



DCS Series Lighting Controller—User Manual

The manual includes information about the following:

DCS-100E, DCS-103E

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Hardware Overview

The DCS Series lighting controller is a high-flexibility controller for machine vision illuminators.

DCS-100E

- Single Independent Output,
- Up to 90W output power, 30W per channel
- 3-Independent Channels within output

Typical Applications

- Cost effective single-light controller
- RGB or other mixed color Lighting
- Single-High Power Lighting; paralleled channel operation provides high power output



DCS-103E

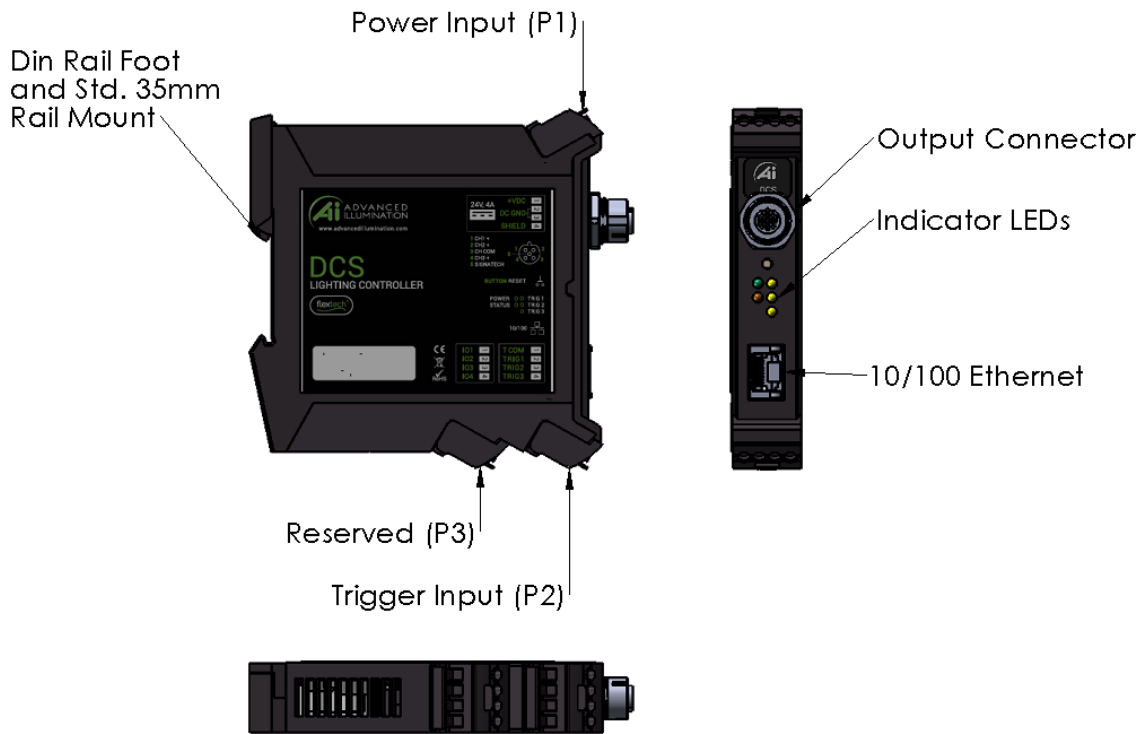
- Three Independent Outputs,
- Up to 90W output power, 30W per output
- 1-Independent Channel within each output

Typical Applications

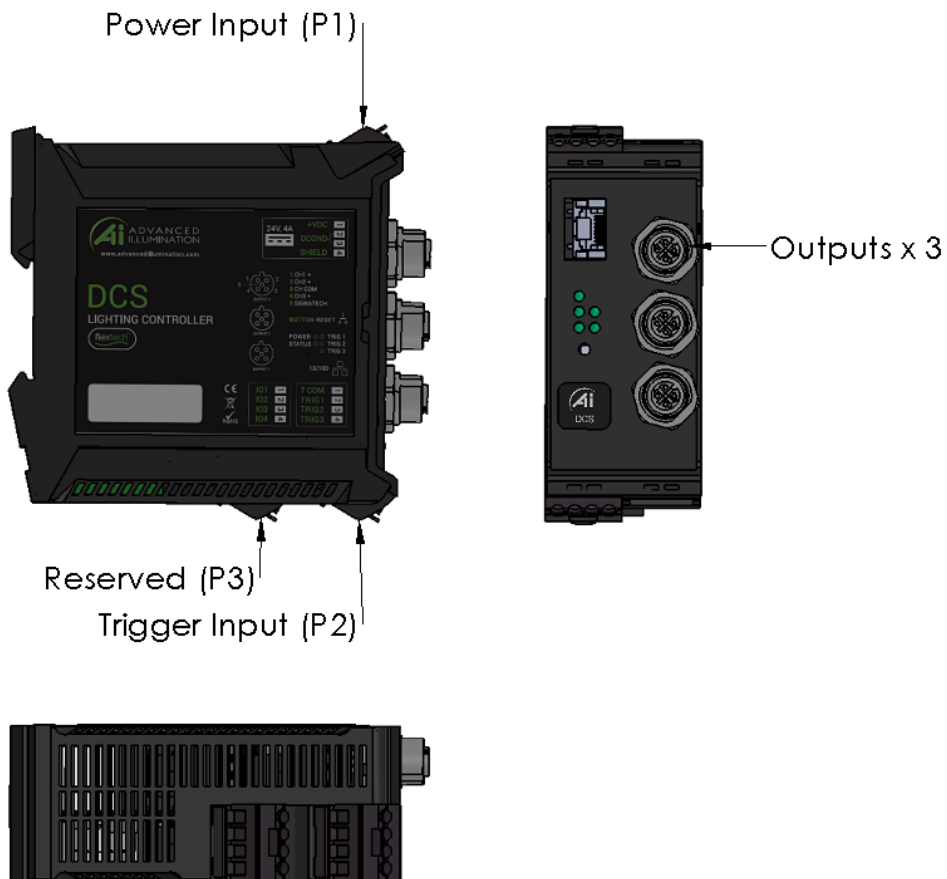
- Cost effective multi-light controller
- Drive a diverse range of different lights independently
- Drive multiple single-color light sources



