP address in the command prompt to assure there is communication.

If there is no communication and a general failure message is displayed, there may be another issue like the Windows Firewall or antivirus blocking the program.
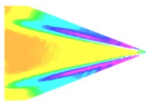
The firewall or antivirus will either need to be turned off or an exception for the software will have to be made to allow it through.

In this case, try connecting to the lens controller in the software interface. It won't connect so press the **STOP** button.

Another solution to communication issues is to clear the associated IP addresses to the LC-1S. This problem can occur when the IP address is changed. There are two methods to clear the IP addresses.

      1.) Run the lens control interface as administrator
   2.) Open the command prompt (as administrator) and type "**arp -d**".
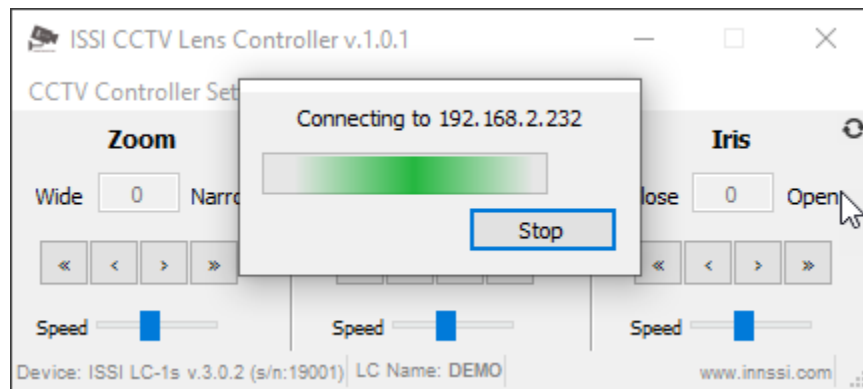
Next, go to the firmware update and load the firmware again. Even though the communication is not established with the software interface, it is still connected to the NIC, which means the firmware can still be updated. Once the firmware is uploaded, the controller should connect via the interface.

