ADVANCED ILLUMINATION

DCS Series - Lighting Controller

USER MANUAL

Contents

Hardware Overview

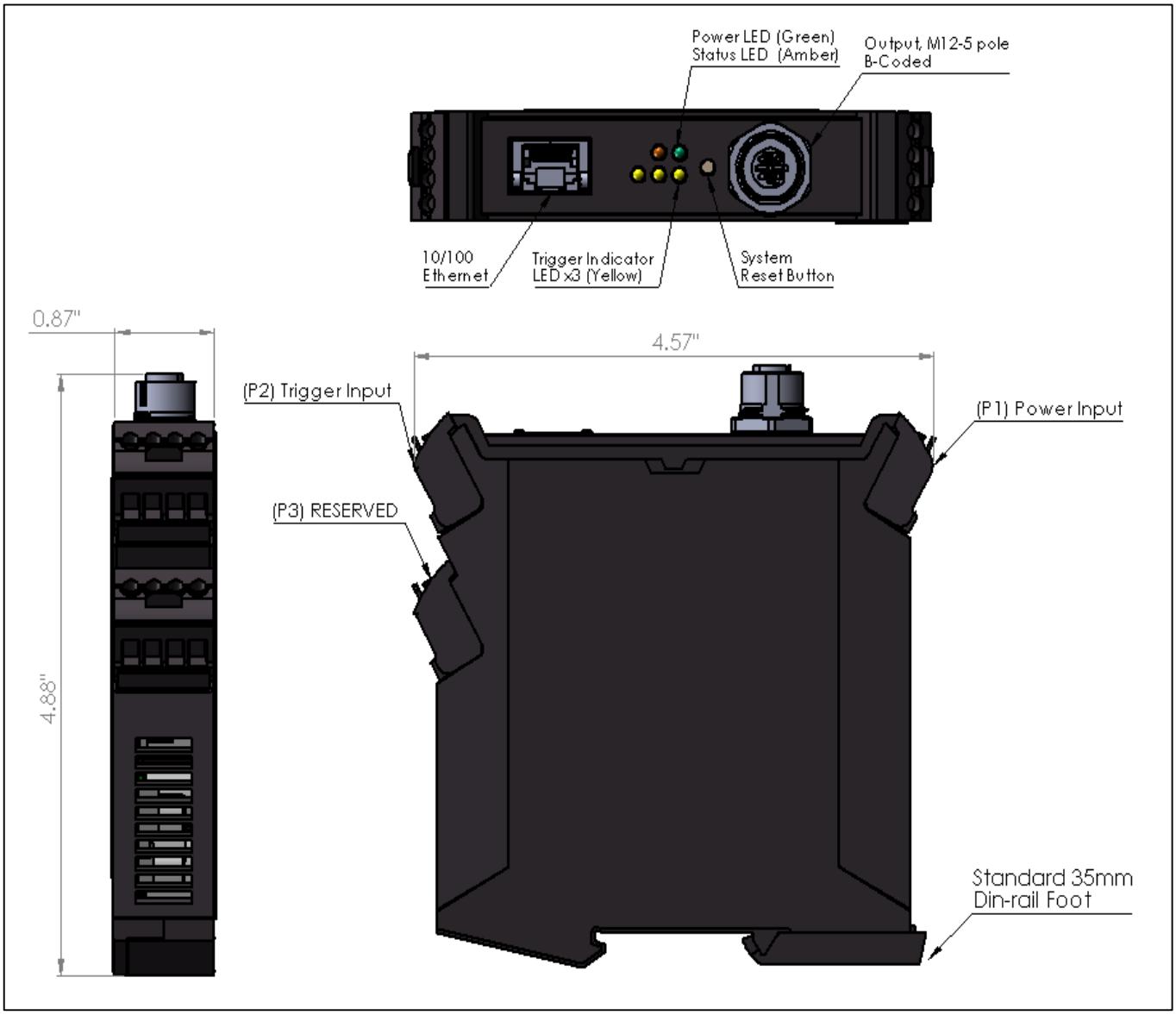


Figure 1 - Installation and Interface

Specifications & Features

Parameters	Details	Notes
Input Power	24VDC Nominal, 4.5A	30VDC absolute maximum – *exceeding 30VDC may result in damage to the controller*
Output Power	90W	1.5A continuous per channel 5A strobe per channel
Channel Control	[3] Independently adjustable Channels	
Modes	Pulsed, Continuous, or Gated Continuous	
Trigger	5-30VDC, Opto-Isolated inputs [3] Individual trigger inputs	24V typical trigger input
Trigger-Pulse-Latency	10usec	
Pulse-Width Range (Pulsed)	10usec – 65msec	1usec steps
Pulse-Delay	1usec-10msec	1usec steps
Duty Cycle	10% pulsed >10% gated-continuous	
Ambient Operating Temperature Range	-10 to 125F	
Maximum Operating Temperature (case)	135 F	
Features	**Details**	**Notes**
10/100 Ethernet	Standard Ethernet (TCP-IP, UDP)	
Software	- Windows-based GUI - Software .dlls in C# and C++ - LabView VI and drivers - Web Server Control applet	Web server runs on most modern web browers.

Lighthead Cable Description

The DCS controller requires a light with a “C1” power designator. This cable contains our proprietary Signatech protection scheme and is programmed for the specific light it is connected to.