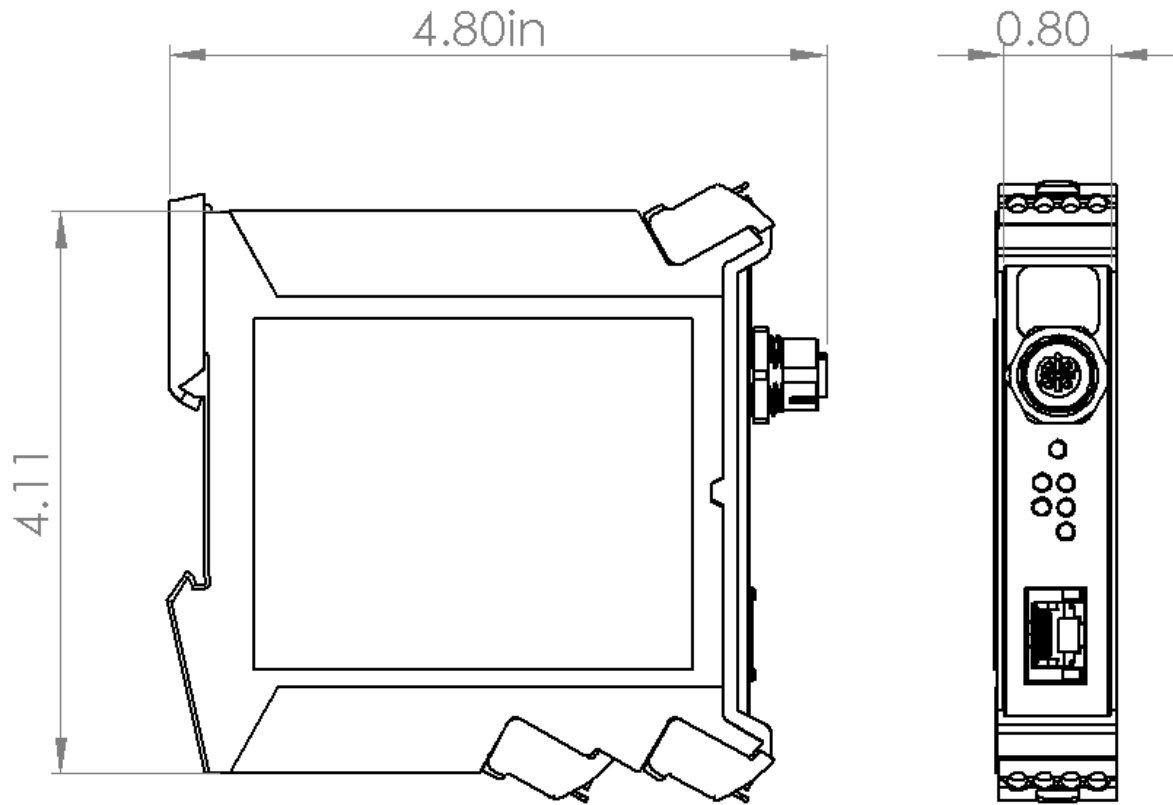
DCS-100E — Overview



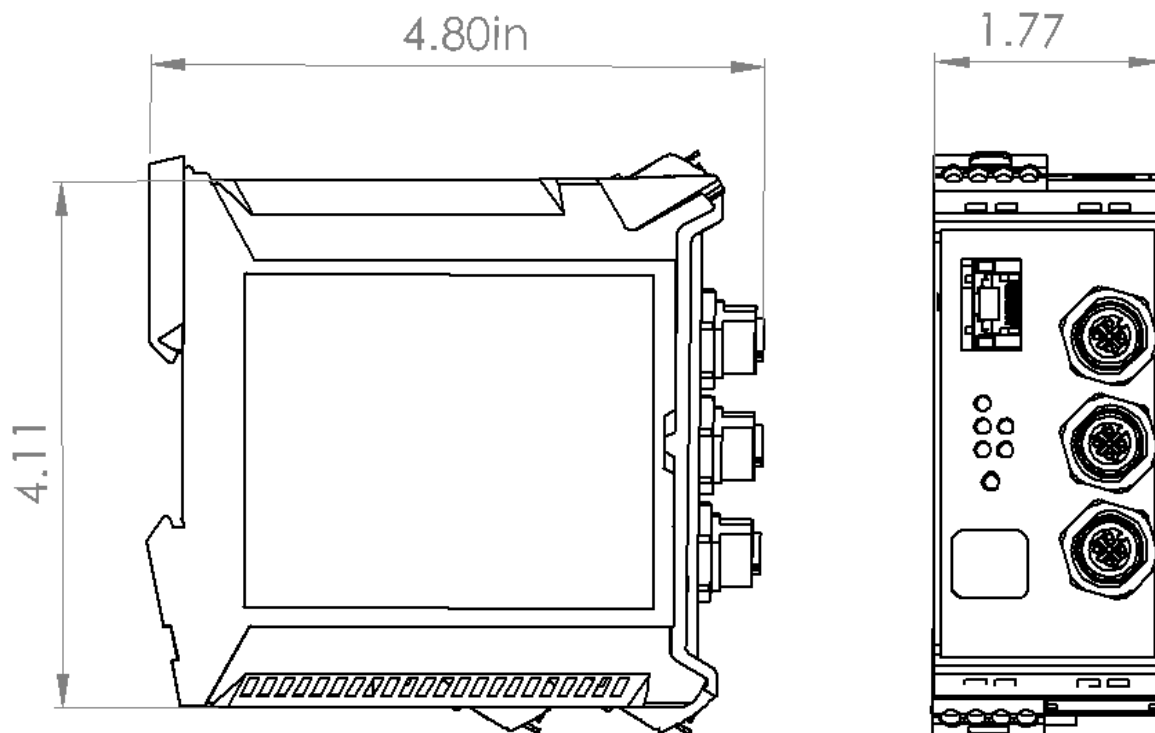
DCS-103E — Overview



DCS-100E — Dimensions



DCS-103E — Dimensions



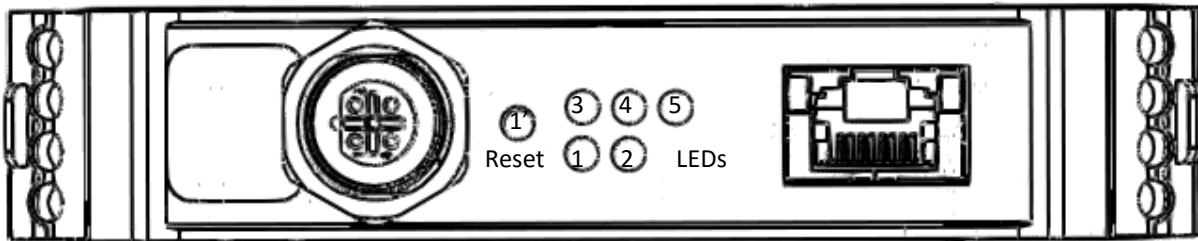
General Specifications

Specification	DCS-100E	DCS-103E	Notes
Power Requirements	24VDC Nominal, 4.5A	—	
Output Power	Up to 90W, 30W per channel	Up to 90W, 30W per output	
Channel Control	(3) Independent channels, (1) output connector	(3) independent outputs, (1) channel per output	
Modes	Continuous, Pulsed, or Gated Continuous	—	
External Trigger Input	5-30VDC compatible, Opto-Isolated inputs	—	
Pulse Width Range	10usec - 10msec	—	Best performance 200usec or above
Trigger-to-Pulse Latency	10 usec	—	
Duty Cycle / Frequency	15% duty cycle limit in pulsed mode. Maximum frequency 5000Hz.	—	Maximum Frequency limited by type of light connected to controller
Maximum Operating Temperature Range	-10 to 125F	—	
Maximum Operating Temperature (case)	135F	—	
Communication / Software	- 10/100 EthernetStandard TCP-IP, UDP - .NET library compatible with C#, etc..	—	

	Color	Behavior	Function
LED 1	Green	On	Main Power Indicator
LED 2	Amber	Blink	Once per second heartbeat when light is connected. Blinks faster when commands are received.
LEDs 3,4,5	Yellow	OFF / ON	External trigger status. Blinks ON when Signal is HIGH
Button	SPST Push	Push and Release	Resets the device to factory settings– Must be held for at least 5 seconds. Recommended to Power Toggle controller after factory reset

