Integration Note

Manufacturer:	**Converging Systems, Inc.**
Model Number(s):	**ILC-x00 family of LED lighting controllers/IMC-xx0/CVM family of motor controllers**
Savant Platforms	Savant Pro and Smart Platforms
RacePoint BluePrint Version	9.0.0 and later
Specific Profile Version	V3.53 or later (see https://www.convergingsystems.com/inres_savantav.php
Driver Developer:	Converging Systems Inc.
Document Revision Date:	01/07/2021

Change Notices

Version	Description of Change	Author	Date
3.53	Updated definitions-overall enhancements. New entities, toggle button feedback. Recharacterization of some entity references to actions (which may cause a project with old drivers to not respond properly).	CSI	1/5/2021
3.49	Clarification of Actions	CSI	10/2/2017
3.46	Implemented SceneSaver Button and SceneRestore Button entities for lighting (save preset and recall preset). Implemented MotorSaver and MotorRecall entities for motors.Reversed direction of projection screens to match logic of Savant Pro App. Implemented new Switch entity for lighting that can send out a dissolve rate (provided you enter a "0" under Address 4 as a placeholder)	CSI	8/1/2017
3.44	Implemented Motor bi-directional feedback for IMC-300 MK II. Enhanced support for CCT on ILC-400 with sliders (bi-directional control) and buttons (for individual selection of CCT).	CSI	7/19/2017

	Implemented “IsITOn” type technology for lighting devices. Currently no entity support for Circadian tuning. Note for use with IMC-300 MKII need to change baud rate to 19,200 for serial (it is set to 57600 for IBT)		
3.20	Added Switch Effect, Switch ColotTemp as toggles--ideal for Pro App scene selection	CSI	6/28/2016
3.19	Added dissolve rates for a number of entities that can be configured as Address 5 within the Data Tables	CSI	6/22/2016
3.18	RGB Slider Update	CSI	6/22/2016
3.17	RGBW support, HSB and RGB and W sliders in data tables. Recall/Store and Effects support	CSI	6/9/2016
…	Multiple updates	CSI	2014-2015
1.1		Ed McKenna	2013
1.0		Ed McKenna	2013

Integration Note Table of Contents

Please the following table of contents to help you navigate through this Integration Note.

PROFILE INFORMATION

Manufacturer:
Converging Systems

Profile Developer:
Converging Systems/Savant Systems

Model:
- e-Node (IP), and IBT-100 (RS-232) for both ILC-xxx lighting controller and IMC-x00 motor controllers ("CS-Bus" controllers)
- e-Node/dmx (IP) for third-party DMX fixtures

Profile Version:
3.53

Control Ports:
IP, RS-232
Note: default baud rate for IBT-100 is set within profile. Should you wish to use this profile to support bi-directional communication now available with the IMC-300 MKII (CVMI) it is necessary to change the default baud rate of 57,600 for the IBT-100 to 19,200 (utilized for the CVMI).

Notes:
Note: This profile REQUIRES daVinci software release 9.3 or higher.

To initially assign **Z**one, **G**roup, **N**ode addresses ("**Z/G/N**"), you must set up your system with the e-Node first (even though you may not be using IP in your final system). In this case for setup, the e-Node acts as the commissioning tool when used with the e-Node Pilot software available from the Converging Systems' website. Then to communicate with a Savant system, you can use either an e-Node or an IBT-100 as your selected front-end communication device.

Inputs: None
Outputs: None
Resources: None

OVERVIEW AND SUPPORTED FEATURES

LED Lighting Control.

The Converging Systems ILC-x00 family of LED lighting controllers are networkable devices which can provide support for Converging Systems' Flexible Linear Lighting Arrays (FLLA) RGB, RGBW, and monochrome LED devices. The devices are supported using either RS-232 serial connection (IBT-100) or Ethernet (e-Node). In addition, a separate e-Node/dmx controller can be used in conjunction with third-party DMX 3-color and 4-color lighting devices and can be controlled using the same device drivers specified within this Integration Note.

The SAVANT system is capable of receiving bi-directional communication data (color status in RGB, RGBW, or HSB color space, and On/Off status) and updating SAVANT sliders (faders) to indicate real time feedback of color state changes as well as some Toggle buttons.

Depending upon the specific LED lighting controller desired to be supported (i.e., ILC-100/300 RGB controller, ILC-400/450 RGBW controller or ILC-400 4-channel monochrome controller or the e-Node/DMX Ethernet/dmx color computer translator, a single Savant profile can be utilized.

THE FOLLOWING OPTIONS ARE SUPPORTED BY THE CONVERGING SYSTEMS E-NODE (LIGHTING) DRIVER:

- Support of over 26 entities to enable quick Savant Data Table programming 

- Discrete control of LED states (ON/OFF).
- Toggle control of LED with button feedback. 

- Two-way control of Correlated Color Temperature (CCT) (or sometimes referred to as “Dynamic White”) settings with RGB and RGBW devices using Converging Systems FLLA LED elements. Specific CCT settings can be selected as well as CCT UP/DOWN controls for CCT adjustments 

- Two-way control of Circadian Lighting (Sunrise to midday sun to Sunset dynamic settings) using Converging Systems RGBW FLLA devices. 

- Ability to trigger a Circadian Up or Circadian Down event from the Savant Pro App based on a celestial or timed event. 

- Support of communication utilizing Telnet with or without authentication (Port 23)
- Two-way control of color settings in the RGB, RGBW, or HSB color space.
- Ability to store and recall specific colors set by a user.
- Ability to store and recall specific colors set by a user within ILC-x00 controllers.
- Ability to recall specific Effects stored within specific ILC-x00 controllers.
- Ability to change Dissolve Rates (time it takes to transitions from one state to another) (i) for On and Off states, (ii) for Presets to other Presets (color) settings, and (ii) for state-to-state transitions within Effects.
- Ability to change Sequence Rates (time after any dissolve that a Preset color is maintained before transitioning to the next color in sequence) in Effects 1 and 4.
- Ability to store a Color Temperate or a Circadian/Sun level setting.
- Control via all Savant interfaces (i.e. keypads, Apps, triggers, scene control).

THE FOLLOWING OPTIONS are not supported by e-Node (lighting) driver**:**

- Reserved

Motor Control.

The Converging Systems IMC-x00 family of LED lighting controllers are networkable devices which can provide support for Converging Systems’ IMC-xx0 family of intelligent motor controllers (IMC-100/IMC-300/IRC-x00, CVM). The devices are supported using either RS-232 serial connection (IBT-100) or Ethernet (e-Node).

The Savant system is capable of receiving bi-directional communication data (motor position where supported) and updating Savant sliders to indicate real time feedback of motor position.

THE FOLLOWING OPTIONS ARE SUPPORTED BY THE CONVERGING SYSTEMS E-NODE (MOTOR) DRIVER:

- Motor Up/Down/Stop
- Motor Position Feedback (for CS-BUS motor controllers that provide this level of functionality).

- Store and Recall of presets (for CS-BUS motor controllers that provide this level of functionality)
- Support of communication utilizing Telnet with or without authentication (Port 23)

THE FOLLOWING OPTIONS are not supported by e-Node (motor) driver**:**

- Reserved

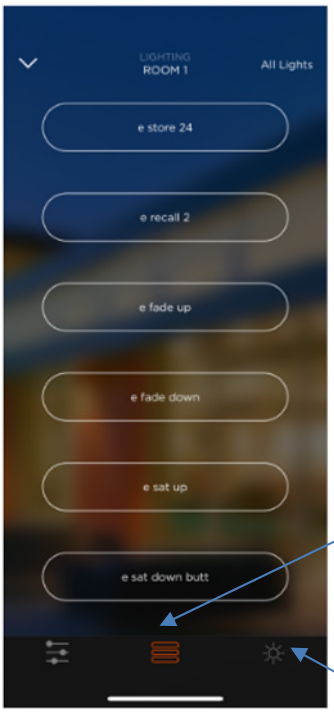
Tabular Summary of Supported Features

The following commands are supported by the current driver for the various lighting and motor control devices.

LED Lighting/Motor Entities

Note: for detail on supported Entities and associated Actions see Appendix 1.

LED Lighting Entities. Over 26 different LED entities have been integrated within the latest profile. The Savant App exposes various entities in within various subsections within the Savant Pro App. See below image for definition of subsections.



SWITCH Sub-Section

SLIDER Sub-Section

ALL Control Sub-Section

Figure 1

Table 1 Table of Entities for Lighting Control

General CS-Bus Commands	Savant Entity Naming[1]	ILC-100m	ILC-100c (sa) ILC-300	ILC-4xx (RGBW mode	ILC-400 (4 ch Mono)	e-Node DMX
General Lighting Control Commands						
Toggle Switches (which appear under" SLIDERS" Section in Savant App and within the Scene Manager)						
Toggle Switch	Switch	✓	✓	✓	✓	✓
Custom Circadian Up	Switch + Adv. Control "Push" + GroupSwitchON			✓	✓	
Custom Circadian Down	Switch + Adv. Control "Push" + GroupSwitchON			✓	✓	
Select Effect	Switch + Adv. Control "Push" + SceneRestore		✓	✓	✓	✓
Switches and other Toggles that appear within "SWITCHES" Section in Savant App						
ON	Discrete Power On	✓	✓	✓	✓	✓
OFF	Discrete Power On	✓	✓	✓	✓	✓
EFFECT,n	SelectEffect		✓	✓	✓	✓[1]
STORE,#	StorePreset	✓	✓	✓	✓	✓
RECALL,#	RecallPreset	✓	✓	✓	✓	✓
DISSOLVE.1=XX	Dissolve (address 4=1)	✓	✓	✓	✓	✓
DISSOLVE.2=XX	Dissolve (address 4=2	✓	✓	✓	✓	✓
DISSOLVE.3=XX	Dissolve (address 4=3	✓	✓	✓	✓	✓
DISSOLVE.4=XX	Dissolve (address 4=4	✓	✓	✓	✓	✓
SEQRATE=XX	SequenceRate		✓	✓	✓	✓
Stop Adjustment	Stop	✓	✓	✓	✓	✓
Device Identify	Device Identify	✓	✓	✓	✓	✓
Traditional RGB Control (see Slider section below)						
None						
HSB (Hue Saturation Brightness Control						
Fade Up	FadeUP	✓	✓	✓	✓	✓
Fade Down	FadeDown	✓	✓	✓	✓	✓
Saturation Up	Sat Up		✓	✓		✓
Saturation Down	Sat Down		✓	✓		✓
Circadian and Color Temperature Advanced Control						
SUN_UP	CircadianUp			✓		
SUN_DOWN	CircadianDown			✓		
CCT UP	CCT Up			✓		
CCT Down	CCT Down			✓		
Color Temperature Select Value	ColorTempSelect			✓		
Sliders that appear within "SLIDERS" Section in Savant App						
Red Slider	RGB (with adr. 4=0)		✓	✓		✓
Green Slider	RGB (with adr. 4=1)		✓	✓		✓
Blue Slider	RGB (with adr. 4=2)		✓	✓		✓
White Slider	WhiteColorControl			✓		✓
Hue Slider	Hue		✓	✓		✓
Sat. Slider	Saturation		✓	✓		✓
Brightness Slider	Brightness		✓	✓	✓	✓
Color Temp (CCT) Slider	ColorTempSlider			✓		
Circadian Sldier	CircadianSlider			✓		

Notes:

[1] Reserved

Motor Control Entities 

Table 2 Table of Entities for Motor Control

General Commands	Savant Naming Convention	IMC-100	BRIC ("Bric Mode")	IMC-300 (MKII)/CVM
General Motor Control Commands				
UP	ShadeUp	✓	✓	✓
DOWN	ShadeDown	✓	✓	✓
LEFT	ShadeLeft	✓	✓	✓
RIGHT	ShadeRight	✓	✓	✓
STOP	ShadeAdjStop	✓	✓	✓
RETRACT	Retract_Home	✓	✓	✓
STORE,#	Motor Save	✓	✓	✓
RECALL,#	Motor Recall	✓	✓	✓
Jog Up +	Jog +			✓
Job Down -	Jog -			✓

Communication Protocols and Authentication Supported for Savant Profile and e-Node

		Platform
Telnet Login with Authentication (with e-Node		✓ All Products with e-Node (and CVM)
Telnet Login without Authentication		✓ All Products with e-Node (and CVM)
~~UDP Mode~~		

INTEGRATION REQUIREMENTS-CONVERGING SYSTEMS CONFIGURATION

NOTE: Converging Systems LED and most Motor Controllers REQUIRE a communication device (either an e-Node for Ethernet connectivity or the IBT-100 for serial connectivity). It is not possible to connect CSI LED or most Motor controllers to a Savant controller in any other way (except if the motor controller has an on-board serial or IP connections).

The system will need to be installed and configured according to the Converging Systems documentation, prior to integration with the Savant system. The Converging Systems e-Node Pilot application (required for setup) is available for download for free from the Converging Systems website (IP configuration using the e-Node is possible using both dynamic and static addressing).

NOTE: It is recommended that the Converging Systems controllers (ILC-x00 controllers as well as the e-Node Ethernet gateway) are running the latest version of firmware available at the time of installation. Directions for uploading new firmware on contained on the Converging Systems website.