A “C1” Suffix is required to the light part number to be compatable.

“C1” Cable Specifications

- 5-Position M12, Male, Reverse (B) Coded, 22AWG Leads
- Standard PVC jacket, shielded (foil with drain)
- Embedded Signatech™ molded into the jacket (pin 5)

Note: Without this cable and an appropriately programed Signatech™ signature, the controller will not function. This is a safety feature to prevent unwanted damage to the Lighthead or controller.

It is possible to bypass Signatech ™ by using an authorized set of Signatch data and a software key provided by Advanced Illumination.

Contact the factory for more information.

Figure 2 – Controller with C1 Cable

Connections

Power Input (P1)

Pin	Function	Note
1	24V DC	4.5A recommended minimum for best performance.
2	DC GND	
3		
4	SHIELD	Optional: Tied to chassis copper for ESD/EMI protection. Tie to earth ground if needed.

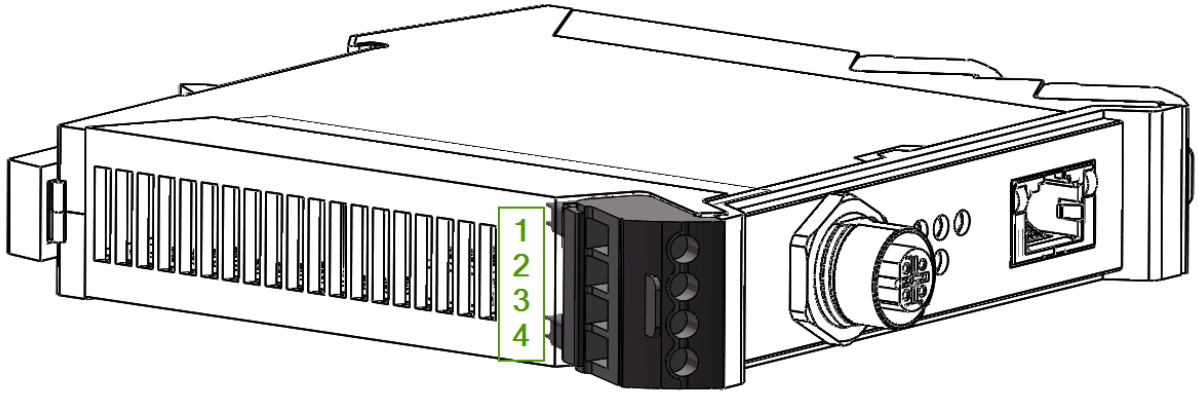


Figure 3 – Power input Connector, P1

External Trigger Input (P2)

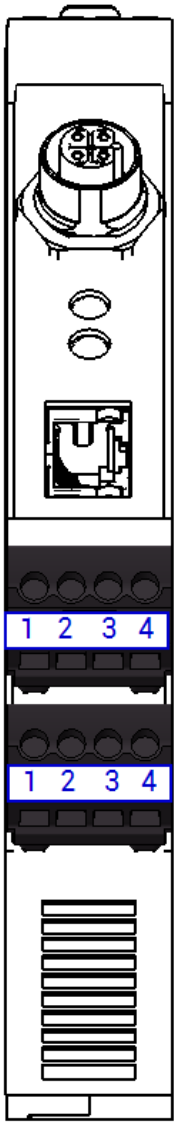


Figure 4

Pin	Function	Note
1	COMMON	Common path for all trigger inputs Tie to a voltage level or ground depending on the type of external trigger
2	TRIGGER 1	
3	TRIGGER 2	
4	TRIGGER 3	

Notes:

~Trigger Inputs are bi-directional opto-isolated. ~All inputs are TTL-compliant, and are rated to +30VDC

P2

P3

P3 IS RESERVED FOR FUTURE USE

Front Panel

LED	Color	LED Behavior	Function
1	Green	Solid	Main power is connected
2	Amber	Off	No light is connected
		Blinking @ 2Hz	Heartbeat, device is ready
		Blinks twice	Command received
3, 4, 5	Yellow	Off	External trigger signal is low
		On	External trigger signal is high
BUTTON	**Type**	**Button Behavior**	**Function**
1	SPST Push	Push and Release	Resets the Device to Factory settings. Erases all EEPROM memory and sets the IP Address back to default.