Locked In Programming Mode

If the controller can be pinged but not connected via software, it could be in programming mode, awaiting firmware. In that case, follow the steps below to gain control back:
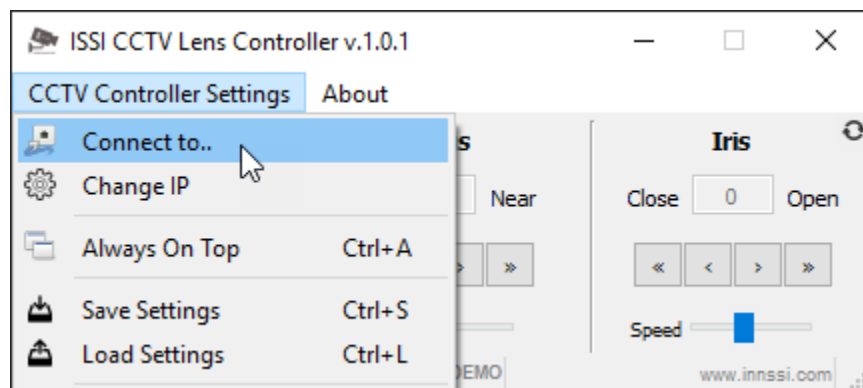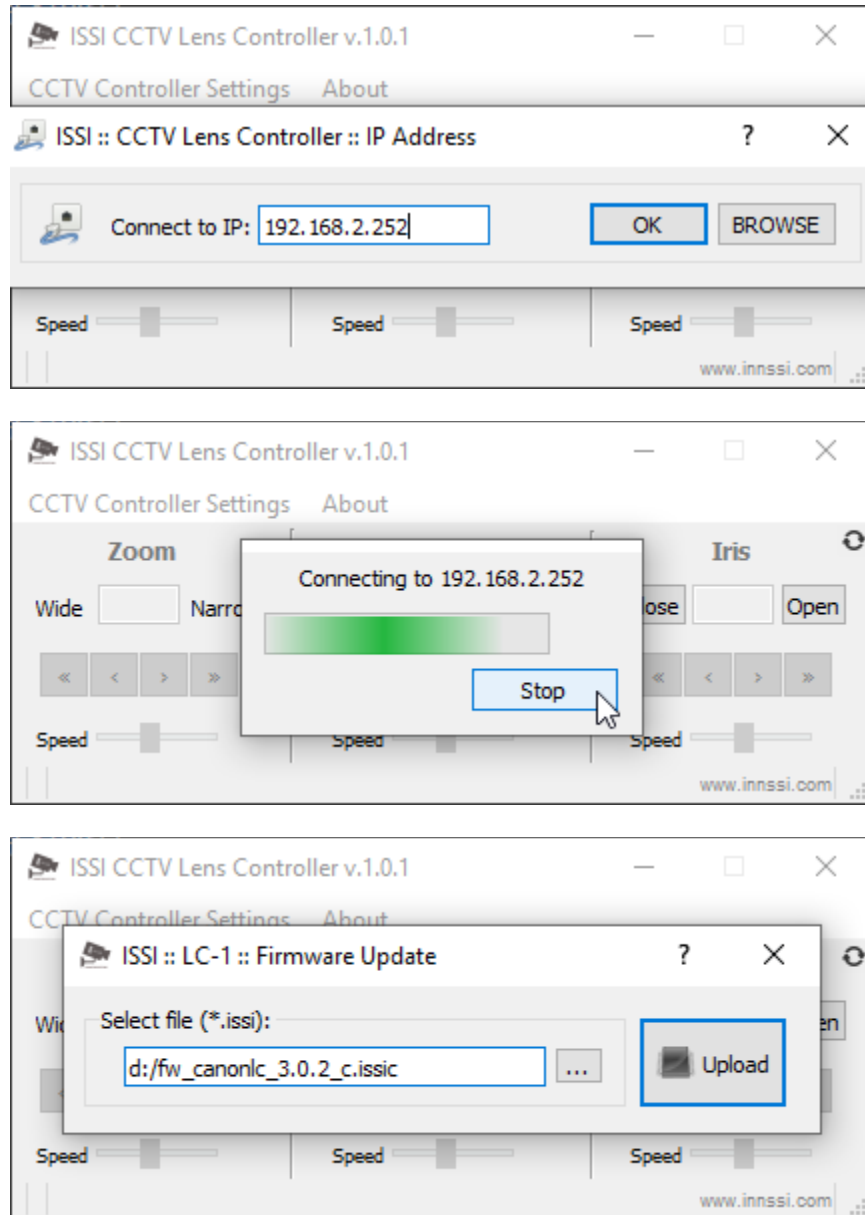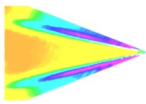
If it does not start automatically (after 1-2 sec), restart by power.

Recovery
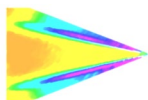
Unplug the device from power. While holding the reset button in, turn power back on and keep holding reset for 2-3 seconds. This will place the LC-1S into recovery mode. This will reset the entire controller (MAC address, IP address) for any changes that were made. Once in recovery mode, restart steps for **Locked In Programming Mode.**

Wiring

A lens cable is supplied with the lens controller. One end has the locking connector to attach to the LC-1S lens connection and the other is ready to wire directly to the lens. The lens will be wired directly to this control cable. For auto-iris lenses, an auto-iris 4-pin connector is supplied. ISSI does not supply this connector.
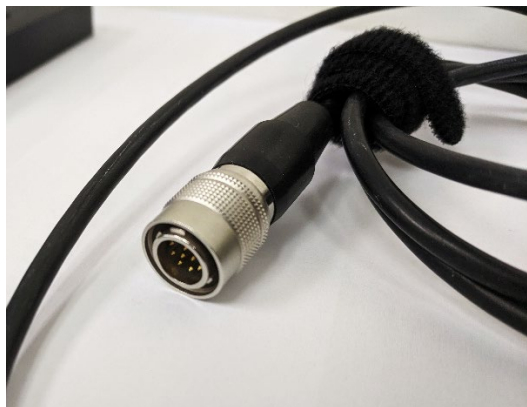
Motorized Lens Functions Connection   **Auto Iris Plug**

Disclaimer: This is provided to show the specifications of the connector on the LC-1S and the capabilities of the LC-1S itself. It is not a guarantee of performance with every CCTV or motorized zoom lens. Damage to the LC-1S or lens due to improper wiring is not covered by the product warranty. If you have a question about wiring, please contact ISSI at support@innssi.com.