WIRING DIAGRAM (for IP connection)

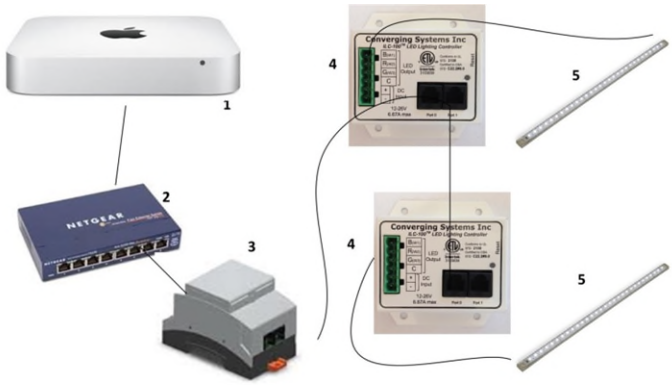


Figure 2

Wiring/Configuration Notes:

1. Maximum length of CS-Bus cabling from e-Node to the last ILC-100/LC-300/ILC-4x0 using CAT5e or better cabling (and obeying the 1-1 pin-out requirements for the RJ-25-RJ25 cable) = 4000 feet
2. Maximum number of ILC-xx0/MC-xx0 controllers and Converging Systems' keypads (if provided) that can exist on a single network connected to a single e-Node device = 254
3. Maximum number of e-Nodes that can exist on a Savant system = 254

BILL OF MATERIALS (for IP control)

Table 3

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	Savant Host Processor	Savant	Various	Ethernet/Serial/IR	various	
2	Network Switch	Various	Various	Ethernet	RJ-45	
3	e-Node	Converging Systems	e-Node	Ethernet	RJ-45 (for Ethernet) RJ-25 for local bus	
4	Lighting Controller (or Motor Controller)	Converging Systems	ILC-xxo or IMC-xx0 or (CVM)	CS-Bus protocol	RJ-25 for CS-Bus communication	Must terminate beginning and end of bus with 120-ohm resister on pins 3/4
5	Flexible Linear Lighting (FLLA)	Converging Systems	FLLA-RGB-xxx		3-color 4 pin 4-color 5 pin	

	RGB or RGBW luminaries		FLLA-RGBW-xxx		1-color 4 pin	

WIRING DIAGRAM (for RS-232 serial connection)

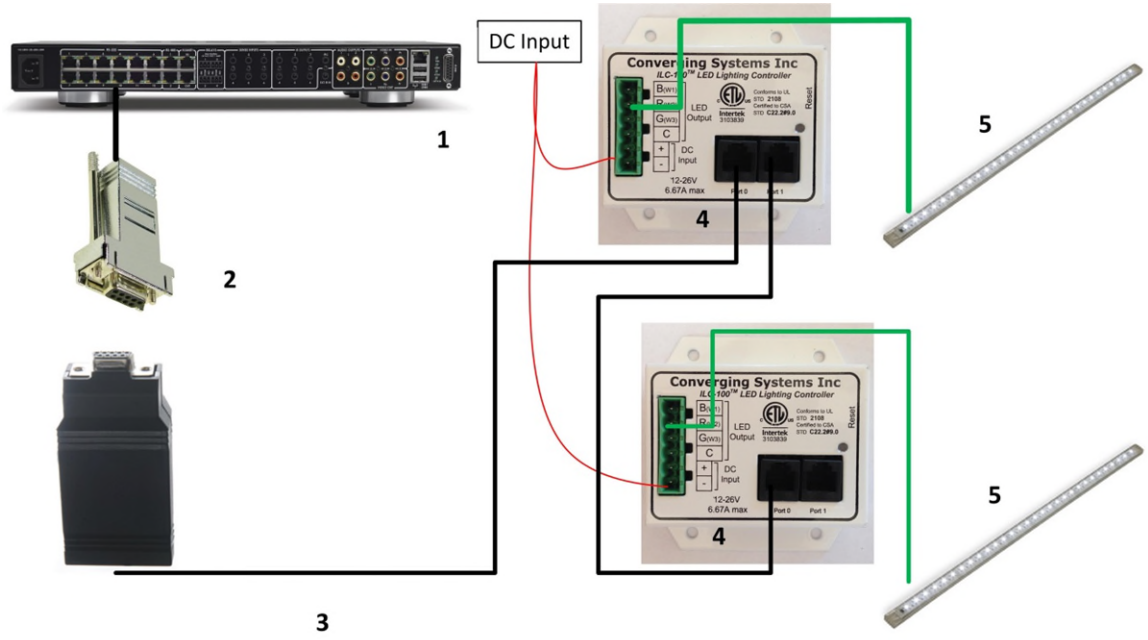


Figure 3

Wiring/Configuration Notes:

1. Maximum length of CS-Bus cabling from e-Node to the last ILC-xxo/IMC-x00 using CAT5e or better cabling (and obeying the 1-1 pin-out requirements for the RJ-25-RJ25 cable) = 4000 feet
2. Maximum number of ILC-1xxo.IMC-xx0 controllers and Converging Systems' keypads (if provided) that can exist on a single network connected to a single e-Node device = 254
3. Maximum number of e-Nodes that can exist on a Savant system = 254

BILL OF MATERIALS (for RS-232c connection)

Table 4

#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	Savant Host Processor	Savant	Various	Ethernet/Serial/IR	various	
2	RJ-45 to DB-9 dongle	Savant	Various	RS-232c	Pinouts RJ45 / DB9 1 / 9 2 / 1 3 / 4 4 / 5 5 / 2 6 / 3 7 / 8 8 / 7	
3	IBT-100	Converging Systems	IBT-100	RS-232c	DB-9 (for Serial) RJ-25 for local bus	
4	Lighting Controller (or Motor Controller)	Converging Systems	ILC-xx0 or IMC-x00 or (CVM	CS-Bus protocol	RJ-25 for CS-Bus communication	Must terminate beginning and end of bus with 120 ohm terminating resister on pins 3/4
5	Flexible Linear Lighting (FLLA) RGB or RGBW luminaries	Converging Systems	FLLA-RGB-xxx FLLA-RGBW-xxx		3-color 4 pin 4-color 5 pin 1-color 4 pin	

WIRING DIAGRAM (for e-Node/dmx w/IP connection)

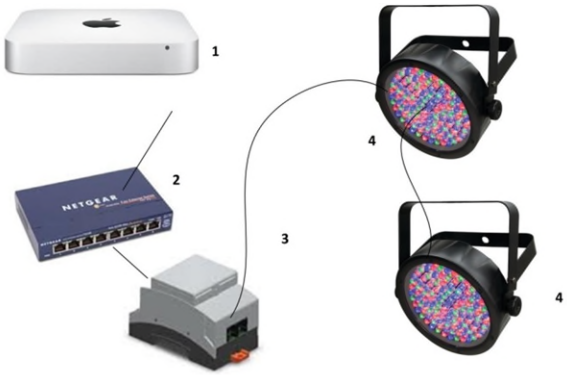


Figure 4

BILL OF MATERIALS (for IP connection)

Table 5

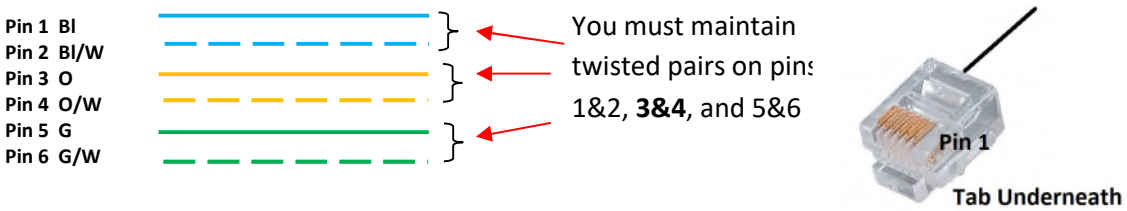
#	Device	Manufacturer	Part Number	Protocol	Connector Type	Notes
1	Savant Host Processor	Savant	Various	Ethernet/Serial/IR	various	
2	Network Switch	Various	Various	Ethernet	RJ-45	
3	e-Node/dmx	Converging Systems	e-Node/dmx	Ethernet	RJ-45 (for Ethernet) RJ-25 for local bus	
4	Lighting Controller (or Motor Controller)	Converging Systems	ILC-xxo or IMC-xx0 or (CVM)	CS-Bus protocol	RJ-25 for CS-Bus communication	Must terminate beginning and end of bus with 120-ohm resister on pins 3/4
5	Flexible Linear Lighting (FLLA) RGB or RGBW luminaries	Converging Systems	FLLA-RGB-xxx FLLA-RGBW-xxx		3-color 4 pin 4-color 5 pin 1-color 4 pin	

COMPONENT HARDWARE SETUP

1. Connect each LED lighting controller (and/or Motor controller) sequentially using Port **1** of the previous device to Port **0** of the next sequential device. Use **CS-BUS Color Standard** for your wiring.

NOTE: The CS-BUS uses standard RJ-25 (RJ-11 6P6C) connectors available at Home Depot, and all electrical distributors). The mandatory pinout is 1-1, 2-2, 3-3, 4-4, 5-5, and 6-6 with twisted pairs on 1&2, 3&4 and 5&6). **You cannot use standard flat telephony cable for telephony cable does not use twisted pairs and the wiring topology is swapped (1-6, 2-5, 3-4, etc.). Failure to follow the CS-BUS wiring standard will void your warranty**. If you return a unit to Converging Systems with its communication chip destroyed this is a telltale sign that you used Telephone cabling. **REPEAT--DO NOTUSE TELEPHONY CABLE**. Also, do **not** attempt to use standard Ethernet cabling (568B or 568A) and simply chop off the browns for this will leave the twisted pairs inconsistent with our CS-BUS Wiring Standard (the middle two lines will not be a twisted pair and data integrity will be lost—See Figure below). If you do not have 6P6C RJ11RJ-25 modular connectors but only have 4p4c connectors you can simply use the middle four wires (B/W, O, O/W and G) as a workaround **but neither the keypads or the IBT-100 will operate**.

CS-BUS WIRING STANDARD (using RJ-25/RJ-11 6P6C)



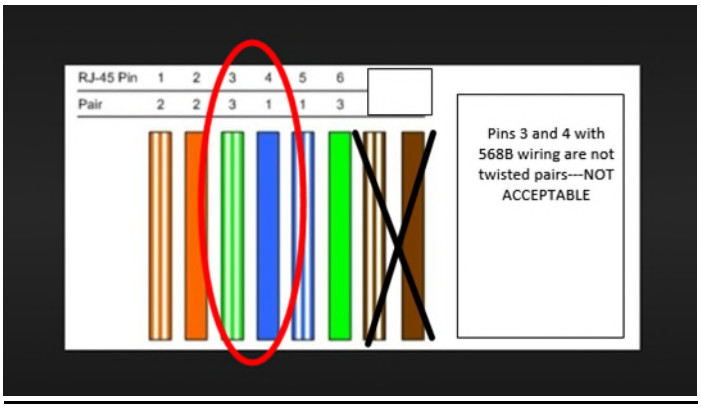


Figure 5
Why Not to Use 568B Wiring-Middle two wires are not a twisted pair!!!!!

2. Connect an available CS-BUS port on the first or last LED Lighting or Motor Controller to an available CS-BUS port on the e-Node or the single CS-BUS port on the IBT-100. Power on all units.

   Note: The CS-BUS by design is a modified IEEE-485 bus which requires termination on the beginning and the end of the CS-Bus. Please be advised that in most cases, termination is not required but if you do experience communication issues, it would be wise to turn on termination (in software using the Pilot software) on the first unit of the chain. If the e-Node or the IBT-100 is used as the last item in the chain, those units have built-in termination. It is important, however, not to turn on any other termination features on any other unit.

COMPONENT SOFTWARE SETUP (using e-Node and e-Node Pilot app):

NOTE: Converging Systems LED and Motor Controllers REQUIRE a preliminary amount of initial setup/commission which requires the e-Node Ethernet adapter. This is required to set **Z**one/**G**roup/**N**ode addressing as well as to turn specific types of bi-directional communication necessary to have Savant dimmer sliders react to color state changes. This section is an **abridged** version of necessary steps which need to be followed. For more information, consult more detailed documentation available on the Converging Systems' website including

-e-Node Commissioning Guide (long version)
-ILC-x00 Intelligent Lighting Controller
-IMC-x00 Motor Controller Manual

1. Launch Pilot. Launch the (PC compatible) e-Node Pilot application available from the Converging Systems website. Before calling for support
   - Make sure you **extract (UNZIP)** the downloaded zip file before you run it. **Note: it will run if not unzipped but not well—be advised**)
   - Make sure all firewalls are turned **off** to enable UDP Port 4000 and Port 5000 traffic--Check your Firewalls and Anti-Virus software to verify this.

- If using Parallels or VMWare, make sure that you have properly forwarded your wired network port.
- Make sure and THAT YOU ARE **WIRED** FROM YOUR COMPUTER running Pilot TO YOUR SWITCH.

Note: It is highly advised to make a ***hardwired*** Ethernet connection from the e-Node to your network switch and another ***hardwired*** Ethernet connection from your switch to your computer running the Pilot application. Data may be lost or corrupted otherwise.

2. Discover E-Node. Select the **View/Map** window.

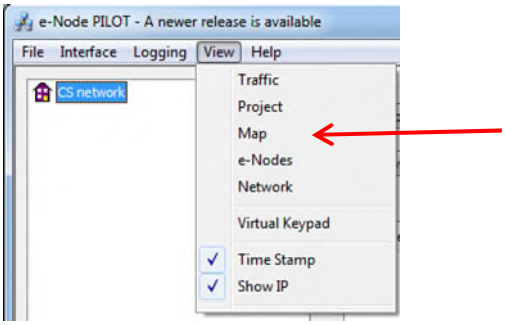


Figure 6

Then select the **Discover e-Node** button and any e-Nodes that have been powered-up and which exist on the same subnet as your computer will be populated on the left window.