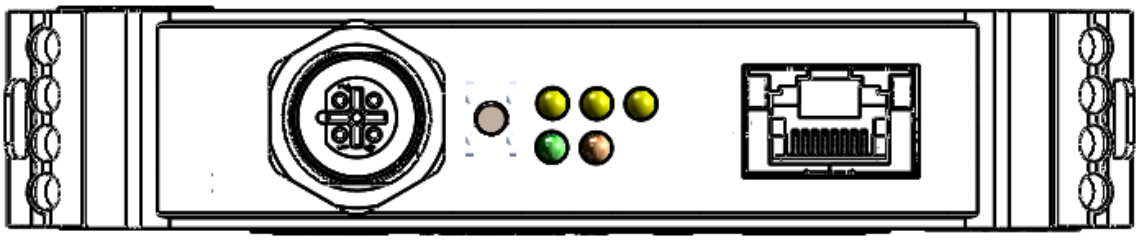


Figure 5 – Front Panel

Trigger Connection Diagrams

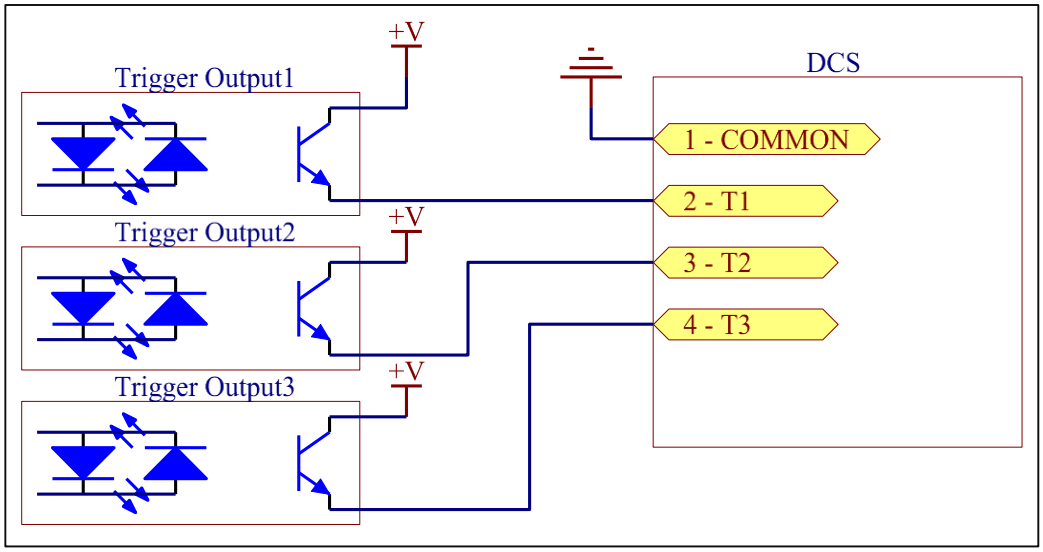


Figure 6 - Typical NPN / Emitter-Follower Connection

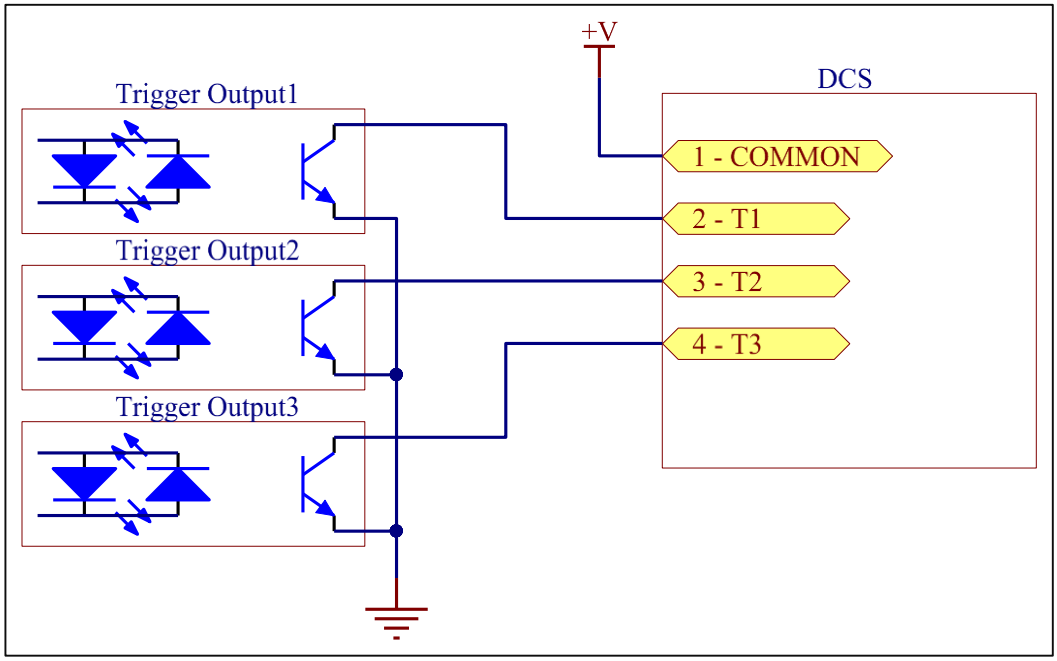


Figure 7 - Typical NPN / Sinking Connection

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

Trigger-to-Pulse delay is 10 usec

It is possible to map triggers together or independently.

Important Note: Pulse Skipping

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.

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.