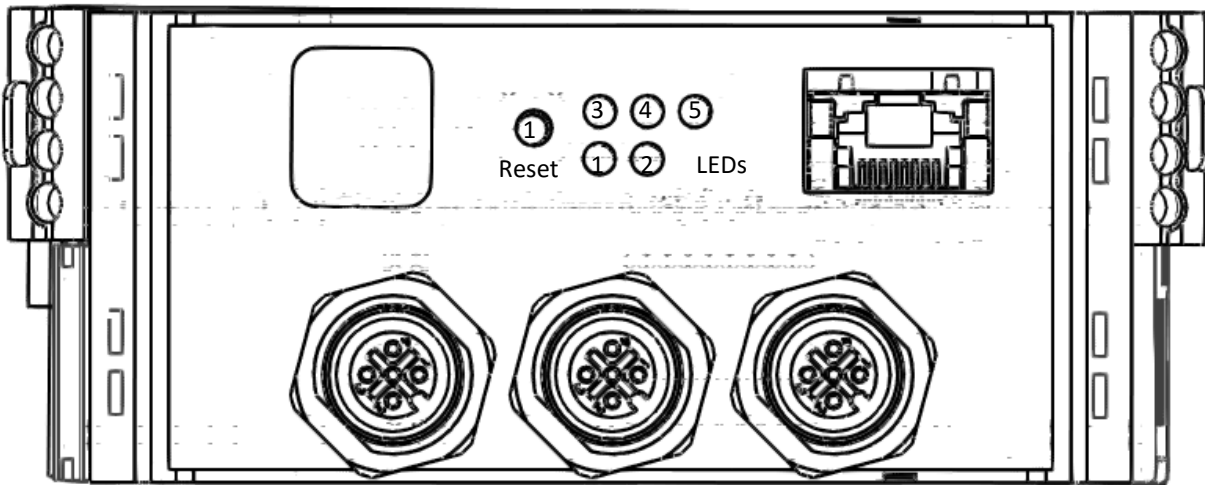
DCS-100E

10/100 Ethernet



Output 1 x 3 channels

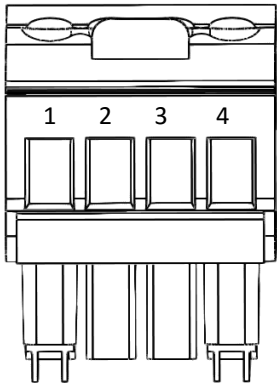
DCS-103E



Output 3 Output 2 Output 1 x1 channel each

Connections

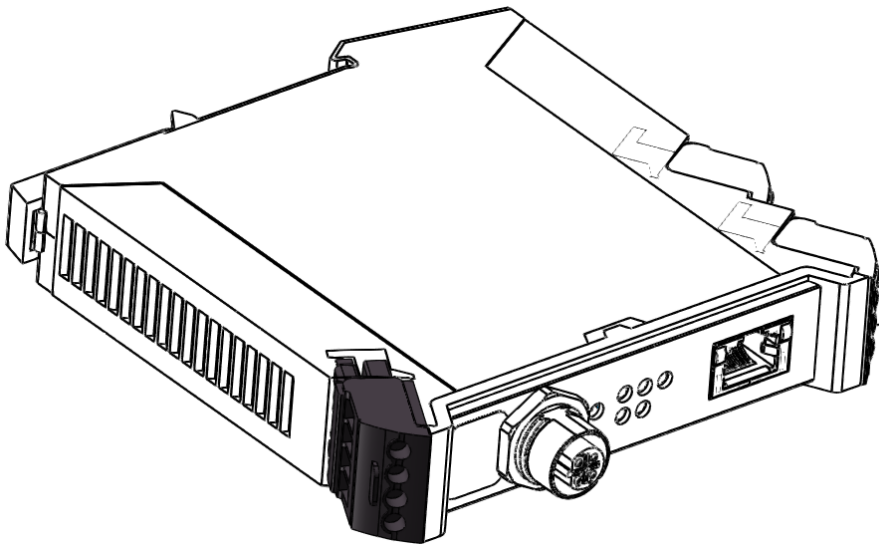
Power Input—P1



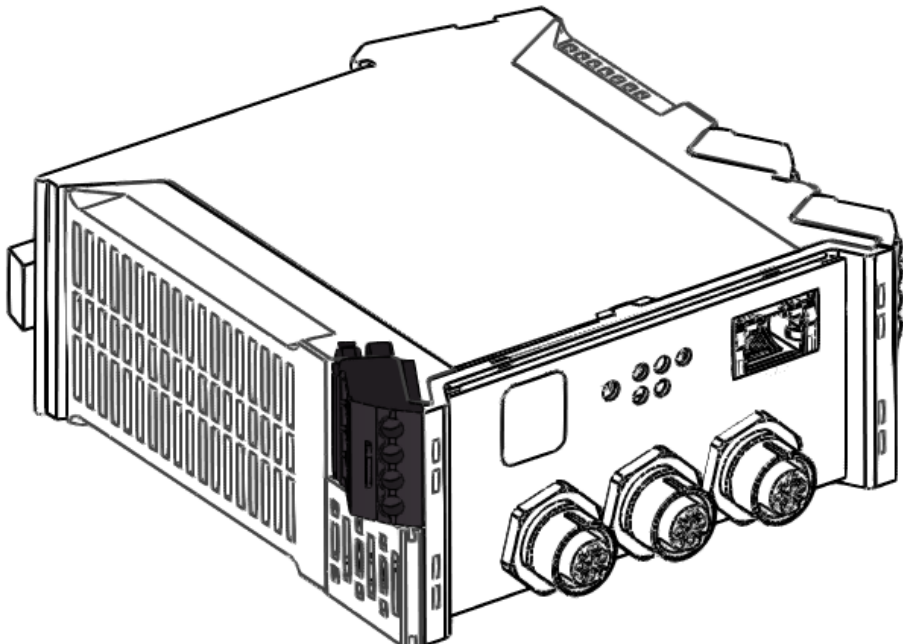
Front View of Connector

Pin	Function	Note
1	+24VDC	4.5A supply Recommended for best performance
2	DC GND	
3	DC GND	
4	SHIELD	Optional: Tied to chassis copper for ESD/EMI protection. Tie to earth ground if desired.