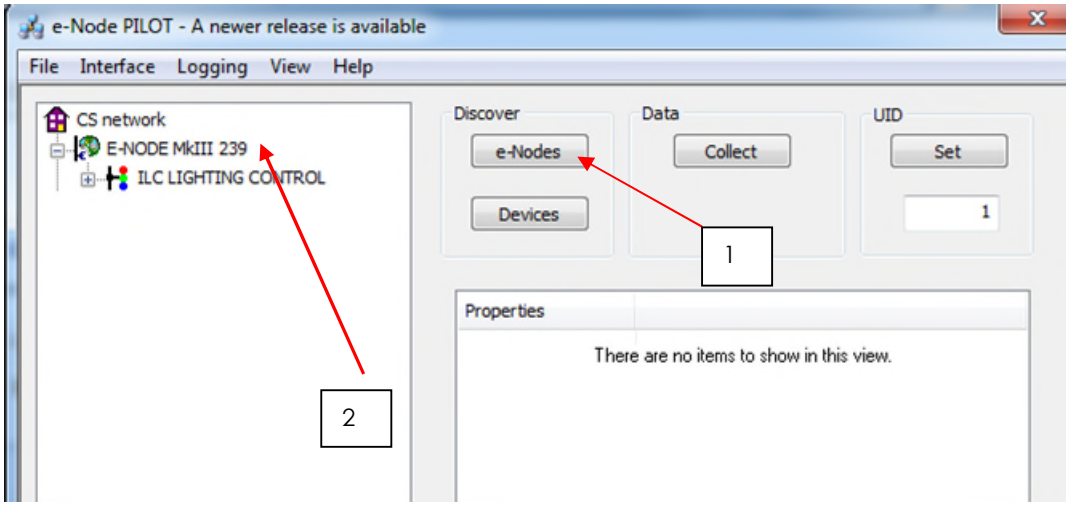


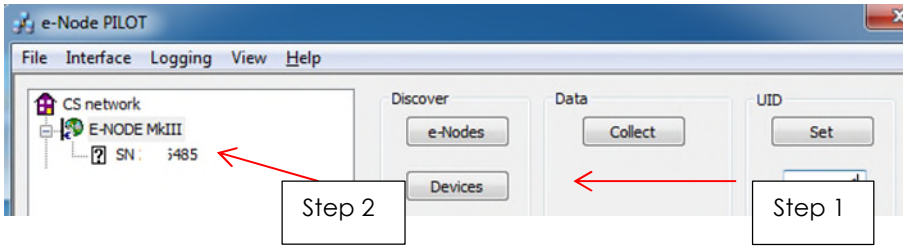
Figure 7

3. Discover Devices. It is necessary that all devices (led and motor controllers) are (i) discovered and then (ii) assigned a unique UID (Unique ID). The procedure to do so varies if you have earlier versions of ILC-x00 controllers or more current ones. To determine which version of firmware you have, start by selecting the **Discover Devices** button as shown below (entry Step 1 in pictures).

i. If ILC-x00 family controllers are properly connected to your e-Node, and after the **Discover e-Node** button has been selected, any ILC-x00 devices connected to that e-Node will auto-populate under that e-Node as a "**SN XXXXX**" entry. If this occurs, you have devices with **SN addressing**. Proceed to Step3a below.

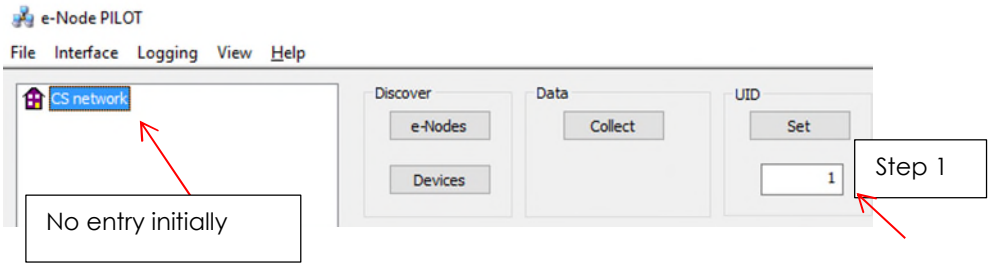
Note: some versions of the IMC-100, the SN XXXX will not appear, so proceed in this case also to Step3a below.

Figure 8



ii. If controllers are properly connected to your e-Node, and after the **Discover e-Node** button has been selected, and if ***no entries appear*** under the previously discovered e-Node then you have **pre-SN Addressing firmware**. (Before you determine that this is the case, make sure the ILC-x00 devices are properly powered on and the interconnect cables with proper pinouts are connected between the e-Node and the ILC-x00 controllers.) If no entries populate, you have devices with **pre-SN addressing and an alternative process is required to discover these (earlier) firmware units**. Proceed to Step3b below.

Figure 9



3a. Assign UID to Device (**for SN Addressing**). First select the **SN entry** for the device that you wish to assign a unique UID by highlighting that entry within Pilot. Next (i) assign an unused UID (unique ID) to the lighting or motor controller to be addressed (generally start with the UID value of "1" and work up sequentially) by entering each subsequent number under the UID set box. To finalize the UID selection, select the Set box and the "**SN**" entry will automatically change to the entered **UID** number.

Figure 10

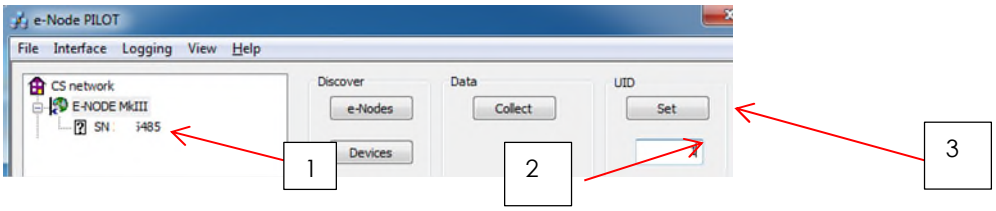
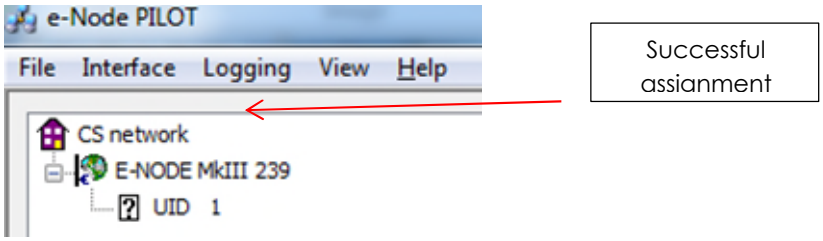


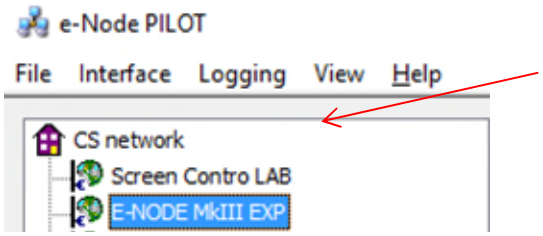
Figure 11



Proceed through all lighting and motor controllers connected to each e-Node until completed.

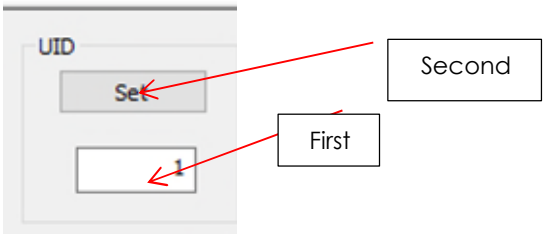
3b. Assign UID to Device (**for pre-SN Addressing**). First highlight the e-Node to which the target device Is connected.

Figure 12



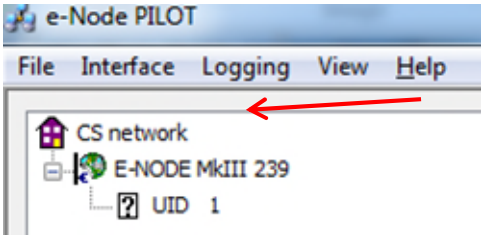
Next (i) assign an unused UID (unique ID) to the lighting or motor controller to be addressed (generally start with the UID value of "1" and work up sequentially) by entering that number under the **UID set box**, then (ii) press the **Set** button and finally (ii) **carefully** press for ½ second the discovery/reset button on the ILC-xx device using a larger type paper clip (small paperclips have a hard time finding the internally positioned reset button).

Figure 13



If successful, the device's on-board PCB LED will blink off for a moment then re-light AND the newly assigned UID entry will auto-populate under the e-Node to which it is connected.

Figure 14

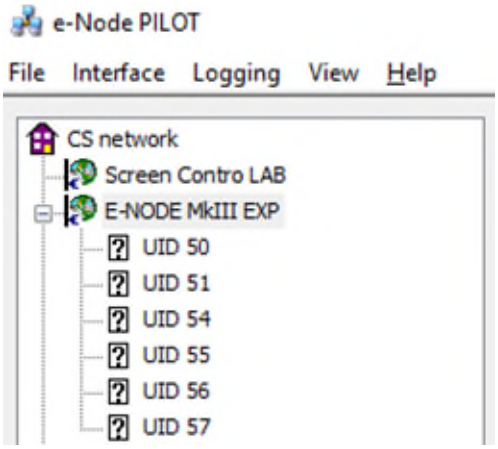


Proceed through all lighting and motor controllers connected to each e-Node until completed.

> **NOTE**: If you by chance enter duplicate UIDs for two controllers, the system will fail to work. In this case since you may not know which unit had the correct (no duplicated UID number assigned to it) and which unit had the duplicated UID number assigned to it, you must **reset both units** according to documentation found for the respective controller on the Converging Systems website and then assign unique UIDs to each one again (i.e., "Unique" IDs).

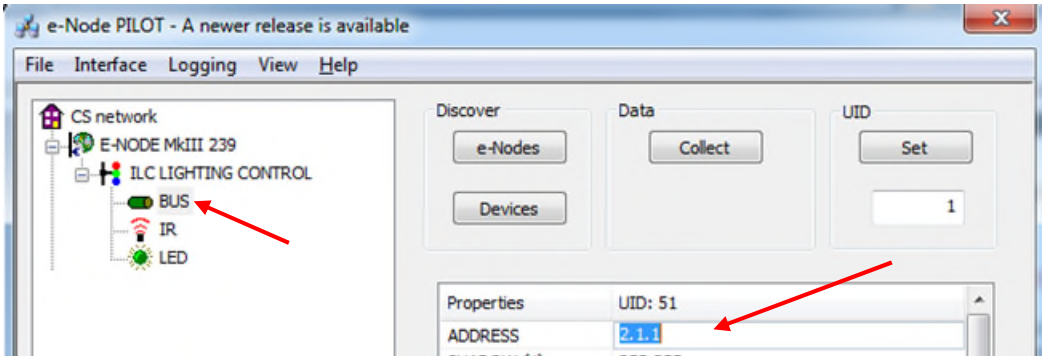
4. Enter Z/G/N Addresses. Enter a discrete **Z**one/**G**roup/**N**ode address for each Lighting or Motor Controller identified within step #3 above. To do so, click on the "**?**" mark and/or the "**+**" mark in front of the targeted controller to expand its data fields. For more information on Zone/Group/Node address, review the detailed explanation of Zone/Group/Node addressing within the Background on Addressing section of this document.

Figure 15



After the selected motor or lighting controller is expanded, a number of data fields with icons will appear. Select the **BUS** tab, to expose the BUS properties windows.

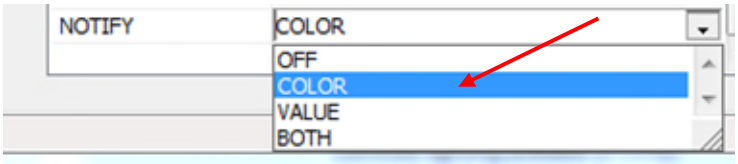
Figure 16



Enter the Zone/Group/Node address separated by **PERIODs** and hit **ENTER**. When the field turns BLUE you know the data has been successfully entered.

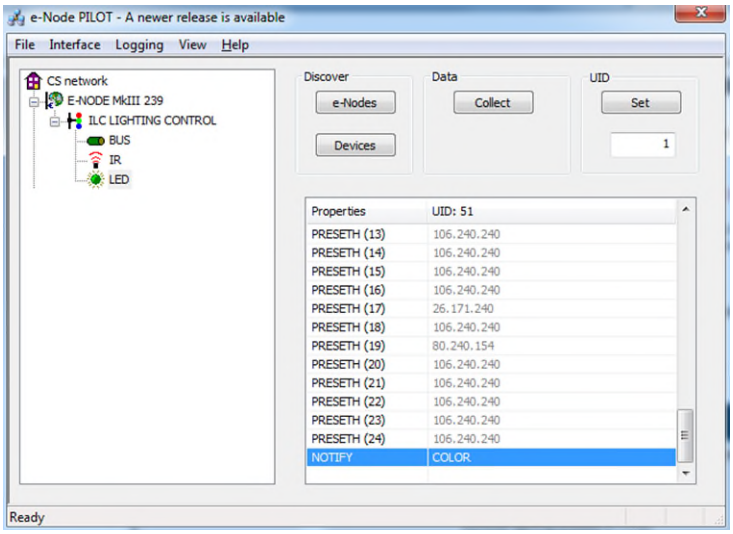
6. In order to invoke bi-directional communication for the ability for Savant's dimmer sliders to automatically respond to changes in color states (a really cool feature), set the **NOTIFY** Flag to either **COLOR** (for the HSV or Hue, Saturation, Value color space) or to **VALUE** (for the old school Red, Green, Blue color space—***old school because there is no dimmer in this color space***). If you want to have both sets of sliders operational for backchannel communication (not really recommended in larger systems where bus traffic may become excessive), set the flag to **BOTH**.

Figure 17



Here is an example of NOTIFY set to COLOR in enable Hue/Saturation/Brightness sliders to operate.