Trigger-to-Pulse delay is 10 usec

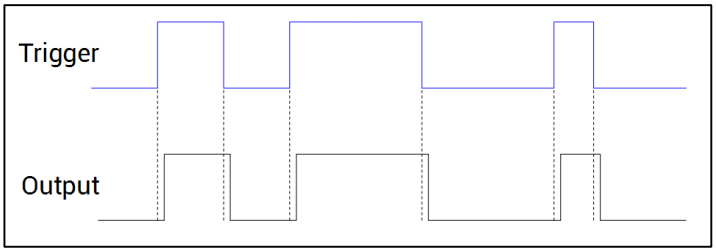


Figure 8 - Typical Gated Operation

Quick Start

Typical Hardware Layout

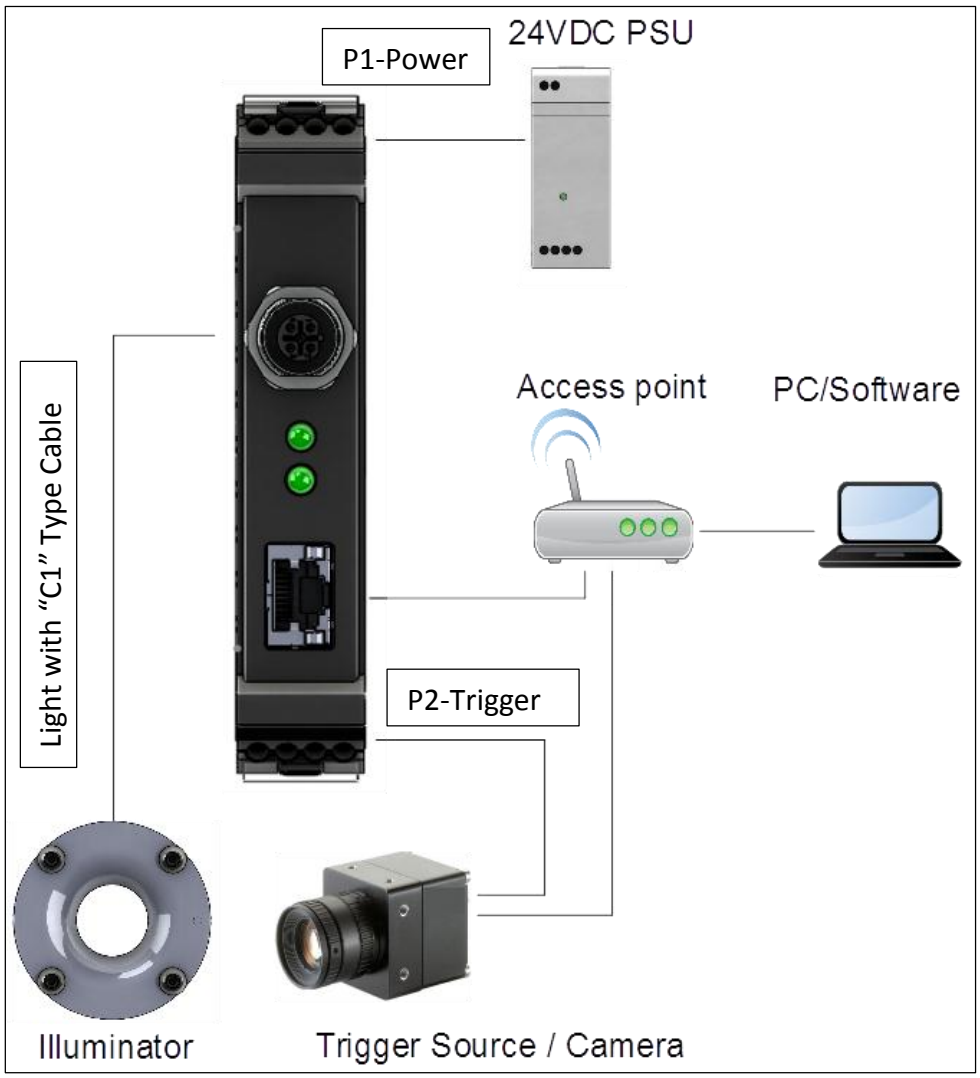


Figure 9 - Typical Hardware Setup

For proper operation, make sure all connections are secure before applying power.

Quick Start: Connect Power and Light

Connect 24V power supply leads to **P1** and the illuminator to the output M12 connector. Connect trigger inputs to **P2** if necessary.

The Light contains a Signatech™ current-drive protection device in the molded M12 connector. This device is programmed to protect the light and govern the drive current.

Removing the lighthead connector or extending it beyond a maximum distance of 3 meters will cause communication problems to the light source and possible lighthead damage.

Quick Start: To start with DHCP

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

Quick Start: To start with a Static IP Address:

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, See FIGURE11.

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.