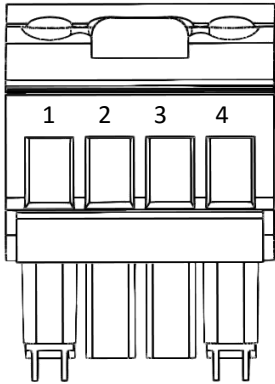
DCS-100E



DCS-103E



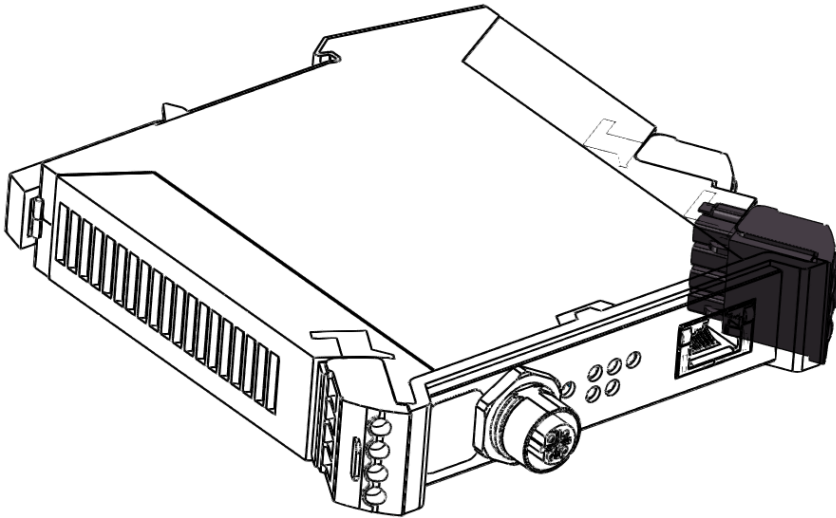
External Trigger Input



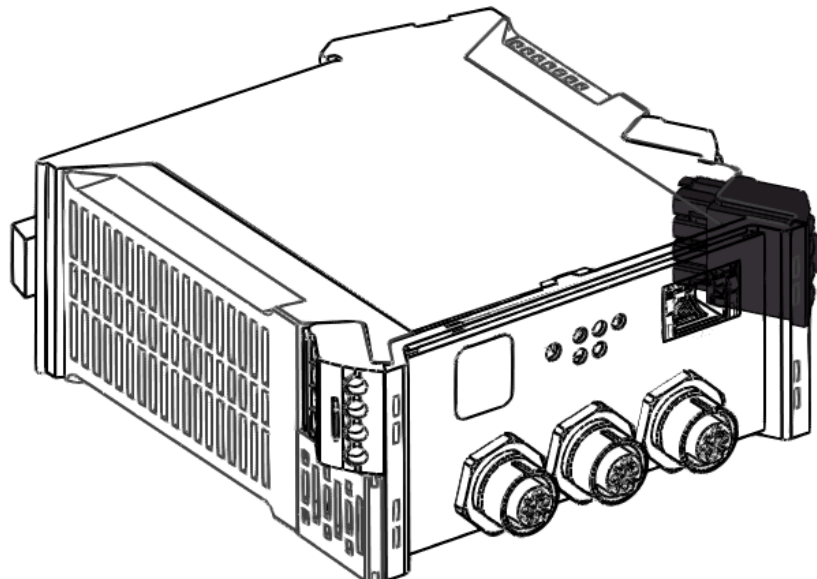
Front View of Connector

Pin	Function	Note
1	Trigger Common	Connect to common ground of supply voltage based on sinking/sourcing requirements. All triggers share common.
2	Trigger Input 1	5-30VDC tolerant
3	Trigger Input 2	—
4	Trigger Input 3	—