Figure 18



The system will need to be installed and configured according to the Converging Systems documentation prior to integration with the Savant system. The Converging Systems e-Node Pilot application (required for setup) is available for download for free from the Converging Systems website under Resources/Software Downloads/Software (http://www.convergingsystems.com/downloads_library.php). IP configuration using the e-Node is possible using both dynamic and static addressing.

NOTE: It is recommended that the Converging Systems LED and Motor control controllers (ILC-x00 controllers, IMC-xx0 controllers, CVM as well as the e-Node Ethernet gateway) are ALL running the latest version of firmware available at the time of installation.

Savant Programming (For Data Table and Work-Flow Programming)

The configuration process will involve loading a lighting communication device (for the e-Node or the IBT-100) and one or more load devices (Motor and/or LED loads). Please follow the below steps to integrate supported hardware and applicable settings within Savant' RacePoint BluePrint Software.

Overview:

This profile is created to control the Converging Systems CS-Bus controller family through a supported communication device (i.e., e-Node(IP), e-Node/dmx or IBT-100 (RS-232) or CVM Motor Controller). This profile follows the Savant Data Table format for lighting controllers as well as for shade/motors and can auto-populate the Savant Pro App UI with most of the CS-Bus device's native functionality. Through the Data Table we are able to

control (i) the **Brightness**, **Hue** and **Saturation** (as well as other features) for each individual ILC-x00 controller (or multiple Zone functionality within the ILC-400) as well as s(ii) specific motor controls for each individual IMC-x00 controller (or multiple Zone functionality within the CVM/IMC-300).

Within lighting control, a number of customized Entities are available that enable quick programming of a wide variety of lighting control parameters (i.e., **Hue/Saturation/Brightness**, **Red/Green/Blue**, **Color Temperature, and Circadian levels**) from traditional sliders/dimmers as well as toggle buttons and standard buttons.

Within the motor/shade control, a number of Entities are also available that enable quick programming of a wide variety of motor control parameters (Up, Down, Stop, Preset, etc.) from traditional sliders/dimmers as well as toggle buttons and standard buttons.

For lighting, Converging Systems recommends that **Hue/Saturation/Brightness** mode will give the highest range of color and functionality, and will integrate the easiest with Savant. An innovative function of the CS-Bus lighting devices is that if a device is controlled in a **R/G/B** color space from one platform or controller (or even a third-party Lutron platform), other Savant devices set to operate in the **H/S/B** model will accurately reflect all color state changes (and vis-versa).

For both Lighting and Motor control, exciting new features of this profile now provide support for a myriad of Entities within both the Slider/Switch/All pages as well as a limited selection of Entities within the Scene Manager. The Table of Supported Entities for Lighting and the Table of Supported Entities for Motor Control detail which Entities are auto-populated within various section of the Savant App.

Note: Although the Savant App still limits the number of Switches that can auto-populate within the Slider Page (and accordingly the Scene Manager), an interesting innovation is now available that enables a wide range of hybrid switches to be now made available within the Pro App Scene Manger- a feature that was previously unavailable. See Appendix 4 for more information. Entities which then could be controlled from within the Scene Manager and triggered by a celestial event or a specific programmed time include:

- **Circadian Lighting Events, (See Appendix 4 for more information)**
- **Lighting Sequence Events (Effect), (See Scene Manager topic below for more information)**
- **Predefined color/color Temperature-CCT), (See Scene Manager topic below for more information)**

Note on IP Authentication:

If using IP (Internet Protocol) control, the login credentials, the proper **User Name** and **Password** must be entered into your configuration. If you desire different credentials, inspect the Converging Systems device in Blueprint, then select "state variables" from the drop-down and change **the User Name** and **Password** to whatever is set on the device. Make sure if using authentication, you turn on Login (authentication) using the e-Node Pilot software to Enabled.

Table 6

Version of e-Node	Default User Name	Default Password
-Node MKIII controllers (with three RJ ports on one side opposite the Ethernet connector	Telnet 1 Or Telnet 2 Or Telnet 3 Or	Password 1 Or Password 2 Or Password 3 Or

	Telnet 4 Or E-NODE	Password 4 ADMIN
E-Node MKII controllers (with two RJ ports on one side) opposite the Ethernet connector	E-NODE	ADMIN
-IMC-300 MKII with built in e-Node	Telnet 1 Or Telnet 2 Or Telnet 3 Or Telnet 4 Or E-NODE	Password 1 Or Password 2 Or Password 3 Or Password 4 ADMIN

Setting Up Devices and Entries Within Blueprint/Data Tables:

1) Search for the Converging Systems CS-Bus controller profile and place in system.
   The latest of the profile can be found on the Converging Systems website under Driver/Profile under the relevant Model of Converging Systems controller.
2) **Note**: Even though the profile refers to itself as a Lighting Controller, it has a dual purpose of driving both Lighting and Motor devices from the same communication device.)
3) Connect either (i) the Ethernet connection or (ii) the RS-232 connection for the applicable CS-Bus component.
4) -For Ethernet connected devices (e-Node), open Inspector for the Ethernet connection and enter the IP address of the e-Node interface in the Host Address field. Set the **UserName** and **Password** as per the above table.
   -For RS-232 connected devices (IBT-100), make the Serial connection for the IBT-100 to an unused RS-232 port on your Savant processor or extender.
5) Open **Tools/Settings** and select either **Lighting** or **Shades** as applicable to open BluePrint Data Tables. Add all the **Entities** you wish for each controller (or multiple entities for the multi-zone functionality of the lighting controllers or motor controllers with multi-channel/zone capability). For each Entity, assign the (i) proper "**Location**," the (ii) appropriate **Label,** and the (iii) appropriate **Address(1)**--**Z**one address, **Address(2)**--**G**roup address and **Address(3)**--**N**ode Address. Additional relevant **Address(4)** and **Address(5)** entries will be discussed elsewhere in applicable sections.

   Note: It is very possible that you will have multiple entries per Z/G/N address for slider and switches. Table 8 in the Savant Sample Screens shows an example Data Table setup for multiple controllers. Table 9 in the same section shows an example Data Table setup for multiple motor controllers. The addresses for each **Z/G/N** address can be found in the Pilot application for the e-Node connected controllers. (See the next Figure for a controller with a Z/G/N of 200,1,5.

Addresses/field for **Entity** selection.

Figure 19

General

a. **Address (1):** This is the **Z**one Address (**Z**) for the specific controller (or channel within an ILC-400 set to monochrome mode or within an IMC-300 series product with multiple motor channels). This goes from 1 to 254 with the 0 acting as a wildcard for all devices with any address within this field.
b. **Address (2):** This is the **G**roup Address (**G**) for the specific controller ((or channel within an ILC-400 set to monochrome mode or within an IMC-300 series product with multiple motor channels). This goes from 1 to 254 with the 0 acting as a wildcard for all devices with any address within this field.
c. **Address (3):** This is the **N**ode Address (**N**) for the specific controller (or channel within an ILC-400 set to monochrome mode). This goes from 1 to 254 with the 0 acting as a wildcard for all devices with any address within this field.
d. **Address (4):** This is a special field for entering Scene/Preset Numbers (1~n) and similar dynamic values and for adding an identifier to select a Red or Green or Blue sliders (using the single RGB Entity) where those are desired. In addition, individual Dissolve identifiers (i.e. 0,1,2,3,4) can be added here (Dissolve.0, or Dissolve.1, Dissolve.2, etc.).
e. **Address (5):** This is a special field for entering Dissolve Rates (in seconds[S] or minutes[m]) for a number of supported Data Table entities:

- Switch (toggle ON/OFF) [1/2/s]
- RecallPreset (for Recall) [S]
- ColorTempSelect (for CCT level selection) [S]
- CircadianUp (to start Circadian upwards) [m]
- CircadianDown (to start Circadian from current level to darkness [m]
- Discrete Power ON (to turn on) [S]
- Discrete Power Off (to turn off) [S]

Note (for additional suffix reference):

[1]For items marked with a 1, an installer can also set these Dissolve rates using Entity (Dissolve). If no value is entered within **Address5**, system utilizes the previously stored value within the ILC-x00 devices' Dissolve.n registers (Dissolve.1, Dissolve.2, Dissolve.3 and Dissolve.4 as appropriate) accessible through e-Node Pilot or the Web-pilot application.

[2]With Switch as a special case with Data Tables, **enter a "0"in Address (4)** and then an appropriate Dissolve Rate (in seconds) within Address 5. The "0" enables the system to operate but has no bearing on the settings per se.

6) Within RacePoint BluePrint **Preferences/UI Defaults Tab**
-For Lighting--make sure "Enable Lighting screen auto population" checkbox is selected
-For Motors/Shades-make sure "Enable Shades screen auto population" checkbox is selected
7) Generate Services, Sync with Services as you normally would.
8) For Motor Control, it is recommended that you add a text field to each page to denote which **Z/G/N** address that page is currently controlling.
9) Sync screens and save and upload the config.

Setting Up HSB Sliders in BluePrint:

If you would like to use the recommended Hue, Saturation, Brightness sliders for the control of color, follow steps 1-4 in the *Setting Up Devices and Entities within Blueprint*. The image below shows a Data Table setup for a single **Z/G/N** addressed device using the HSB sliders. (In this case the **ZGN** is 200,1,5)

Figure 20

Setting Up Color Temperature Sliders in BluePrint:

If you would like to have access to continuous /slider color temperature control (for CCT between 1700K and 7000K where supported), follow steps 1-4 in the *Setting Up Devices and Entities within Blueprint*. The image below shows a Data Table setup for a single **Z/G/N** addressed device using the CCT slider. (In this case the **ZGN** is 200,2,1)

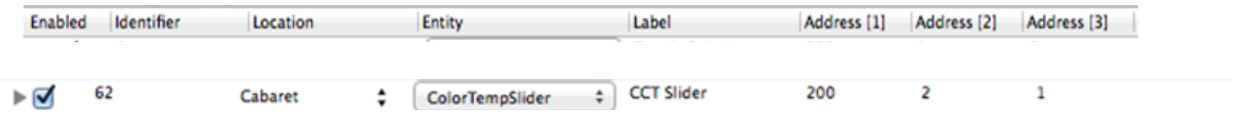


Figure 21

Setting Up RGB Sliders in BluePrint:

If you would like to use a Red, Green, and Blue slider instead of the recommended Hue/Saturation/Brightness sliders, follow steps 1-4 in the *Setting Up Devices and Entities within Blueprint*. The image below shows a Data Table setup for a single **Z/G/N** addressed device using the RGB sliders. (In this case the **ZGN** is 200,1,1 but **Address(4)** indicates a "0" for a Red Slider, "1" for a Green Slider, and a "2" for Blue Slider—one entity auto generates three different sliders in this case!)

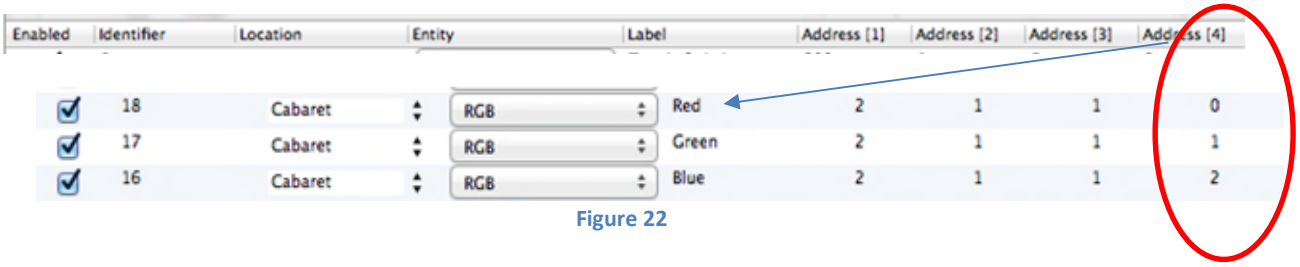


Figure 22

Note: You can have both **HSB** and **RGB** sliders simultaneously that auto-respond with Converging Systems' technology (cool feature for showing off to customers but not really necessary to control color).

1) Add three Entities for each **Z/G/N** address for which you wish to have RGB sliders.
2) Select **RGB** for each Entity from the dropdown.

3) In **Address(1**), enter the **Z**one address, and in **Address(2)**, enter the **G**roup address and in **Address(3)**, enter the **N**ode Address ***and in Address(4), you will need to put 0, 1 or 2***, depending upon if you want this to control Red, Green, or Blue, (Red=0, Green=1, Blue=2).
4) Repeat these steps 1-3 for each **Z/G/N** addressed component for which you would like RGB sliders.
5) Generate services, sync screens, and save and upload the config.

Setting Up an Additional White Slider in BluePrint:

If you would like to use an additional White slider in addition to the RGB sliders established above, follow the below steps within *Blueprint.*

Note*: The intention of a White Slider is to control the White element in a RGBW output device. It is not designed to control a single channel/monochrome output device. Use Brightness ONLY to control a single channel/monochrome device.*

1) Add a **WhiteControlChannel** Entity for each **Z/G/N** address for which you wish to have White sliders.
2) In **Address(1)**, enter the **Z**one address, and in **Address(2)**, enter the **G**roup address and in **Address(3)**, enter the **N**ode Address.
3) Repeat these steps 1-3 for each **Z/G/N** addressed component for which you would like White sliders.
4) Generate services, sync screens, and save and upload the config.