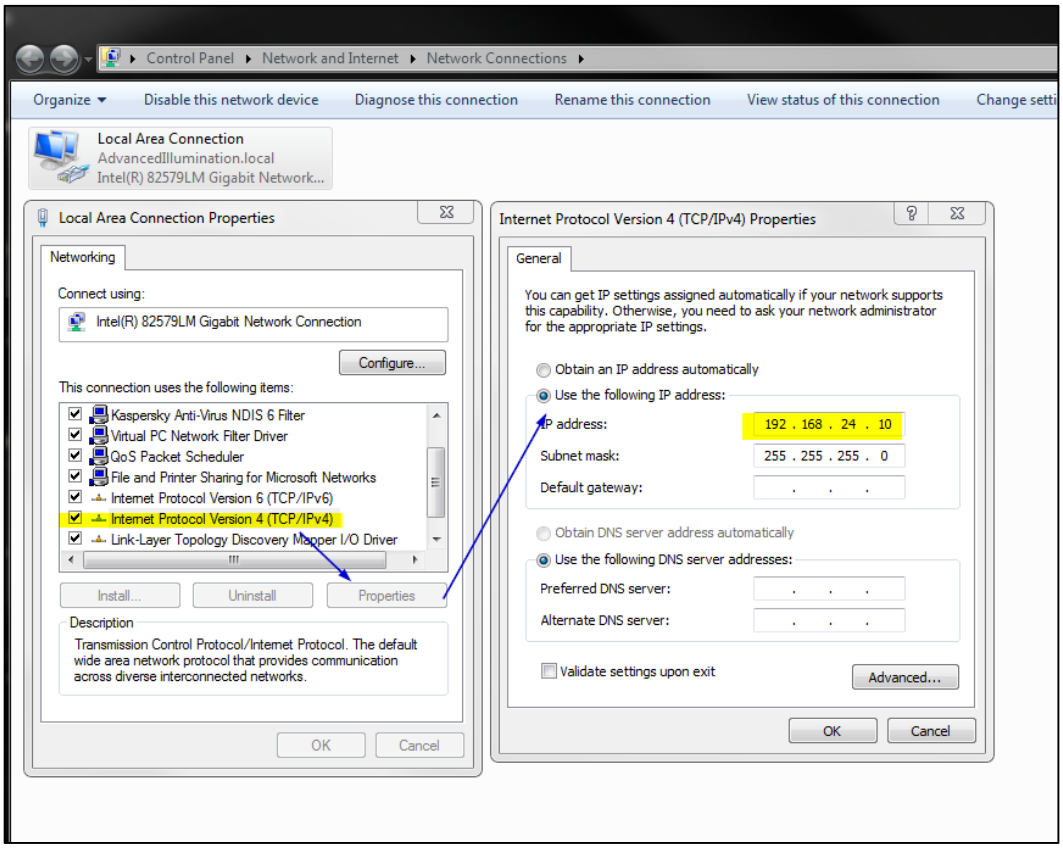


Figure 10 - Static IP Address Configuration

Quick Start: Graphical User Interface (GUI) Installation

Install the software using the provided DCS-Setup application.

Installation requires Microsoft .NET framework 4.0 or later.

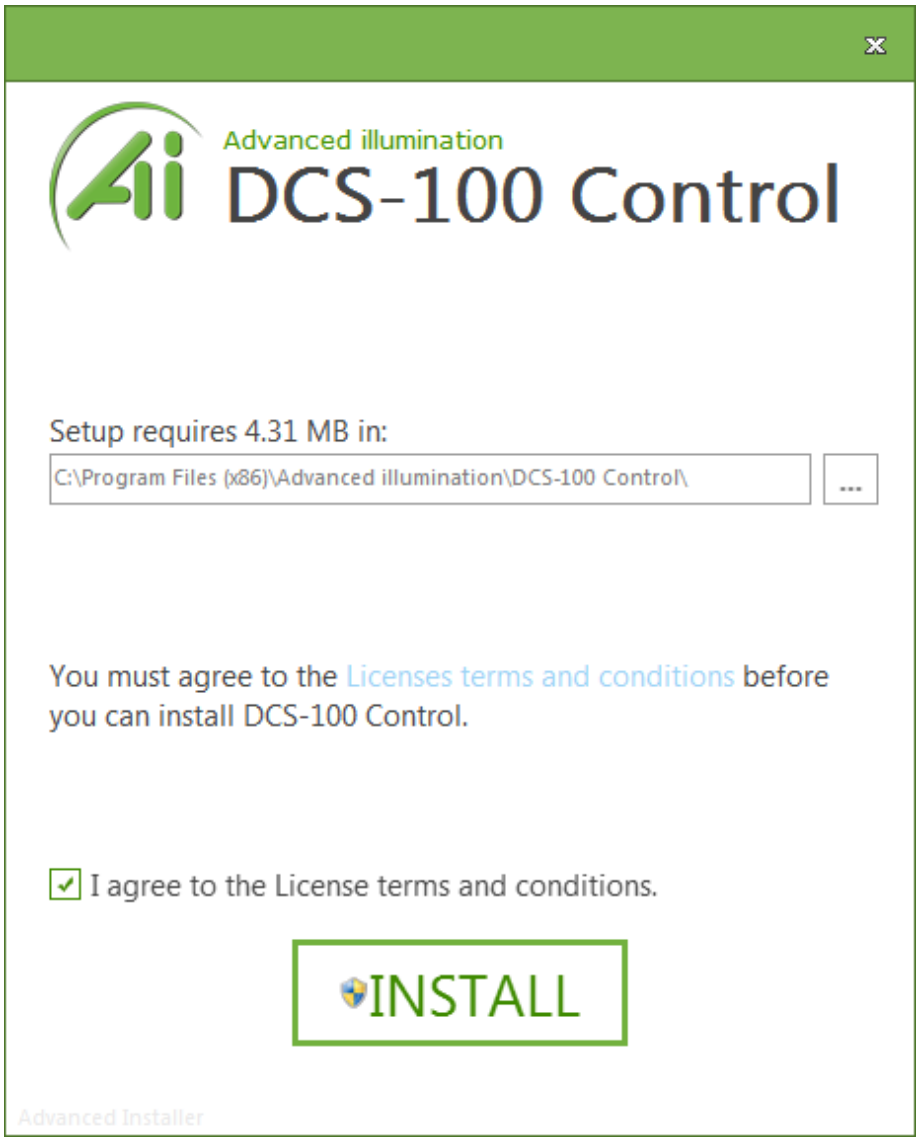


Figure 11 - DCS Software Installer

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.