DCS-100E

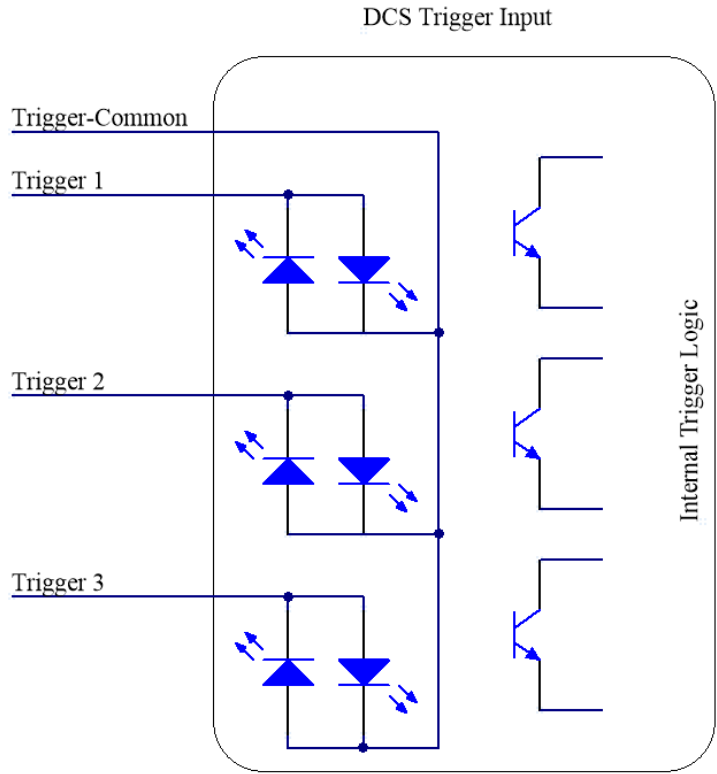


DCS-103E

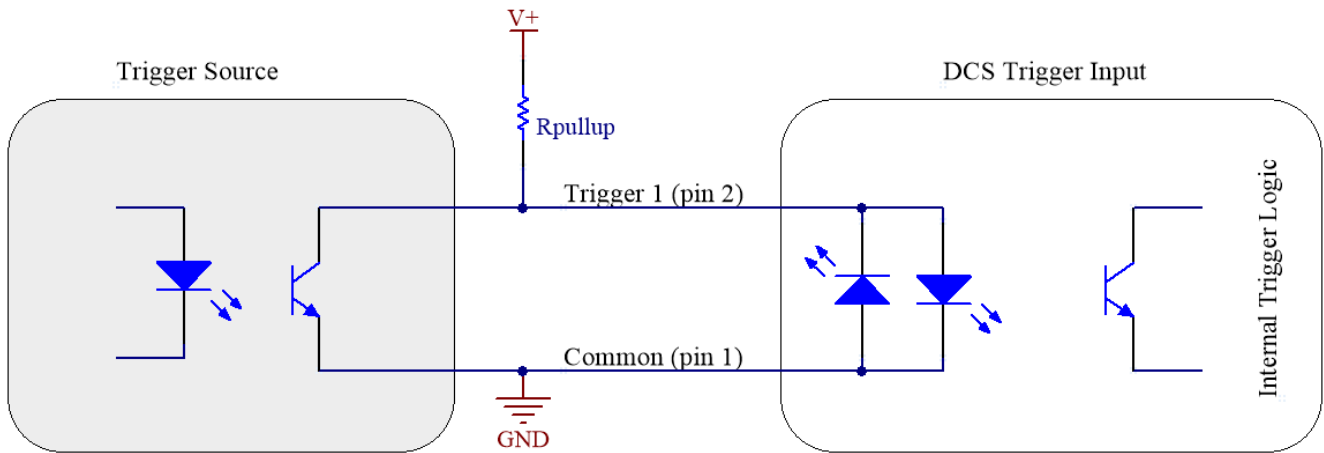


Trigger Connection Diagrams

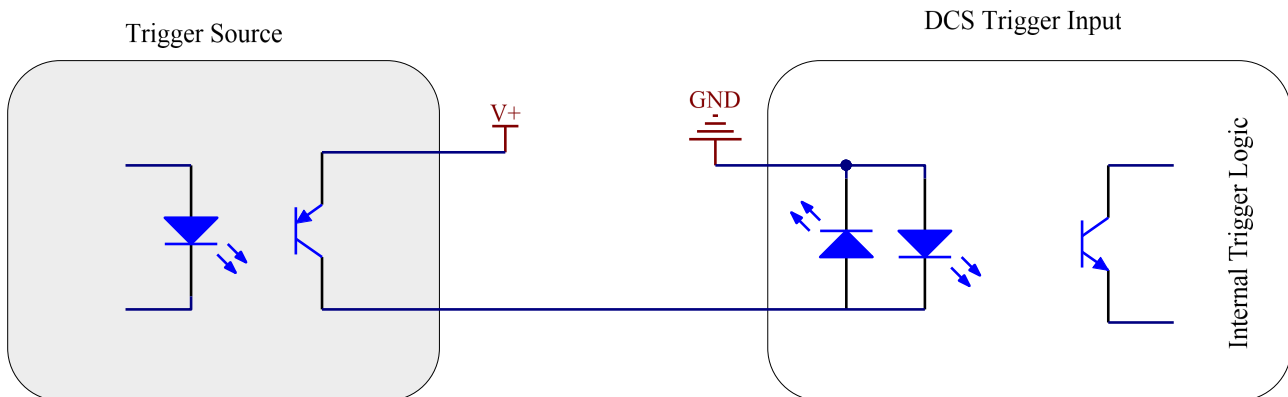
Trigger Input Schematic.



NPN "Open Collector" Sinking Output

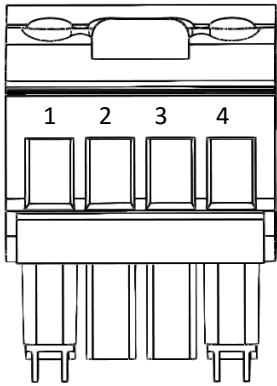


PNP "Sourcing" Output



Connections

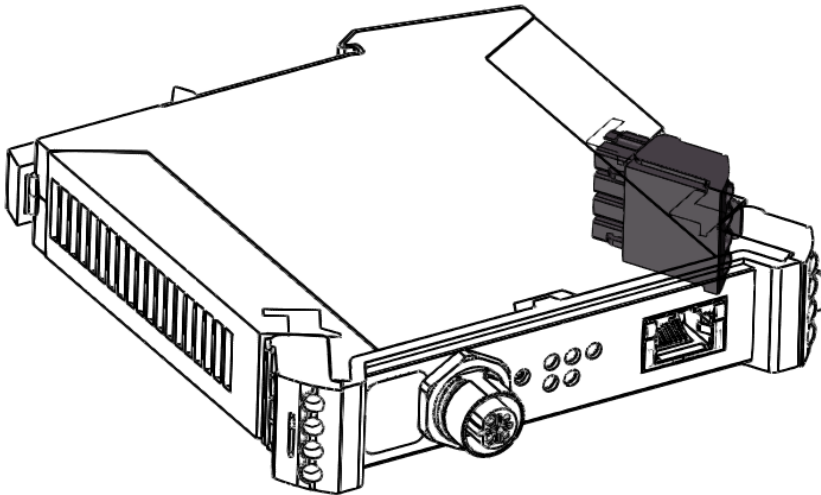
Reserved Input—P3



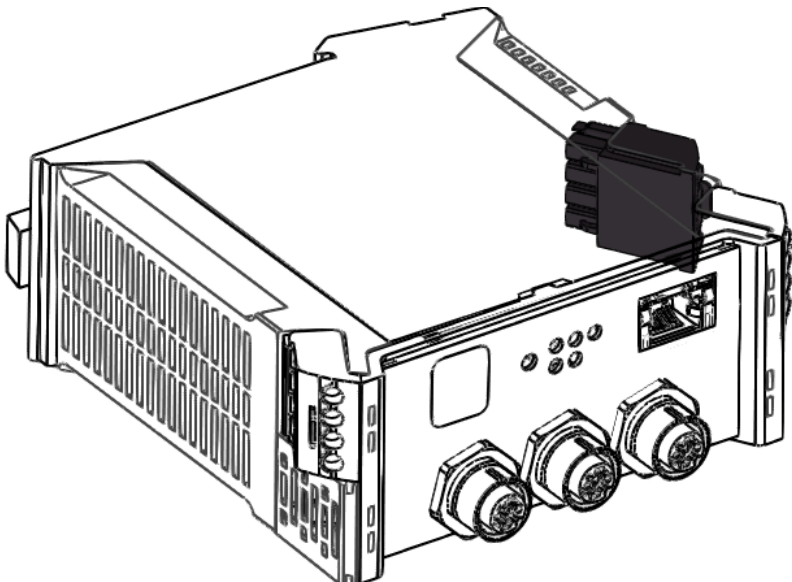
Front View of Connector

Pin	Function	Note
1	IO1	Reserved
2	IO2	Reserved
3	IO3	Reserved
4	IO4	Reserved

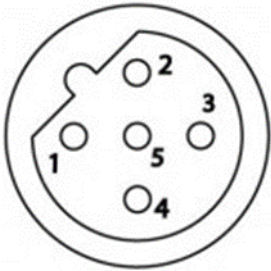
DCS-100E



DCS-103E



Connector Pinout and C1 Cable Definitions



Female, B-Coded Receptacle

5 Position M12

Pin	"C1" Cable Conductor Color	Function
1	Brown	Channel 1, LED+
2	White	Channel 2, LED+
3	Blue	Channel Common, LED-
4	Black	Channel 3, LED+
*5	*Signatech™	Signatech™ Light Protection

Important Information

The connector is not for field-use without explicit instruction or assistance from Ai. A **Signatech** signal must be detected for the outputs to be enabled. A "C1" part number with an Ai standard light will have the correct connector installed for compatibility.

Signatech is a configured lighthouse protection scheme which is over-molded in standard "C1" cables.

Under normal operation, pin 5 is read by the controller to determine information about the attached light head and safety limits for current-drive.

Note:

Avoid cross-threading by inserting the cable straight and gently until proper contact is made – the connector should thread in smoothly with little resistance. Do not force the connector if it doesn't thread in smoothly.

*Do NOT connect anything to pin 5 – damage to internal electronics may occur if pin 5 is used for anything other than Signatech protection.



Shown with RL208-050

Modes of Operation

Continuous

Continuous mode provides continuous illumination at the desired current. Light is always on unless a user issues a command to shut it off or the power is disconnected.

Power is limited by the type of light that is connected and by the total power dissipation of the controller.

Limits are determined by Signatech™. It is not required to manually limit settings to protect the controller or light.

Strobe

Strobe mode illumination is triggered by an external signal.

Pulsewidths are available from 10usec to 64msec, and can be attached independently to each channel. Delay is available from 1us to 10ms.

Important Notes : Pulse Skipping and Idle behavior

When the maximum trigger frequency is exceeded, the controller will “skip” pulses in order to maintain a safe duty cycle. This may appear as dark image acquisitions (missed triggers) or unstable flickering. Double-check your frequency and compare it to the maximum reported from the controller if this occurs.

Reduce your current or shorten your pulsewidth to increase the maximum frequency if required.