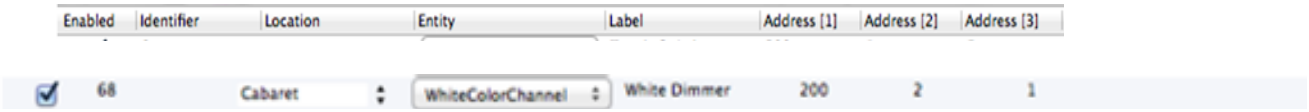


Figure 23

Method to Introduce additional/multiple Toggle Switches which exist as Entities into the Savant Scene Manager:

By default, the Savant Pro App generally enables a limited (1 or 2) number of Entities that exists as Toggles to be auto-populated with the Lighting Scene Manager. There may be cases where some Entities that otherwise would not be available within the Scene Manager are still desired to be triggered either through a (i) celestial event or a (ii) time of day scheduled event. Some of these cases might include:

- Triggering a Circadian Lighting Event, (See Appendix 4 for more information)
- Triggering a Lighting Sequence ("SelectEffect" entity),
- Triggering a predefined color ("RecallPreset" entity) or a predefined color temperature ("ColorTempSelect" entity)

Use the following methodology to be "tweak" any pre-existing Toggle Entity to be triggered as described above. Within ***Blueprint/Tools, Setting/Lighting***.

1) Select the **+** icon at the bottom left of the Lighting Settings (data table) page to add a new **Switch** Entity.
2) Add the applicable (i) **Controller**, (Ii) **Location** and (iii) **Address(1)**, **Address(2)** and **Address(3**) entries. Don't enter anything yet for **Address(4) or Address(5)--**see below for those directions.
3) Hit **Done**, then **Generate Services** and once again enter the **Data Table** to append information to your previously generated new Entity as follows:

4) Select **Show Advanced Columns check box** and under **Command** enter the ALTERNATIVE **Entity Name** for the new hybrid Switch/Entity that you wish to create. Refer to the below table to pick the applicable Entity. Where an **Address(4)** and/or an **Address(5)** is required below, enter those as well (IMPORTANT)

Table 7

	Column A	Column B	Column C	Column D
What to event do you want to expose within Scene Manager within the Pro App	Entity to be entered under "Command" within BluePrint	Name to be used a reference to this activity	Address(4) entry (index #)	Address(5) entry (dissolve rate)
Any Effects (dynamic color show)	**SelectEffect**	Enter name to help you identify this activity (i.e., Effect 1)	Enter applicable Effect #	NA
Any Recall (static color)	**RecallPreset**	Enter name to help you identify this activity (i.e., Recall 1)	Enter applicable Recall #	Enter a # from 1-57600 (seconds)
Any CCT level (static color)	**RColorTempSelect**	Enter name to help you identify this activity (i.e., CCT 2700)	Enter applicable CCT level (from 1700 to 7000)	Enter a # from 1-57600 (seconds)
Circadian Event (i.e., Circadian up)	**CircadianUp**		NA	Enter a # from 1(min) to 1440 (min in a day)

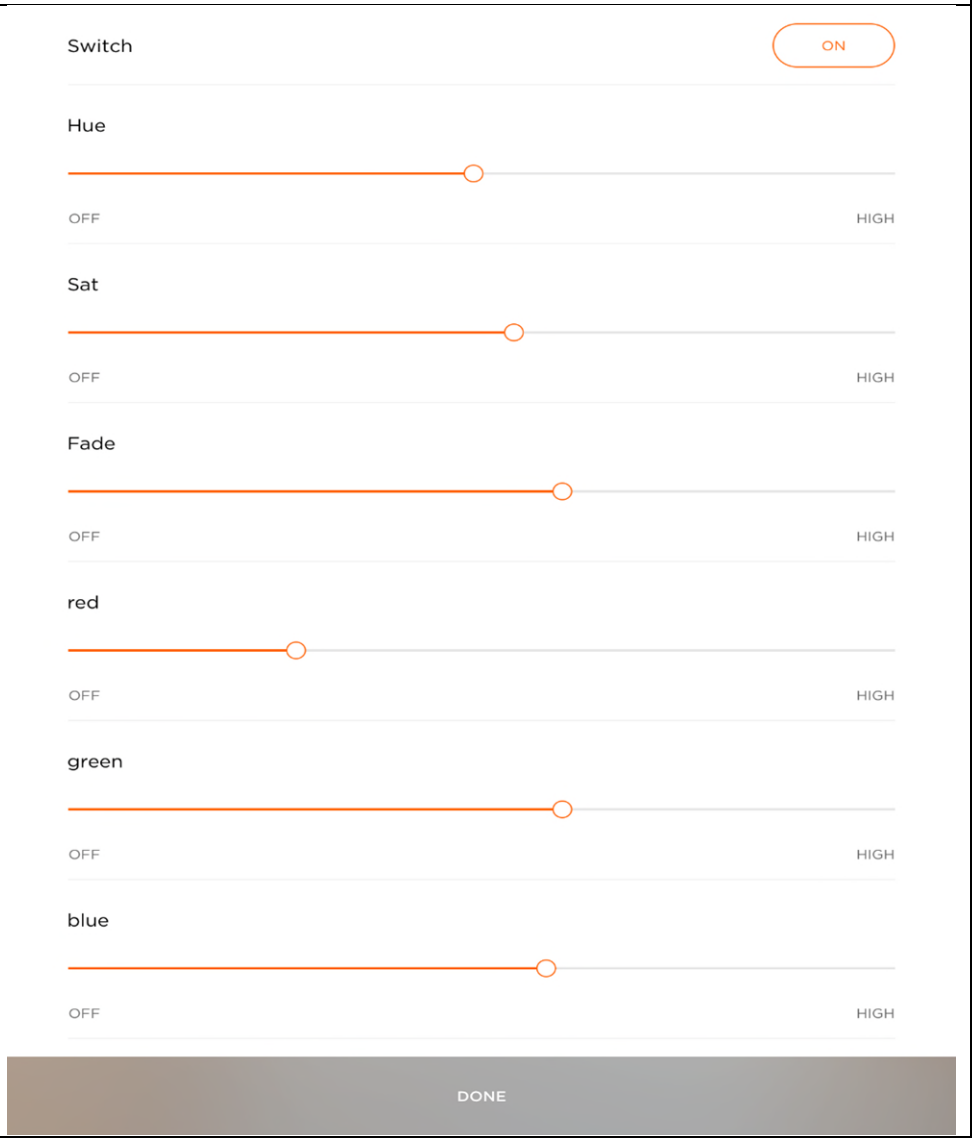
5) Hit Done, Upload to master and proceed to next step
6) Launch the Pro App, and within the Pro App Scene Manager set us a new Schedule using the name entered within Column B
7) Complete the process by picking the (i) appropriate **time** within the Pro App Scheduler, an (ii) applicable **scene** name and the (iii) related picture. Hit Done and watch the event take place.

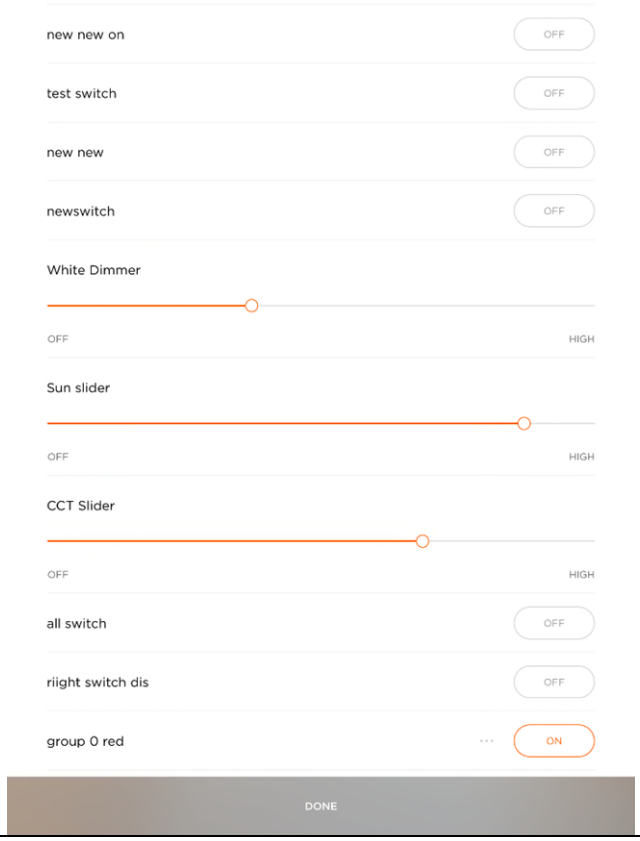
Savant Sample User Screens

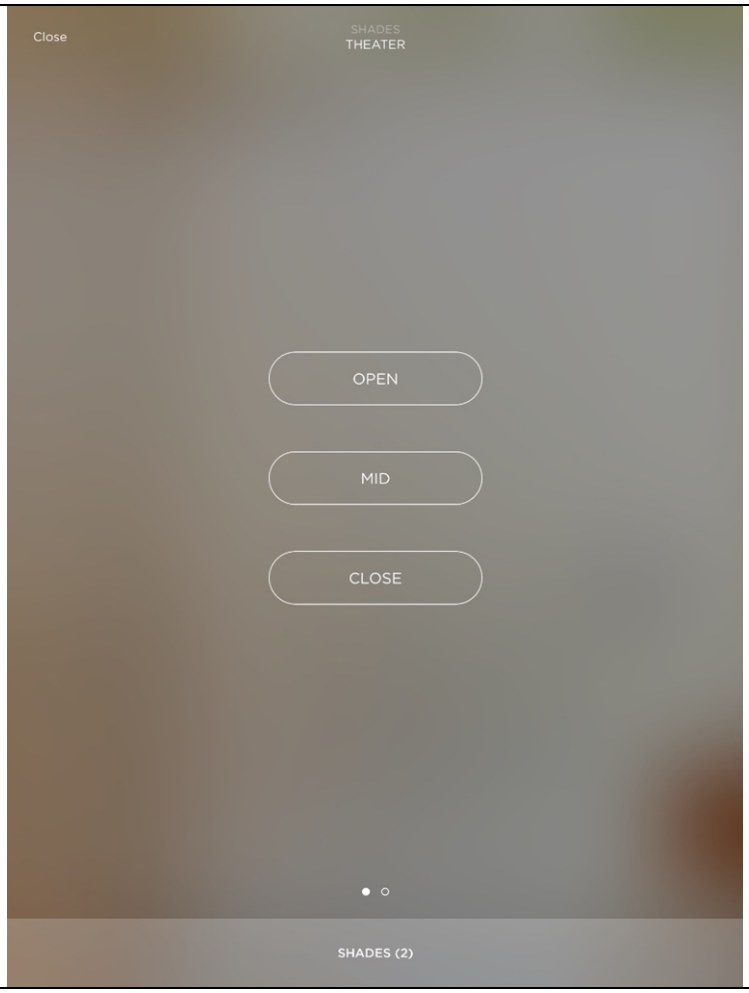
Pro 9.3.3 App (or later)

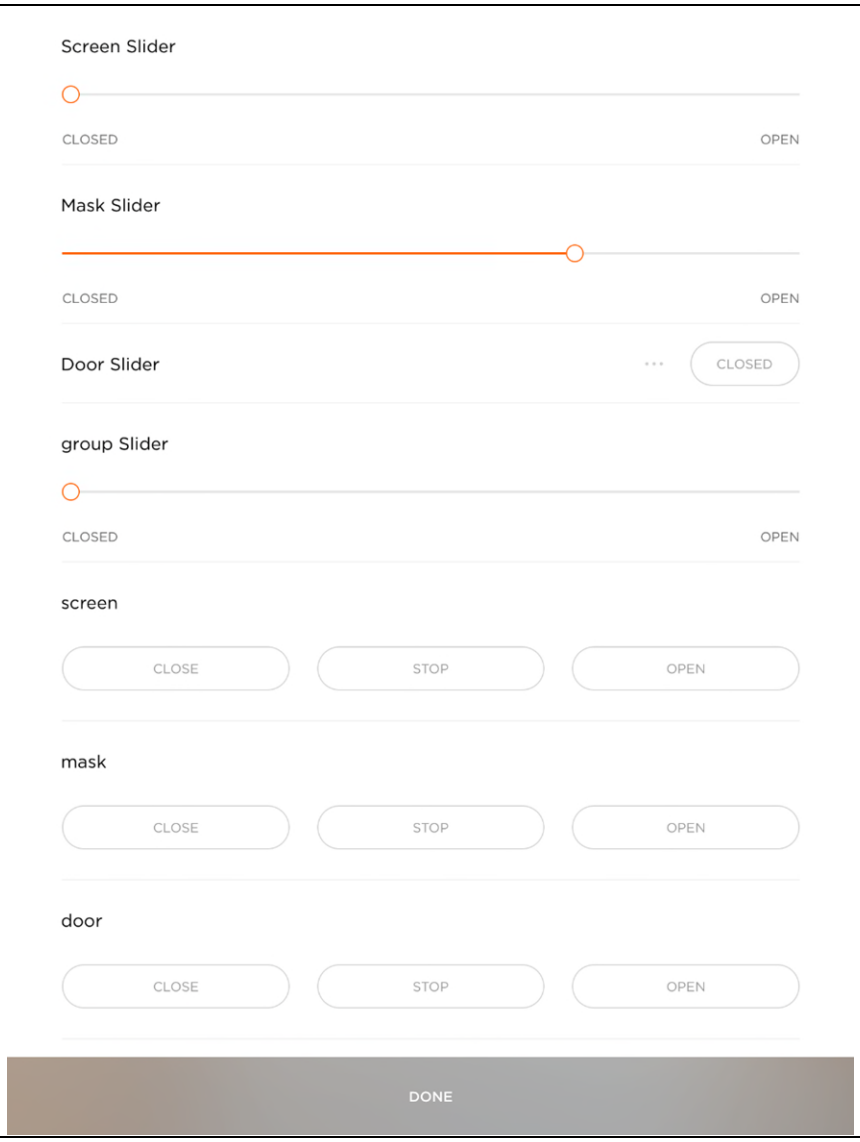
By using Data Table programming, nearly instant programming is possible using the Converging Systems profile and our LED and/or motor elements.