Specifications

The standard output voltage for motorized lens functions is 6VDC. Depending on the lens being used, this may also be set to 8VDC or 12VDC at ISSI prior to shipment. The lens to be used should be indicated prior to shipment so that ISSI can set the proper output voltage for motorized lens functions. The output voltage will be indicated on the packaging and on the ID tag label on the LC-1S itself.

| Nominal Power Consumption	1W
Max Power Consumption (6V lens)	Lens Dependent
Input	6.5-28VDC (12VDC power adapter included)
Interface	10/00 Mbps Ethernet
Protocol	UDP
Output Voltage (Zoom and Focus Motors)	6VDC (Standard) Set based on lens (8VDC or 12VDC available)
DC Auto-Iris Power	5VDC
Video Auto-Iris Power	6VDC
Input Resolution	10 bits
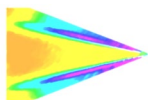
Control Connector: Hirose HR10A-10R-12S(71)
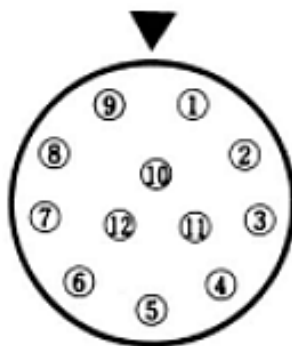
Pin	Signal Type	Control Cable Color	Signal Name
1	6 VDC	Blue	Motor 2 (focus) Command Voltage +
2	6 VDC	Brown	Motor 2 (focus) Command Voltage -
3	6 VDC	Black Shield	Motor 1 (zoom) Command Voltage +
4	6 VDC	Black Center	Motor 1 (zoom) Command Voltage -
5	GND	Red Shield	Ground
6	5 VDC	Red Center	+5V
7	6 VDC	Orange Center	Motor 3 (iris) Command Voltage +
8	6 VDC	White Shield	Motor 3 (iris) Command Voltage -
9	N/C	White Center	Future Use
10	0-5 VDC	Yellow	Focus potentiometer input
11	0-5 VDC	Gray	Zoom potentiometer input
12	0-5 VDC	Orange Shield	Iris potentiometer input
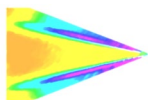
Auto Iris Connection
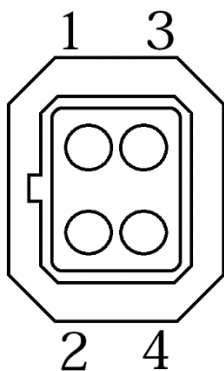
DC Auto-Iris	**Video Auto-Iris**

Pin	Signal
1	Brake -
2	Brake +
3	Drive +
4	Drive -

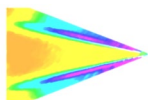| Pin	Signal
1	6VDC
2	N.C.
3	Video
4	Ground

To avoid lens damage, always compare wiring instructions to the lens wiring diagram.
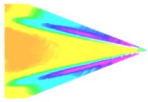
Dimensions
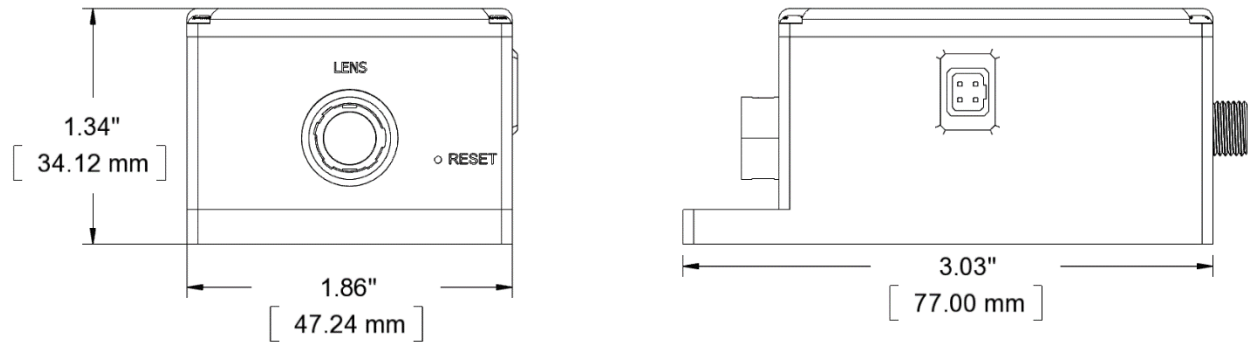
LC-1S Dimensions

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