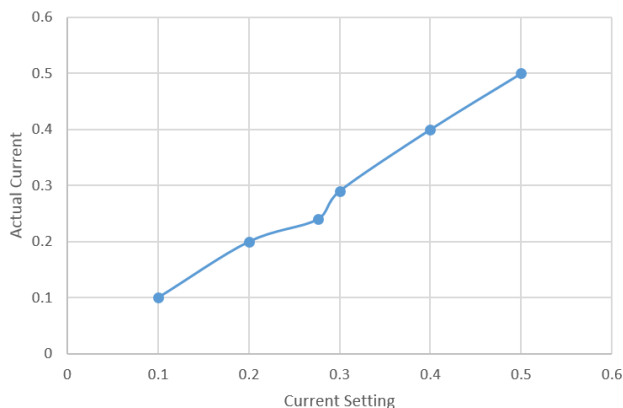
When the DCS controller is idle (no trigger active) and in strobe mode, it may be possible to see a very small current visible in the illuminator. This is normal behavior and ensures the illuminator will be at 100% capacity for the next trigger pulse.

Gated Continuous

This mode produces continuous illumination at the desired current, but the output follows the on-time of the external trigger signal.

This mode is most useful to turn the light off during processes or in between inspections, or when longer pulse widths than pulsed mode will allow are needed.

Important Note: The output current has a slight change in linearity at the 276mA drive current. The result is a minor “flat spot” where the brightness difference may not be exactly as expected. The output example is illustrated here:



Quick Start

Quick Start: To start with DHCP

Use this method if connecting through a network switch that automatically assigns IP addresses

Power the controller with the Ethernet cable connected to a network. The controller will automatically be assigned an IP address by the network hardware.

The controller will default to using DHCP when it is available.

Optional: After initially connecting to the controller, the user can supply a custom IP address by sending a UDP packet command with the new IP address. See the command table for proper usage of the commands.

If the user enters a custom IP address, it will begin using that address upon startup.

If a static-IP address has been entered into EEPROM by a user, it will no longer use DHCP unless the EEPROM is cleared by a "RESET" command, or the reset button is pressed.

Quick Start: To start with a Static IP Address:

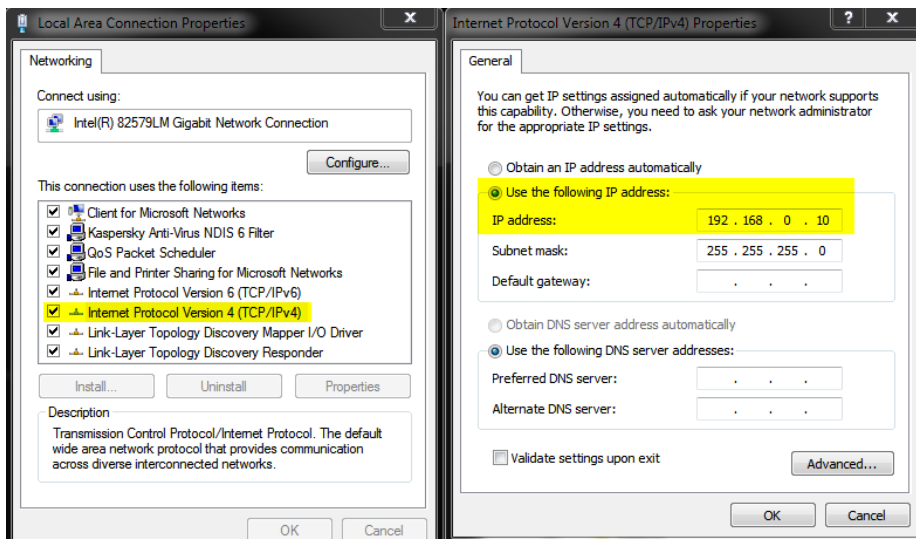
Use This Method if direct connecting to PC

Power the controller without an Ethernet cable connected, or connected directly to a PC. The controller will begin with a default IP address of **192.168.0.1**

Make sure the PC is using a STATIC IP connection. To assign a static IP in Windows, change your adapter settings in your network configuration to use a static ip under IPV4 Settings.

The static IP must be in the range of 192.168.0.XXX to work properly.

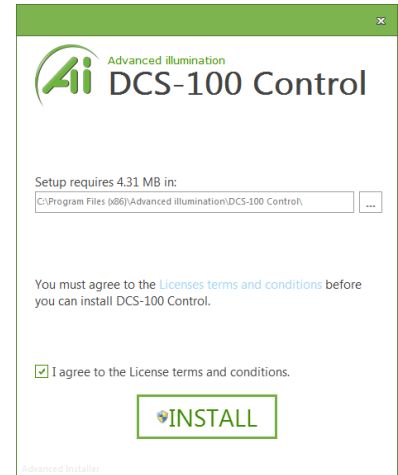
Typically it is NOT required to use a cross-over cable, but maybe necessary for older machines.



Quick Start: Graphical User Interface (GUI) Installation

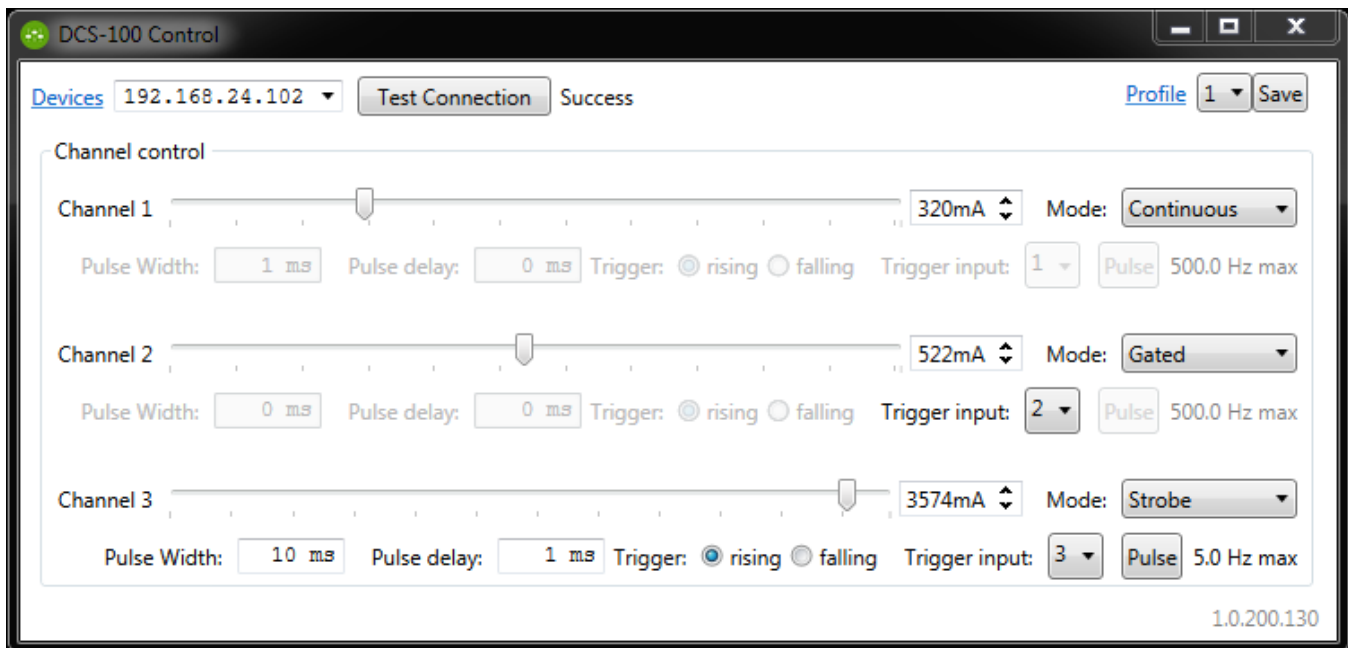
Install the software using the provided DCS-Setup application.