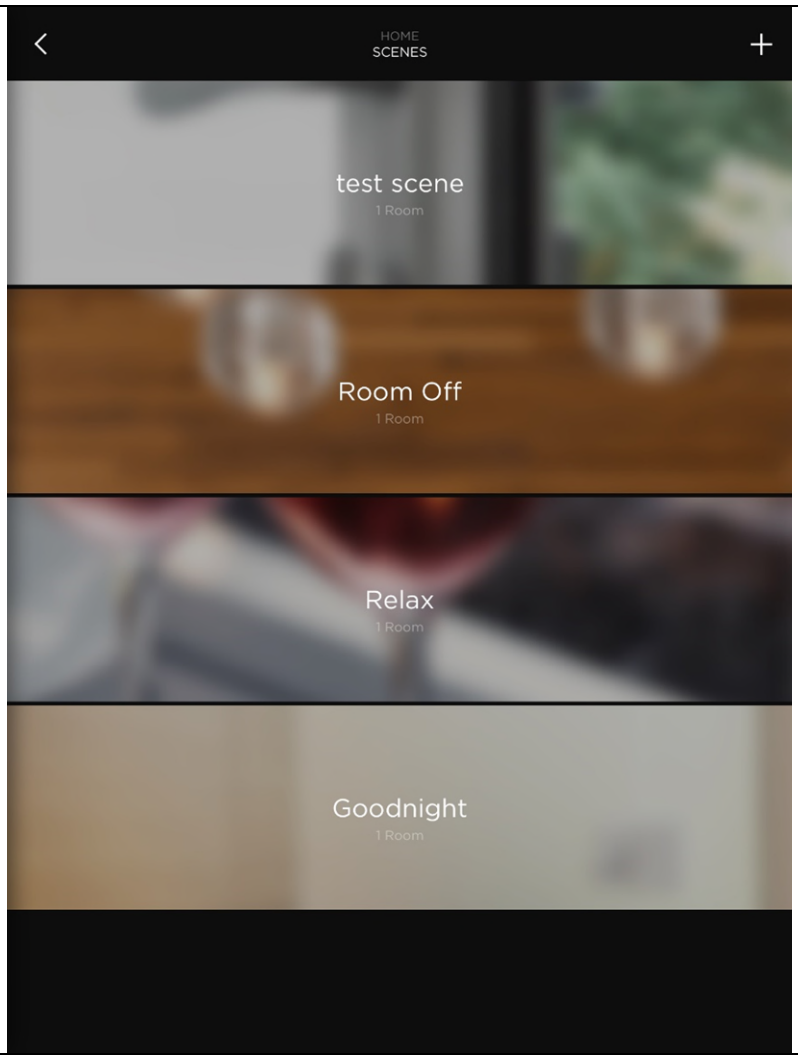
Figure 24

Figure	Screen Shot
Sliders and Switches Standard bi-directional control of Hue, Saturation, Brightness, Red, Green, Blue	

Sliders and Switches Advanced bi-directional control of White as well as Circadian Rhythm (SUN) and Color Temperature (CCT)	

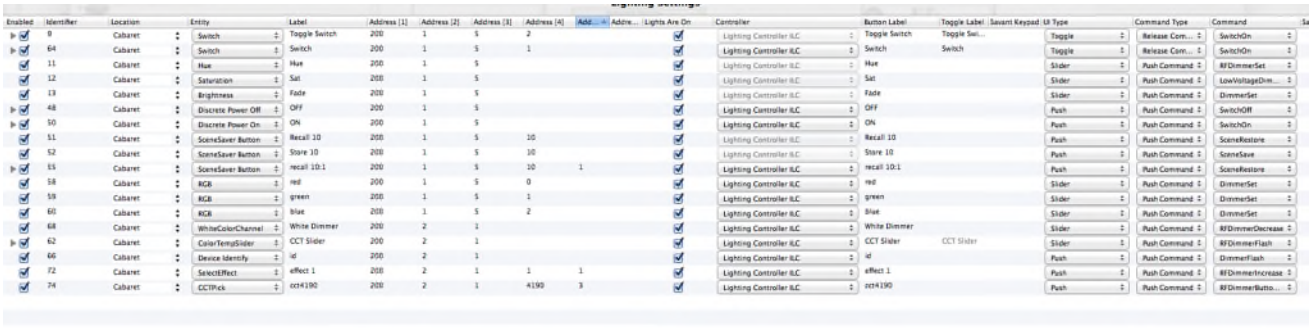
Top Level Control Of Motor or LEDS		

Slider bi-directional control of Motor operators	

Customizable Scenes (see Appendix 4 for example here)	

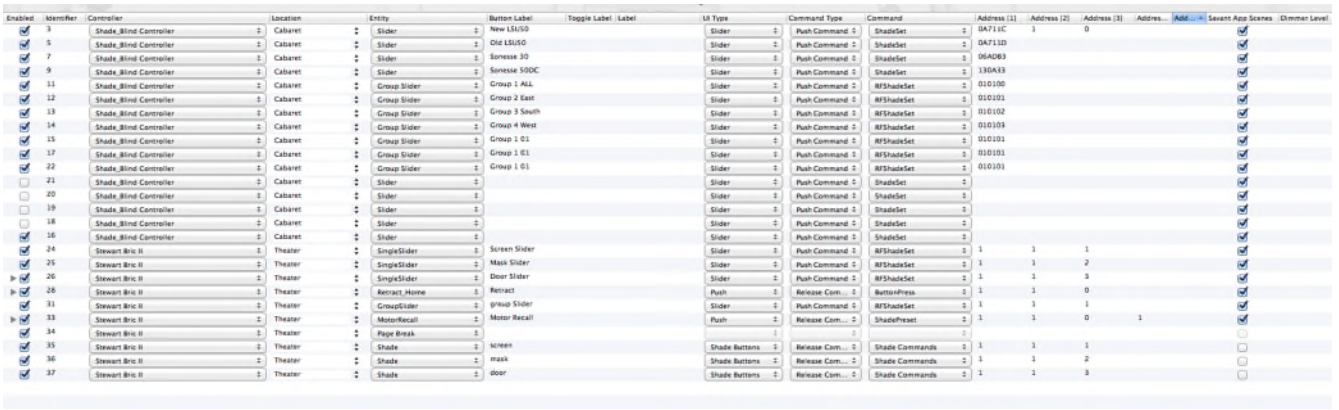
Data Table setup for Lighting Control

Table 8



Data Table setup for Shades (for Motor Control)

Table 9

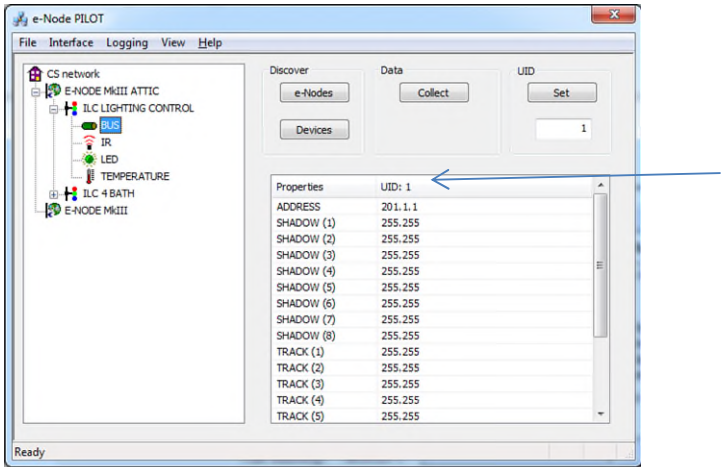


FAQ and Common Mistakes

FAQ/Common Mistakes

1) I am not able to control the CS-Bus controllers from my Savant interface.
   a. Make sure e-Node IP device is on the network and is accessible through the e-Node Pilot application.
   b. Make sure the IP address of the e-Node is on the control wire in Blueprint.
   c. Make sure that if authentication is being used for IP communication that the **Username** and **Passwords** have been set to the same values both within the e-Node and within Blueprint.
2) How do I find the addresses of my CS-Bus controllers?
   The addresses of each CS-Bus controller can be seen within the e-Node Pilot application under View Map. The **Z/G/N** addresses are the addresses that you assign within BluePrint within the Data Table (or within customer Workflows) to control devices.

Figure 25



3) How do control more than device at the same time?
   Simply set up a **Z/G/N** address within the Data Table with a wild card for the field that overlay those devices that you wish to control. For instance, if you had three devices with **Z/G/N** address of 2.1.1 and 2.1.2 and 2.1.3 you would assign the address of 2.1.0 which would signal all devices to move at the same time.
   Note: for a multiple-channel motor controller which may have a factory default address of 1.1.1, 1.1.2, 1.1.3, use the wildcard address of 1.1.0 to Store and Recall Presets. However, for the control of individual motors, use their non "0" address (i.e., 1.1.1 rather than 1.1.0).

4) How do I get feedback from a device if I am sending a wildcard command as explained above?
   The CS-Bus network intelligently pools members of a group and provides automatic feedback of a "spokesman" motor for the group. This is seamless to the installer and the Group Sliders or Controls will respond accordingly. Specifically, if you sent out a command with a **Z/G/N** address of 2.1.0 destined for a triad of devices with addresses of 2.1.1 and 2.1.2 and 2.1.3, CS-Bus internal logic would query the controller with a "1" in the node location and respond back with its setting or position, but would "write" that value from the 2.1.0 (group wildcard) location (rather than from a different target of 2.1.1

which would be unreadable by Savant). This would ensure that a slider for a wildcard address would get proper feedback, even though there was not a real 2.1.0 device populated. Note: this is a new feature and might require a firmware updated to CS-Bus controllers (consult the factory for more information).

5) I changed a light from the Pilot application using the Message window or the Virtual Keypad, but the change does not show up on the Savant Interface. Typically, this occurs when the Telnet Enabled field within Pilot is not set (to Enabled) and the e-Node is not rebooted. The Pilot application uses UDP communication and Savant uses Telnet.

6) I changed a light from the Pilot application using the Message window or the Virtual Keypad, but the change may or may not show up on some of the Pro App's sliders in real time (i.e., Red, Green, Blue, CCT, Circadian, Hue, Saturation, Brightness) or some individual control Toggle switches. For all sliders, if you refresh the Savant page on the Pro App, the sliders will auto-update. The Toggle Switch for the room will automatically update but a bug within Savant sometimes disables an individual toggle switch from changing its appearance (from black to white, and visa-versa from an outside alternative control platform such as Lutron). **But most importantly, the room control for ON.OFF does properly reflect the status within the room (at least as far as all Converging Systems lighting devices are considered)**.

   Note: There can be no guarantee that third-party lighting devices' profiles have been properly engineered to support this innovative feature. Please consult those vendors if you see such unexplainable occurrences.

7) If I change a light from one Savant UI using the HSB interface, will sliders on another Savant UI that implement RGB update to reflect the color state changes sent to the targeted controller? This is another great feature of the color model within the ILC-x00 controllers. If Notify within the e-Node Pilot is set to **Both**, all sliders on all UI devices will update appropriately, even though they are set to different color spaces. (An RGB value of 240.0.0 will be reflected as an H/S/B value of 0.240.240 which is identical).

8) How to Select a Color Temperature? Use entity **ColorTempSlider** for a slider/dimmer to pick a color temperature from 1700K ~ 7000K (for supported devices). Use **ColorTempSelect** (within BluePrint) with Address4 set to the particular CCT.

9) The System sends our command for RGB without a trailing value. Update to the latest Profile.

10) I cannot populate more than one Switch on my Pro App scene select page for a particular **Z/G/N** address. This is a known limitation with current versions of the Savant Pro App and hopefully will be resolved in the near future. See **Method to Introduce additional/multiple Toggle Switches which exist as Entities into the Savant Scene Manager** as well as Appendix 4 for workarounds here**.**

11) The ON/OFF (toggle) buttons on the Pro App may not always keep pace with the current operation, is this expected? The Dimmer sliders keep track with the current operation, but presently the Orange On/Black OFF buttons may not react properly. This has been resolved with the latest profile release.