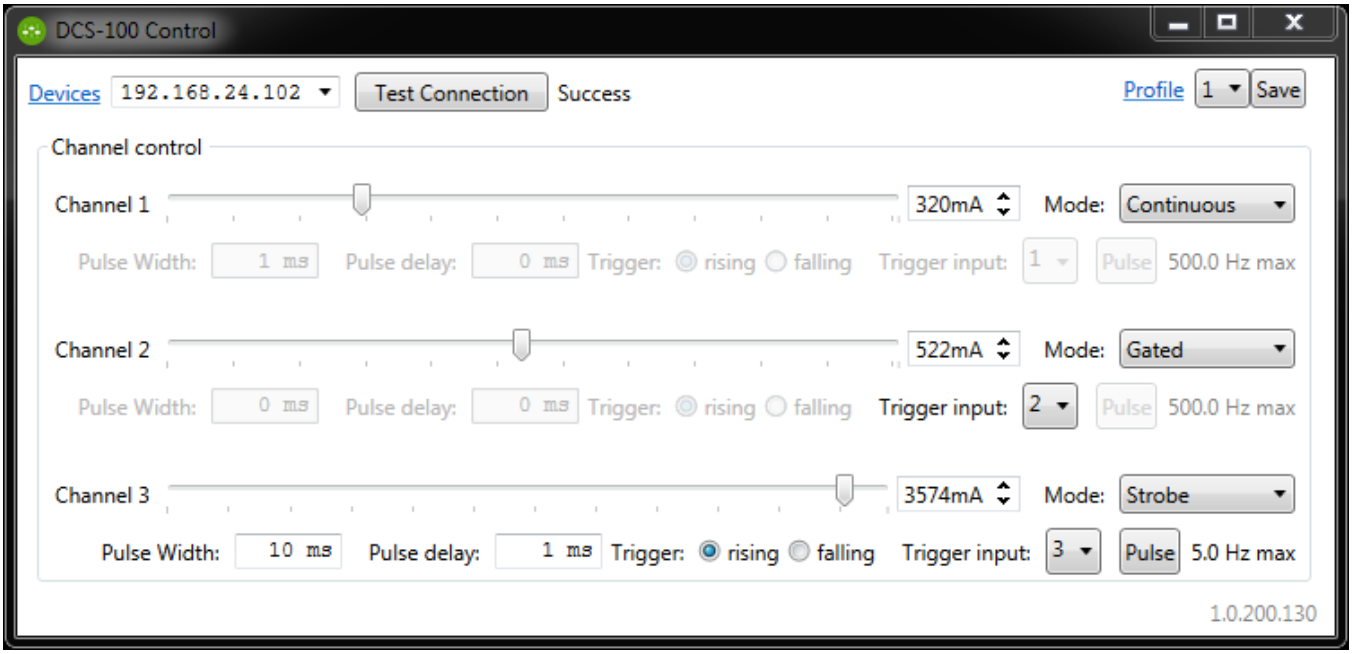
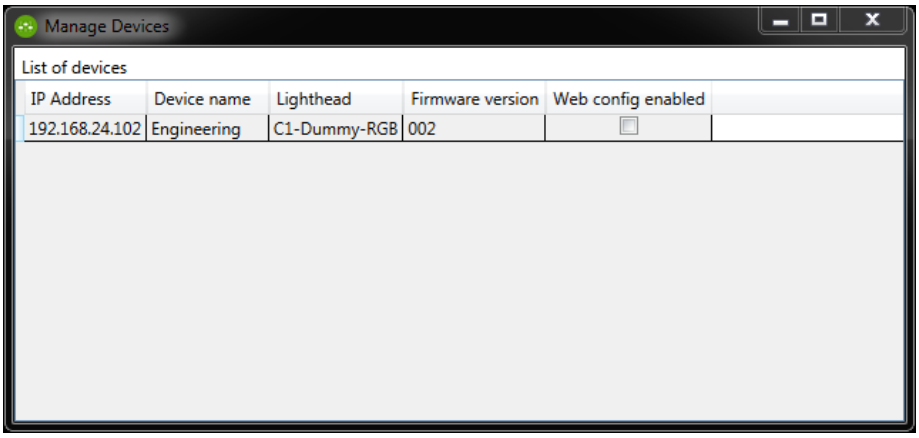


Figure 12 & 13 - DCS GUI



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.

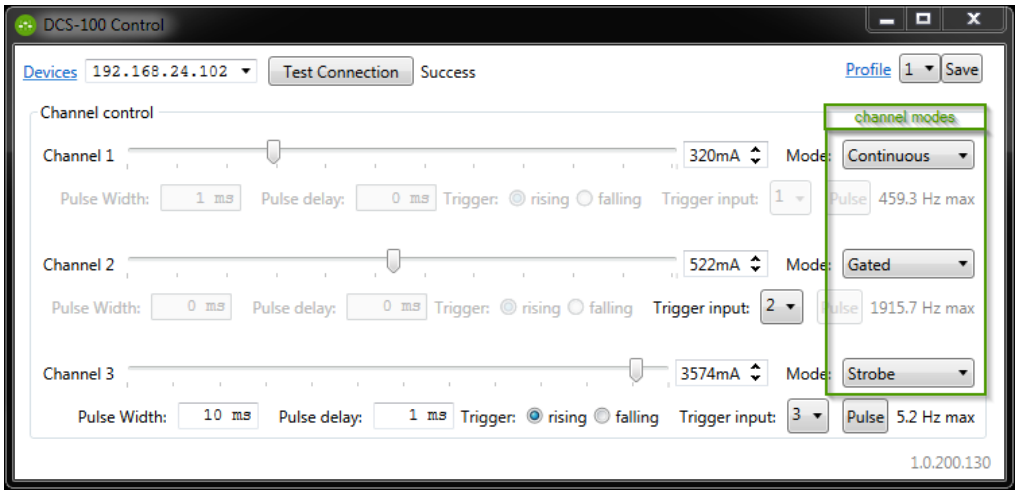


Figure 14

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.