Note: Installation requires Microsoft .NET framework 3.5 or later.



Quick Start: Using the GUI

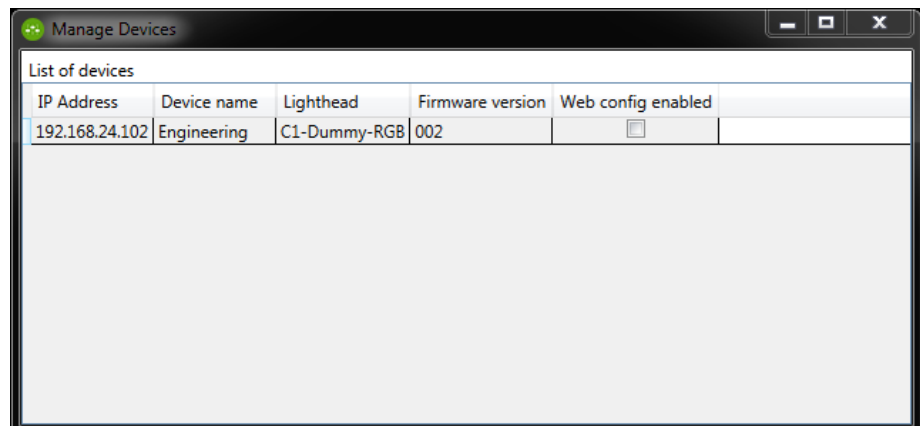
Pressing the devices drop-down box will ping the network for devices. The controller will scan for DCS controllers on the network, and will display any devices found in the dropdown menu. Select your device and press “Test Connection” to connect.



Manage Devices

The Manage Devices dialog can be used to view information about the controller or the attached light.

Device can be renamed, or IP address changed by entering new data in the fields.



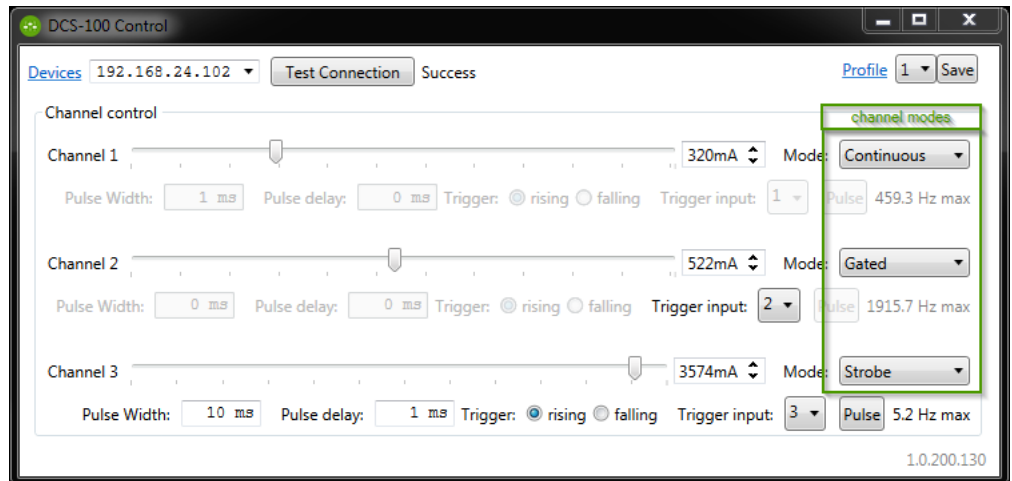
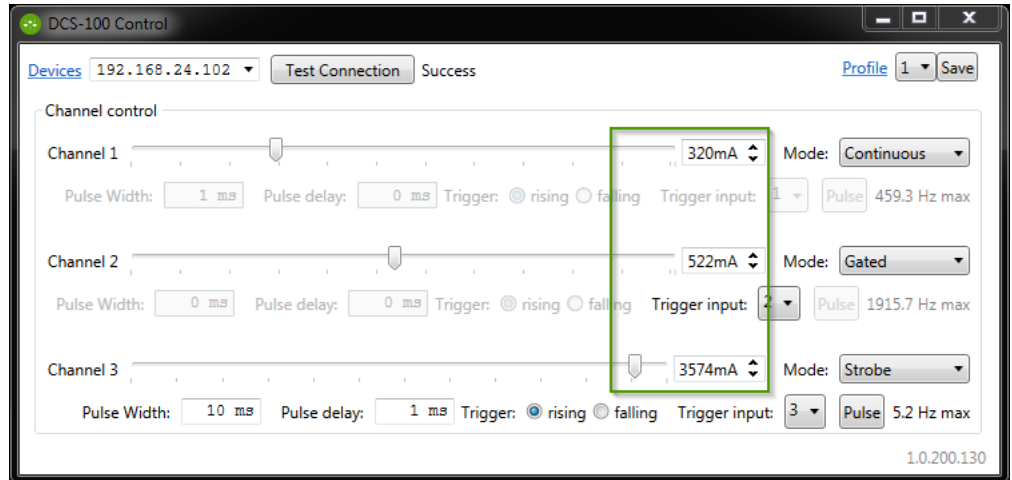
Quick Start: Enabling Modes

Select the mode for the specific channel with the drop-down box

All channels can operate in a mixture of any mode. There are no restrictions.

Output current is governed by Signatech™, which are current drive restrictions implemented by Advanced Illumination.

Note the different current limits depending on the mode used.



Continuous vs. Strobe Operation

Strobe mode provides higher current limits than continuous. Using Signatech™ we can overdrive the output current higher. These values vary depending on the pulsewidth, current and type of light being used.

In Strobe or Gated-Continuous modes, the output is triggered by an external device. Strobe mode uses a user-specified pulse-width and Gated-Continuous uses the input trigger width to determine the output pulse width.

Pressing the “Pulse” button will send a software “trigger” command causing the light to pulse once.

For pulsewidth and delay the units “ms” and “us” can be entered for milliseconds and microseconds respectively. Default units are msec.



Quick Start: Other Features

Renaming Devices:

Devices can be renamed by clicking the “Devices” text. The part number and listed devices will be shown when opening this menu.

Changing the IP address:

In the “Manage Devices” window, enter the new IP address and press Enter, or TAB. The new IP address setting will not take effect until the power is toggled to the controller.