Appendix 1

Supported Entities and Actions

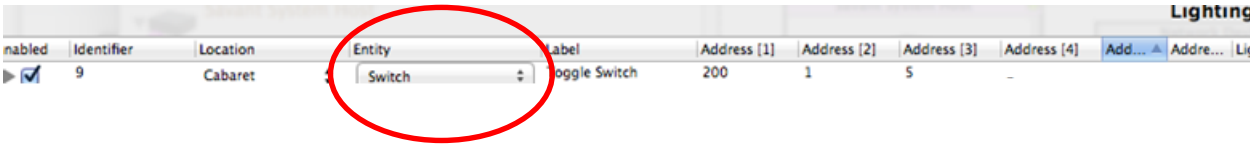
LED Control	
Entity Listing	**Section 1a**
Entity Detail	**Section1b**
Support Actions	**Section 1c**
Motor Control	
Entity Listing	**Section 2a**
Entity Detail	**Section 2b**
Support Actions	**Section 2c**

Section 1a. LED Entities Lighting Directory (click on item for information)

Brightness	Associated with DimmerSet
CircadianSlider	Associated with RFDimmerButtonDoubleTap
CircadianUp	Associated with GroupSwitchOn
CircadianDown	Associated with GroupSwitchOff
ColorTempSelect	Associated with RFDimmerButtonPress
ColorTempSlider	Associated with RFDimmerFlash
CCT Up	Associated with RFButtonPress
CCT Down	Associated with RFButtonRelease
Device Identify	Associated with DimmerFlash
Discrete Power On	Associated with SwitchOn
Discrete Power Off	Associated with SwitchOff
Dissolve	Associated with DimmerStop
FadeUp	Associated with DimmerIncrease
FadeDown	Associated with DimmerDecrease
Hue	Associated with RFDimmerSet
RecallPreset	Associated with SceneRestore
RGB	Associated with special RGB operator
Saturation	Associated with LowVoltageDimmerSet
Sat Up	Associated with GroupDimmerIncrease
Sat Down	Associated with GroupDimmerDecrease
SceneSaver Button	Associated with SceneSave
SelectEffect	Associated with RFDimmerIncrease
SequenceRate	Associated with RFDimmerStop
Stop	Associated with RFButtonHold
StorePreset	Associated with SceneSave
Switch	Associated with SwitchOn/SwitchOff

Section 1b. LED Lighting Entities Detail

ENTITY PULLDOWN



Lighting

a. **Brightness[1]:** This is the slider that controls the brightness of the specific **Z/G/N** addressed component. This goes from 0 (off) to 100 (full on brightness).
b. **FadeUp**. This is a button command that starts fading from the current brightness level until full brightness is reached or a STOP command is encountered.
c. **FadeDown**. This is a button command that starts fading from the current brightness level until full off is reached or a STOP command is encountered.
d. **Hue[1]:** This is the slider that controls the actual Hue (or color) of the specific **Z/G/N** addressed controller and represents the different colors of the spectrum that the ILC-x00 and connected luminaries support.
e. **Saturation[1]:** This is the slider that controls the amount of White in a color from washed out (0) to vibrant (100). **Note**: White is defined in a RGB system as full on 100% Brightness and 0% Saturation regardless of the HUE selected—interesting but true.
f. **SatUp**. This is a button command that starts increasing the saturation from the current saturation level until full saturation is reached or a STOP command is encountered.
g. **SatDown**. This is a button command that starts decreasing the saturation from the current saturation level until zero saturation is reached or a STOP command is encountered.
h. **Stop**. This is a button command that interrupts any ongoing adjustment (saturation, brightness, circadian, etc.).
i. **Switch[1].** This is toggle button that will turn on or off a specific **Z/G/N** addressed controller. **New**- any dissolve rate entered into **Address5** will be "bundled" into the Switch command (provided you enter a "0" in **Address4** as a placeholder).
j. **SelectEffect.** This is toggle button that will turn ON a selected Effect (n) depending upon the Data Table entry for the **Z/G/N** address as well as the Effect entered in **Address4** (this populates within the Pro App scene select window). The alternative Toggle State is OFF and this state can be alternatively used as an OFF command within the Savant Pro App scene select window. (The Savant Pro App scene select page supports DIMMERS and one SWITCH currently-see Method to Introduce additional/multiple Toggle Switches which exist as Entities into the Savant Scene Manager for more information on a workaround.)
k. **ColorTempSelect (Color Temp).** This is toggle button that will turn ON a selected ColorTemp (CCT) depending upon the Data Table entry for the **Z/G/N** address as well as the CCT level entered in Address 4 (this populates within the Pro App scene select window). The alternative Toggle State is OFF and this state can be alternatively used as an OFF command within the Savant Pro App scene select window. (The Savant Pro App scene select page supports DIMMERS and one SWITCH currently—see above "j" for more information.)
l. **RGB[1]:** This will create a Red, Green, and/or Blue slider depending upon what you have set in the Address 4 field (i.e., "0" creates a Red slider, "1" creates of Green slider, and "2" creates a Blue slider).
m. **WhiteColorChannel[1]:** This is the slider that controls the White channel on the ILC-400 controller if configured in the RGBW mode. This goes from 0 (off) to 100 (full white). (This is not relevant for controlling a monochrome led output type where Brightness should be used.)

n. **StorePreset Button:** This will either (i) create a previously stored Preset Color (1-24) from a database preserved within each ILC-x00 controller (and e-Node/dmx) depending upon what you set up in the **Address(4)** field or (ii) save a color state into Preset Color (1-24) which is specified in **Address(4)**.

o. **RecallPreset Button:** This will either (i) recall a previously stored Preset Color (1-24) from a database preserved within each ILC-x00 controller depending upon what you set up in the **Address(4)** field or (ii) recall a color state into Preset Color (1-24) which is specified in **Address4**.

p. **ColorTempSlider[1]:** This is the slider that controls **C**orrelated **C**olor **T**emperature (**CCT**) on the ILC-40xx controller (when set to 4-color mode). This goes from 0 (which maps to 1700K) to 100 (which maps to 7000K).

q. **CCT Up:** This is a special control to increment Color Temperature upwards from warm white (of 1700K) to cool white of 7000K (where supported). This goes from 0 (which maps to 1700K) to 7000 (which maps to 7000K).

r. **CCT Down:** This is a special control to decrement Color Temperature downwards from cool white (of 7000K) to warm white of 1700K (where supported). This goes from 100 (which maps to 7000K) to 0 (which maps to 1700K).

s. **CircadianSlider[1]:** This is the slider that controls **Circadian Tuning** (**SUN**) on the ILC-4x0 controller (when set to 4-color mode). This goes from 0 (which maps to sunrise) to 240 (which maps to midday sun).

t. **CircadianUp:** This is a special control to increment Circadian Lighting upwards from Darkness to midday sun. This goes from 0 (which maps to sunrise) to 240 (which maps to midday sun).

u. **CircadianDown:** This is a special control to decrement Circadian Lighting downwards from an existing Circadian Level (i.e., midday sun) to Darkness. This goes from 240 (which maps to midday sun) to 0 (which maps to darkness).

v. **Dimmer Button:** (Reserved).

w. **Device Identify:** This push button will flash for approximately 20 seconds the specific **Z/G/N** address device (both any connected LED loads as well as the controller's on-board LED). This may not be needed in your implementation, but is helpful in finding the current controller if the DataTable buttons or controllers are not labeled.

x. **Discrete Power On:** This push button will issue the ON command to the targeted controller. This discrete command is recommended over the alternative Savant ON/OFF toggle for significantly less bus traffic is experienced with this discrete button. **Note**: The Savant standard Toggle ON/OFF button sends an ON to every single slider and switch with a common Zone/Group/Node address while this discrete operation, only sends a single ON command.

y. **Discrete Power Off:** This push button will issue the OFF command to the targeted controller. This discrete command is recommended over the alternative Savant ON/OFF toggle for significantly less bus traffic is experienced with this discrete button. **Note**: The Savant standard Toggle ON/OFF button sends an OFF to every single slider and switch with a common Zone/Group/Node address while this discrete operation, only sends a single OFF command.

z. **Dissolve:** This push button will issue a separate Dissolve command with the type of Dissolve entered in **Address(4)** (from 0 to 4) and the Dissolve Rate (in seconds) entered in **Address(5)**. This function is typically used with a wildcard address to impact global dissolve rates for a group of controllers.

Note: If you want to simply change the dissolve rate of a specific (non-slider) Entity, simply enter that Dissolve Rate (in seconds) within **Address(5)** column for that non-slider Entity. If you want to change the Dissolve Rate for a group of controllers use this Entity to save time. Following is a table documenting those Dissolve Rate

Table 10

Dissolve Type (this number entered in Address4)	Function	Controller Type			
		ILC-100m ILC-400m (mono mode)	ILC-100c/ILC-300	ILC-4x0 (RGBW, RGB or Bi-White mode	DMX (e-Node/dmx
1	Dissolve function for transitions between from one state and another using direct value commands such as SET,L; SAT, S; HUE,H; RED,R, GREEN,G, BLUE,B; COLOR;VALUE	✓	✓	✓	✓
2	Dissolve function for transitions between ON and OFF and between PRESETS (RECALL,X)	✓	✓	✓	✓
3	Dissolve function for transition from one state another with the following effects -EFFECT(1) -EFFECT(4)		✓	✓	✓
4	Time to complete a full cycle with the following EFFECT function. (Min is 14 seconds—max is 240 seconds -EFFECT(3)		✓	✓	
0	Wildcard command to change all possible Dissolve Functions in unison (typically not used any longer after above discrete entries were developed)	✓	✓	✓	✓

aa. **SequenceRate**. This push button will issue a setting for the SequenceRate variable with the rate (in seconds) entered in **Address(4)**. SequenceRate is applicable for some Effects and is the period when the LED is illuminated as opposed to the dissolve period between two sequence ON conditions (the dissolve period is one of several Dissolve rates).
Note: It is not possible to change a Sequence Rate other than through this **Entity** (SequenceRate) or Action (RFDimmerStop). Alternatively, you can make manual changes to the factory setting for SeqRate within the e-Node Pilot or web-pilot Application for CS-Bus controllers.

Table 11

SequenceRate in seconds (this number entered in Address4)	Function	Controller Type			
		ILC-100m ILC-400m (mono mode)	ILC-100c/ILC-300	ILC-4x0 (RGBW, RGB or Bi-White mode	DMX (e-Node/dmx
N	Specifies the time (after any dissolve) that the preset color is maintained before transitioning to the next in sequence. -EFFECT(1) -EFFECT(4) (not available on DMX)		✓	✓	✓

Section 1c. LED Lighting Actions

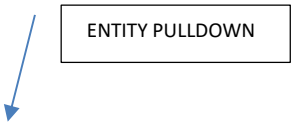
Supported LED Actions

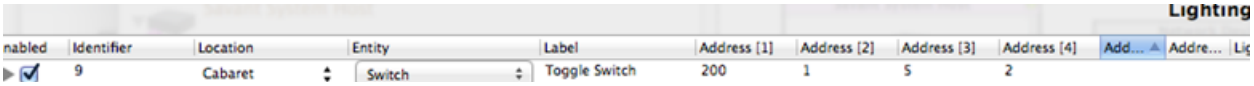
DimmerFlash	Identify LED w/address ZGN
DimmerIncrease	Fade UP for LED w/address ZGN (opt. *fade time in Address 5*)
DimmerSet	Fade/Brightness Adjustment for LED w/address ZGN (slider)
DimmerStop	To set Dissolve.m *for seconds,n (m is Address 4 , n is Address 5)*
GroupDimmerIncrease	Sat UP for LED w/address ZGN (*opt. fade time in Address 5*)
GroupDimmerDecrease	Sat DOWN for LED w/address ZGN (*opt. fade time in Address 5*)
GroupSwitchOn	Circadian (SUN+) Up for LED w/address ZGN (*opt. fade time in Adr. 5*)
GroupSwitchOff	Circadian (SUN-) Down for LED w/address ZGN (*opt. fade time in Adr. 5*)
LowVoltageDimmerSet	Sat Adjustment for LED w/address ZGN (slider)
RFButtonPress	CCT UP for LED w/address ZGN (*opt. fade time in Address 5*)
RFButtonRelease	CCT DOWN for LED w/address ZGN (*opt. fade time in Address 5*)
RFButtonHold	Stop (of any active adjustment)
RFDimmerDecrease	White Component Adjustment for LED w/address ZGN (slider)
RFDimmerButtonPress	Select CCT,n (1700~7000 in address 4, opt fade time in Adr. 5)
RFDimmerFlash	CCT Adj. Feat. for Data Tables to pick CCT for LED w/address ZGN (slider)
RFDimmerIncrease	Effect, n Feature for Data Tables for LED w/address ZGN (n in Adr. 4)
RFDimmerSet	Hue Adjustment for LED w/address ZGN (slider)
RFDimmerStop	To set SeqRate for seconds,s (s is Address 4)
RFDimmerButtonDoubleTap	Circadian Adjustment for LED w/address ZGN (slider)
SceneRestore	Recall Preset,n for LED w/address ZGN (address 4 for n)
SceneSave	Store Preset,n for LED w/ address ZGN (address 4 for n)
SwitchOff	LED Off for LED w/address ZGN
SwitchOn	LED On for LED w/address ZGN

Section 2a Motor Control Entities Directory (click on item for information)

Shade	Associated with ShadeUp/ShadeDown/ShadeSTop
Motor Slider	Associated with ShadeSet
ShadeUP	Associated with ShadeTiltOpen
ShadeDown	Associated with ShadeTiltDown
ShadeLeft	Associated with ShadeTiltOpen
ShadeRight	Associated with ShadeTiltClose
Jog+	Associated with ButtonRelease
Jog-	Associated with ButtonPressAndRelease
Motor Recall	Associated with ShadePreset
Motor Save	Associated with RFShadeSet
Retract_home	Associated with ButtonPress
Shadeadjstop	Associated with ShadeStops

Section 2b Motor Control Entities Detail





Motor

a. **Shade:** This will direct a motor Up or Down with a three-position keypad. The center choice (half) is operational only where a motor offers positional control (CVM-yes, IMC-100-no).
b. **MotorSlider.** This will direct a motor to a specific position (if the motor has a built-in encoder to provide feedback as to its position). Door motors can also be controlled and they will return a binary response 0.00 for top and 100.00 for bottom
c. **ShadeUp.** This will direct motor upwards.
d. **ShadeDown.** This will direct motor downwards.
e. **ShadeLeft.** For systems with left/right motors, this will a motor leftwards.
f. **ShadeRight.** For systems with left/right motors, this will a motor rightwards.
g. **ShadeAdjStop.** For will direct a motor to stop.
h. **MotorRecall:** This will direct a motor to a previously assigned Preset location (Presets 1-24) for supported motor controllers (IMC-300/CVM) from a database preserved within each supported IMC-x00 controller depending upon what you set up in the Address(4) field. Currently motor position can be stored using the **MotorSave** Entity (see next). **Note**: it is required that you use the wildcard of "0" for **Address(3)** to recall the state for all motors in a system (on one IMC-300/CVM controller).
i. **MotorSave:** This will save a current position if a motor to a previously assigned Preset location (Presets 1-24) for supported motor controllers (IMC-30/CVM) from a database preserved within each supported IMC-300 controller depending upon what you set up in the **Address(4)** field. **Note**: it is required that you use the wildcard of "0" for Address(3) to save the state for all motors in a system (on one IMC-300 controller/CVM) when settings for a bank of motors have been saved within a preset.
j. **Jog+:** This will direct a motor to jog or move minutely a specific amount toward Home.
k. **Jog-:** This will direct a motor to jog or move minutely a specific amount away from Home.
l. **Retract_Home.** This will direct a motor to retract or Go Home.