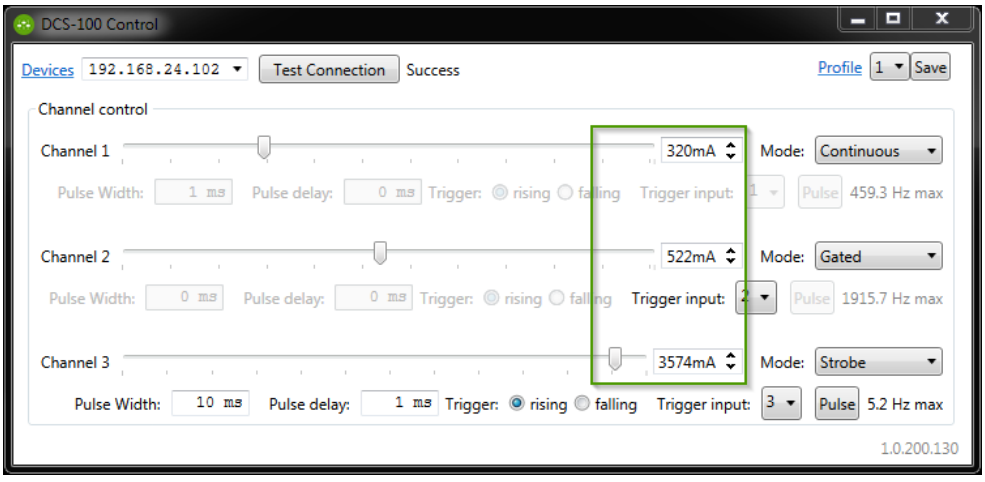


Figure 15

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.

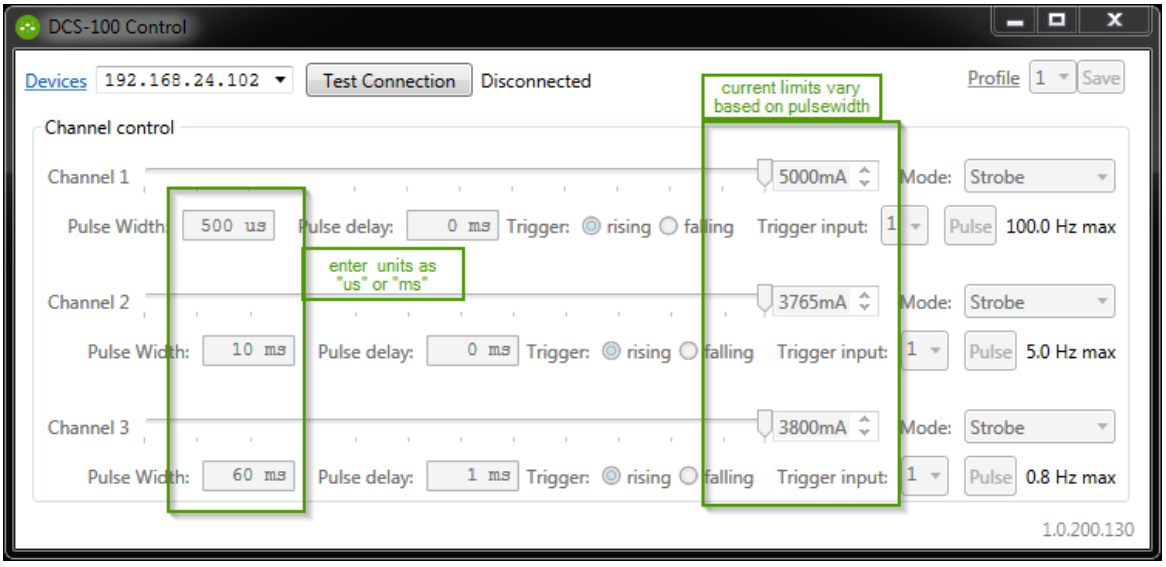


Figure 16

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.

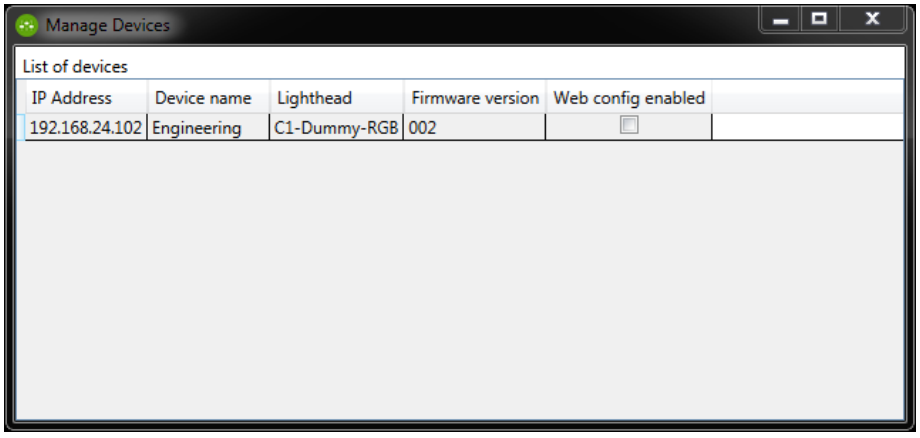


Figure 17

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.