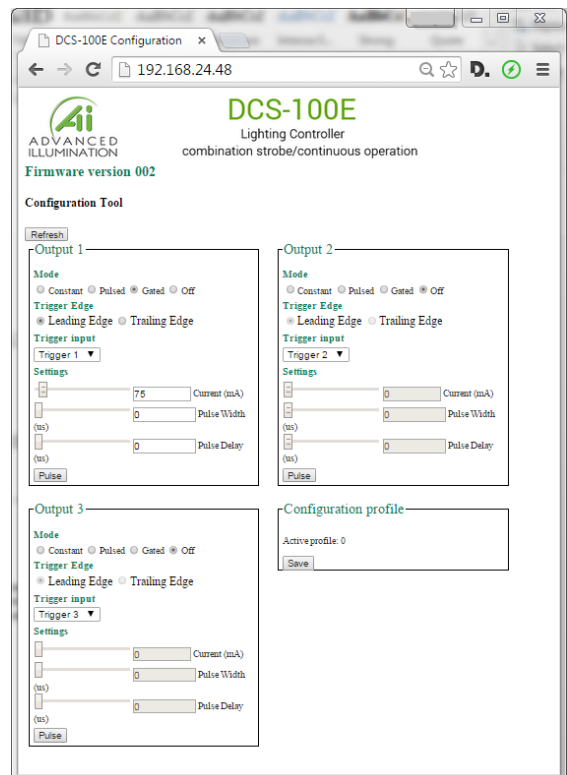
Profiles:

Configuration profiles can be saved by selecting a profile number and pressing save. The profiles switch immediately when selecting a new one, so make sure your settings are saved before switching to a new profile.

By default, the last-used profile will be enabled when the controller is switched on.

Ethernet WebServer

In the devices list, you can enable the WebServer and control the output from a standard internet browser. After enabling the web server in the Software GUI, you can access the built-in web server from most internet browsers by entering the IP address



Standard Ethernet Communication & Commands

Default Ethernet Settings

The Controller uses standard Ethernet protocol (TCP-IP and UDP) to communicate. The DCS control user interface can be used to communicate, or other software may be used to send data packets directly from the host to the controller.

Setting	Value
Typical Port Settings	UDP, port 7777 TCP, port 777
DHCP	Enabled by default
Default IP Address	192.168.0.1 *Controller will use default IP if DHCP fails upon power up, or if an Ethernet cable is not connected
User Assigned IP Addresses	User can assign a new IP address by sending a command, or entering a new IP address in the “manage devices” window of the GUI. If a user assigned IP address is used, the controller will not begin using that IP address until the controller power is toggled.

Command Structure

The DCS100 uses an SCPI-like interface where commands are a series of readable strings with parameters separated by commas. The strings must be terminated by a semicolon (;) for proper operation.

Commands can be sent in an ASCII format by specifying the IP Address and correct port number for either TCP/IP or UDP.

Commands with a parameter

Commands that require a parameter have it separated by a comma.

Example: "SET:LEVEL, 100;"

Where "SET:LEVEL," is the command and "100" is the parameter.

Commands without a parameter

If the command has no parameter, the command simply ends with a semicolon.

Example: "*IDN?;"

Commands are non-case sensitive, and spaces may be used between commands and parameters for readability. Extra spaces will be ignored by the controller.

Information / Help commands

COMMAND	DESCRIPTION	RETURNS
<pre>"*IDN?;"</pre>	<p>Gets device information: firm-ware, hardware, etc..</p>	<p>Advanced illumination "DCS-100: (fw version, hw version)"</p>
<pre>"*CHANNEL:CONFIGS?;"</pre>	<p>Reports the current, pulse-width, delay, and trigger map settings on all channels</p>	<p>Returns an XML formatted string:</p>
<pre>"*PROFILE:NUMBER?;"</pre>	<p>Gets the active profile number</p>	<p>INFO: Profile "n" is currently active.</p>
<pre>"*PROFILE:NAMES?;"</pre>	<p>Gets all the profile names saved in memory</p>	<p>Returns an XML formatted string:</p> <pre><profiles><profile id="0" name="0" /><profile id="1" name="1" /><profile id="2" name="2" /><profile id="3" name="3" /><profile id="4" name="4" /><profile id="5" name="5" /></profiles></pre>

Channel/Output Control Commands

COMMAND	DESCRIPTION	RETURNS
SET:LEVEL:CHANNELc,nnnn;	Sets the current in milliamps c = 1 - 3 (channel number) nnnn = 0-1500 (continuous &gated) nnnn = 0-3000 (strobe)	"SET:LEVEL:CHANNEL1, nnnn;" Where nnnn = 0-750 for continuous, 0-3000 for strobe
SET:MODE:CHANNELc,n;	Sets the mode c = 1 - 3 (channel number) n = 0 (off) n = 1 (continuous) n = 2 (strobe) n = 3 (gated continuous)	INFO: Channel "n" set to mode "x (xxx)"
SET:TRIGGER:CHANNELc,n;	Sets the trigger edge c = 1 - 3 (channel number) n = 0 (falling edge) n = 1 (rising edge)	INFO: Channel "c" set to "xxxx edge" trigger.
SET:WIDTH:CHANNELc,nnnn;	Sets the pulsewidth in usec c = 1 - 3 (channel number) nnnn = 0-65,000 (us)	INFO: Channel "c" pulse width set to "nnnn" us
SET:DELAY:CHANNELc,nnnn;	Sets the pulse delay in usec c = 1 - 3 (channel number) nnnn = 0-10,000 (us)	INFO: Channel "c" pulse delay set to "n" microseconds.
MAP:TRIGGER:CHANNELc,n;	Maps the specified trigger to the specified channel c = 1 - 3 (channel number) n = 1 - 3 (trigger number)	INFO: Channel "n" trigger set to input "n"
TRIGGER:CHANNELc;	Generates a software trigger on the specified channel c = 1 - 3 (channel number) Note: only works for pulsed mode	none

Utility Commands

COMMAND	DESCRIPTION	RETURNS
SAVE:PROFILE,n;	Saves the profile in EEPROM n = 0-5 (profile number)	INFO: Profile "n" has been saved.
LOAD:PROFILE;	Updates all settings to the chosen profile	INFO: Name of profile 0 set to 'test'
SET:PROFILE:NAME,xxxxxx;	Saves a name to the current active profile	INFO: Name of profile "n" set to 'xxxxxx'
SET:STATIC:IP,nnn.nnn.nnn.nnn;	Writes a static IP address into memory nnn = IP address separated by "."	INFO: IP Address set to "nnn.nnn.nnn.nnn." This will not take effect until the device is re-booted.
DISCONNECT;	Disconnects communication to the controller from the host	INFO: This DCS-100E will now accept connections from other library instances.
SET:WEB:CONFIG,n;	Enables the built-in web-server n = 0 (disabled) n = 1 (enabled)	INFO: Web configuration "enabled/disabled"

Warranty Information

Every Advanced illumination, Inc. (Ai) product is thoroughly inspected and tested before leaving the factory. Products are warranted to be free of defects in workmanship and materials for a period of two years from the original date of purchase. Should a defect develop during this period, please contact Ai Customer Service or your Ai distributor for a Return Merchandise Authorization (RMA), and return the complete product, freight prepaid, to Ai. Please provide a detailed description of the problem if possible. If a defect is found, Ai will - at our discretion - repair or replace the product without charge. Ai claims no liability for any implied warranties, including "merchantability" and "fitness for a specific purpose."

Electromagnetic Compatibility

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) as stated in the product specifications. These requirements and limits are designed to provide reasonable protection against harmful interference only when the product is operated in its intended industrial electromagnetic environment. To minimize the potential for electromagnetic interference or unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

Technical Support and Product Information

Standard product info: www.advill.com

Technical support support@advill.com

440 State Garage Road, Rochester VT. 05767

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