Profiles and device names can all be changed with the GUI or by sending external commands to the controller.

Ethernet Web Server

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 of the controller in the browser address bar. Note that only the active configuration can be changed via the web server

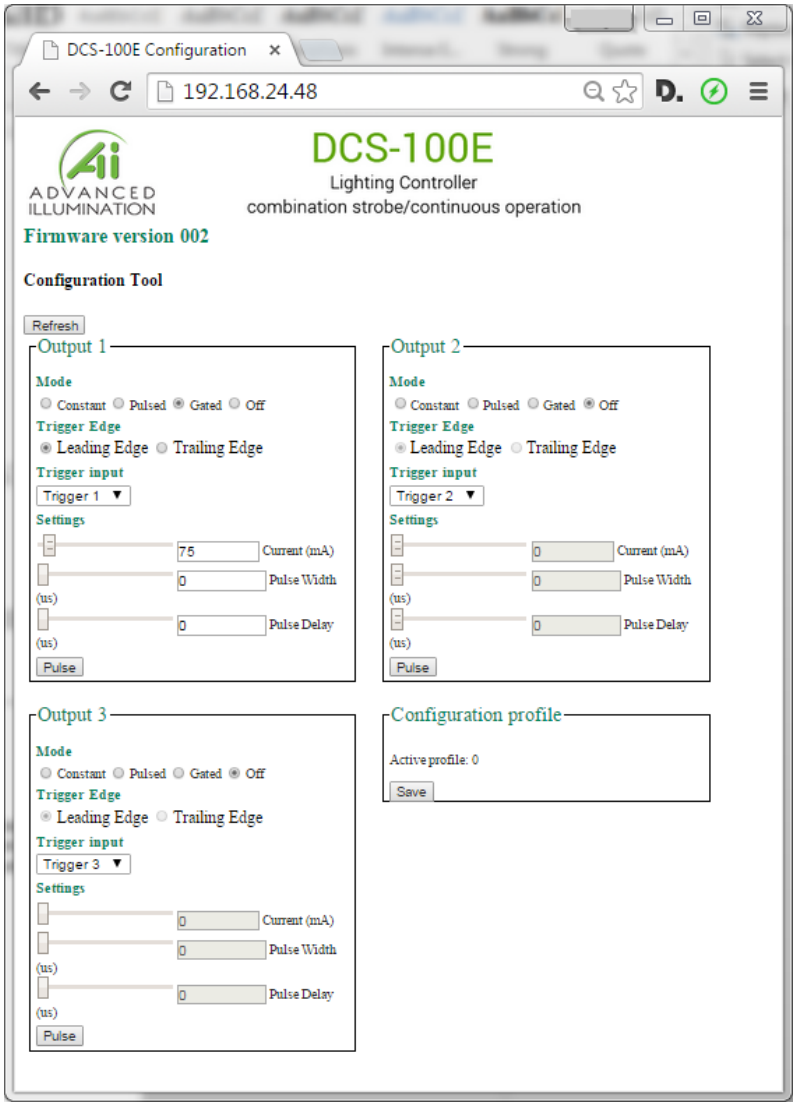


Figure 18 – Webserver UI

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 or TCP-IP, port 7777
DHCP	Enabled by default
Default IP Address	192.168.24.115 Controller will use default IP if DHCP fails upon power up, or if an Ethernet cable is not connected
User Assigned IP Address	User can assign a new IP address by sending a command If a user assigned IP address is used, the controller will begin using that IP address until a reset command is issued

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 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.

Command Interface List

Information / Help commands

COMMAND	DESCRIPTION	RETURNS
"*IDN?;"	Gets device information: firmware, hardware, etc..	Advanced illumination "DCS-100: (fw version, hw version)"
"*CHANNEL:CONFIGS?"	Reports the current, pulsewidth, delay, and trigger map settings on all channels	Returns an XML formatted string:
"*PROFILE:NUMBER?"	Gets the active profile number	
"*PROFILE:NAMES?"	Gets all the profile names saved in memory	Returns an XML formatted string: <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>
"*IP:ADDRESS?"	Gets the IP address of the device	

Channel Control Commands

COMMAND	DESCRIPTION	RETURNS
"SET:LEVEL:CHANNEL**c, 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:CHANNEL **c, n;**"	Sets the mode c = 0 - 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:CHANNEL **c, 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:CHANNEL **c, 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:CHANNEL **c, 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:CHANNEL c, n"	Maps the specified trigger to the specified channel c = 0 – 3 (channel number) n = 0 – 3 (trigger number)	
"TRIGGER:CHANNEL c"	Generates a software trigger on the specified channel c = 0 – 3 (channel number)	

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 "."	
"DISCONNECT"	Disconnects communication to the controller from the host	
"SET:WEB:CONFIG, n"	Enables the built-in web-server n = 0 (disabled) n = 1 (enabled)	
"OVERRIDE:SIGNATECH"	Overrides the external Signatech data. Must be used in conjunction with a Signatech-KEY provided by Advanced Illumination.	

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

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