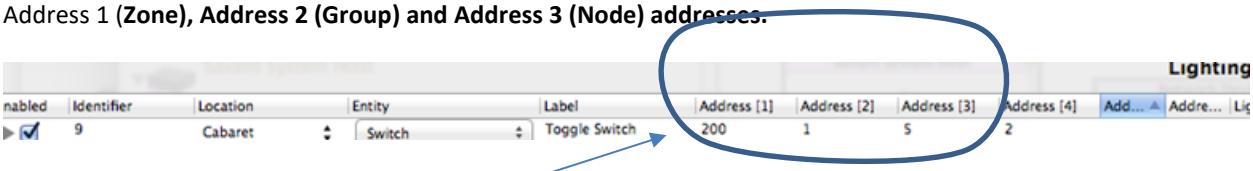
Section 2c. Motor Control Actions

ShadeUp	Moves motor w/**ZGN** address Up
ShadeDown	Moves motor w/**ZGN** address Down
ShadeStop	Stops motor w/**ZGN** address
ShadeTiltOpen	Moves motor w/**ZGN** address Left
ShadeTiltClose	Moves motor w/**ZGN** address Right
ButtonRelease	Jogs motor w/**ZGN** address Up by n (toward rolled up position)
ButtonPressAndRelease	Jogs motor w/**ZGN** address Down by n (toward unrolled position)
ShadePreset	Moves motor w/**ZGN** address to Preset index, n (Address4)
ButtonPress	Moves motor w/**ZGN** address to fully retracted position
RFShadeSet	Stores current position of motor w/**ZGN** addr. into index n (Address4)
QueryCurrentPosition	Moves motor w/**ZGN** address Down
ShadeSet	Move motor w/**ZGN** address to ShadeLevel position

Appendix 2

Background on Addressing

This information is only relevant for when you ***start*** adding buttons and sliders within the Data Table section of your Savant project. All Converging Systems' devices (loads or controllers as opposed to communication devices) that are connected to a communication device (e-Node or IBT-100) will be addressed using a unique **Z**one/**G**roup/**N**ode addressing scheme (**Z**/**G**/**N**). Those addresses are referred to within Savant Data Table as Address 1 (**Zone), Address 2 (Group) and Address 3 (Node) addresses.**



In the above example, The ZGN address is 200,1,5

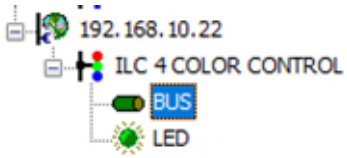
Background on ZGN Addresses: The largest group is referred to as the **Zone**, which might be associated with a floor of a building. The next smaller group is referred to as the **Group**, which might be associated with a room on that floor of a building. Finally, the smallest entity is referred to as the **Node**, or the particular unit in that Room or Group, and within that Floor of Zone. From the factory, all lighting devices have a default address of **Zone**=2, **Group**=1, **Node**=0 ("0" refers to an undefined unit).

Range of Z/G/N Addresses: Enter a number between 1 and 254 for **Z**one numbers, **G**roup numbers, and **N**ode numbers.

Please note -- no two controllers should be assigned the same Z/G/N address. If you desire to have multiple controller's activity all mirror each other, there are two possible choices which will work.

Option 1---Assign each a different Z/G/N address to each (i.e., 2.1.1 2.1.2 2.1.3 etc.) and use a wildcard address (2.1.0) to control all devices which share the non-zero entries.

Option 2-- Use the **Shadow (1)** or **Shadow(2)** address feature available within BUS and set all devices that you wish them to track each other to the same common Shadow address (but different from the primary Address) as shown below.



First Controller		Second Controller	
ADDRESS	2.1.1	Properties	UID: 125
SHADOW (1)	3.1.1	ADDRESS	2.1.2
SHADOW (2)	255.255.0	SHADOW (1)	3.1.1
POWER	ENABLE	SHADOW (2)	255.255.0
TERM	DISABLE	POWER	ENABLE
		TERM	DISABLE

Background on Bi-Directional Feedback: Once a load device (CS-Bus controllers) is programmed using the e-Node Pilot application to a non-zero value, then **AND ONLY THEN** can those devices can be queried or monitored for state data (color or motor position) which is quite useful in auto-updating sliders and numerical readouts.

The figure below describes this hierarchy.

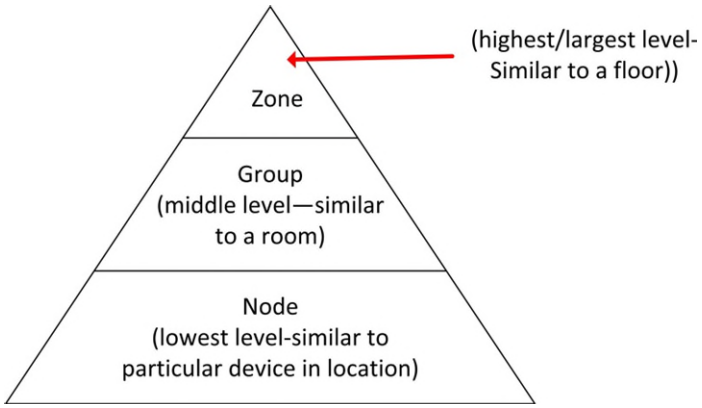


Figure 26

YOU MUST HAVE PRE-ASSIGNED Z/G/N ADDRESSES TO ALL LOADS BEFORE PROCEEDING WITH SAVANT PROGRAMMING. See the Converging Systems' documentation on the e-Node Pilot application for more information here.

At this point after you assigned **Z/G/N** address to all loads (ILC-100/300 or ILC-4x0 controllers) it would be useful to write down a "map" of all interconnected loads and their re-assigned **Z/G/N Addresses** for use when programming within Savant Data Tables.

Example: If you have a device with a Z/G/N address of **2.1.1**, then the Savant system can monitor that device to determine its current lighting status. If you choose to enter a wildcard address of a 2.1.**0** (that is a broadcast to all

units with Z/G/N addresses between **2.1.1** and **2.1.254**), only the unique color settings available from the device with an address of **2.1.1** or the first Z/G/N unit in the series will be queried.

Example: If you have a device with a Zone/Group/Node ("**Z/G/N**") address of **2.1.1**, then the Savant system can poll that device to determine its current lighting status. If you choose to enter a wildcard address of a 2.1.**0** (that is a broadcast to all units with Z/G/N addresses between 2.1.1. and **2.1.254**), only the unique color settings available from the device with an address of **2.1.1** or the first Z/G/N unit in the series will be queried.

Specifically, if you had more than one ILC-x00/ILC-4x0 controllers, you could give them (through the e-Node Pilot application) addresses as follows:

Table 12

ILC unit	Zone/Group/Node Address
First Unit	2.1.**1**
2nd unit	2.1.**2**
nth unit	2.1.**3** or some other number up to **254**

Appendix 3

COLOR SPACE ISSUES

Note on Color Space.

Converging Systems recommends that only the HSB (Hue, Saturation and Brightness color space is used for it is infinitely more accurately and user friendly to control color. Although the **Figure** below shows both HSB and RGB sliders on the same UI, this is probably more confusing for the typical user than the simple subset of HSB (hue, saturation, brightness) controls**. Since there is no concept of dimming within the RGB color space, having RGB sliders only frustrates the user who may just want to dim a full color luminary. However, if the User is intent on having RGB sliders, we would recommend ADDING the Brightness slider to get accurate dimming.**

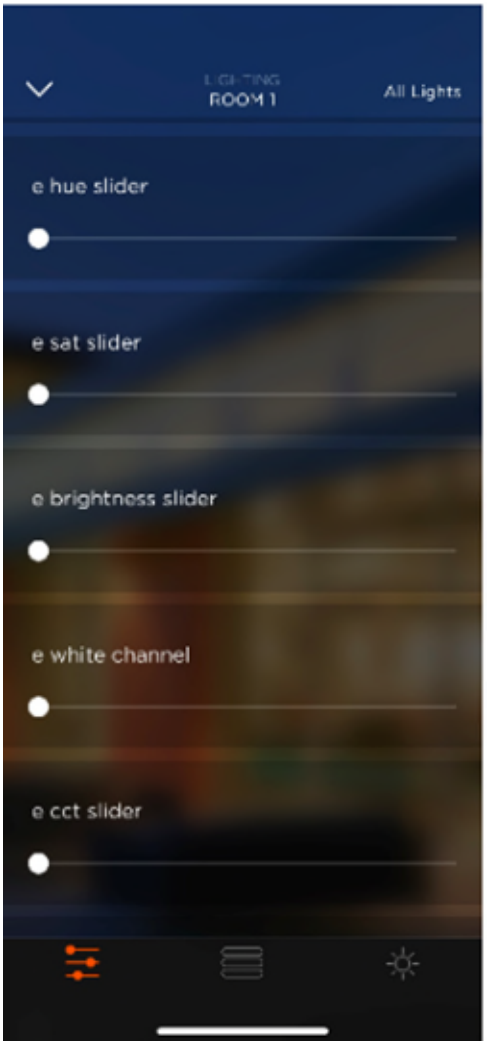


Figure 27

Appendix 4

Circadian Lighting with Savant

Profile Backgrounder

Converging Systems and Savant System, Inc. have collaborated since 2013 in a sophisticated profile to support both led lighting and motor control technology. In 2016, Converging Systems introduced Circadian lighting as an adjunct to its full color device offerings. Recent advancements to the harmonized e-Node harmonized lighting/motor control profile now expands it feature set by enabling **Circadian lighting** support from all Savant automation controllers through the (i) Racepoint BluePrint software (where applicable Entities with ramp up/ramp down timing values are entered), and then (ii) Savant Pro App where Scheduling within the Scene Manager is performed.

The current released profile available from the Converging Systems website.

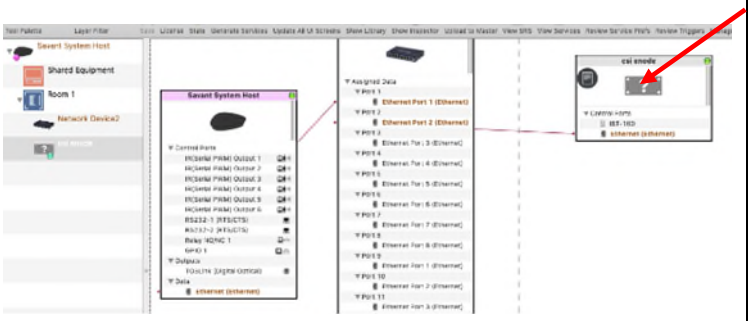
Circadian Lighting

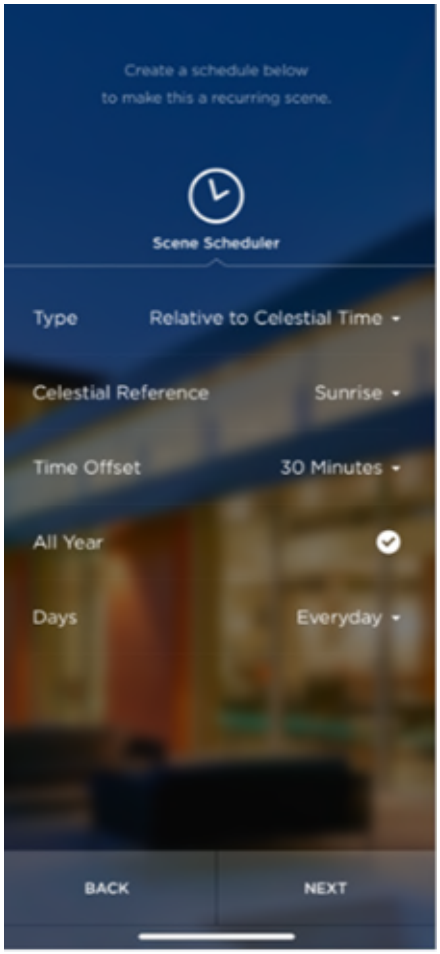
Circadian Lighting is a corollary to human circadian rhythm. Circadian rhythm is a 24-hour clock controlled by the hypothalamus, an area of the brain, that controls each person's circadian rhythm by receiving stimuli from the eyes and signaling when it is daytime and nighttime. Cooler temperatures are used in spaces when it is appropriate to promote alertness and attention. Warmer temperatures (seen when the sun is rising or setting) are used when people are waking up or falling asleep. The concept of using light to influence human circadian rhythm is a relatively new idea in the lighting industry and research continues to provide new findings. Converging Systems has mapped the chromaticity values of the sun on the Big Island of Hawaii over a course of a week (where atmospheric interference is less intense or impacted by pollution/cloud cover (one of the reasons the Mauna Kea observatory was built there). The most significant changes in the chromaticity values occur during two periods.

- The first period (which we will call "**Sunrise**" below) occurs during the three-hour period starting 30 minutes before sunrise and running for three hours thereafter (with a metric of 0 ~ 240 for that period).
- The second period (which we shall call "**Sunset**" below) occurs during the three-hour period starting 2.5-hours before sunset and running for three hours thereafter (with a metric of 240 ~ 0 for that period).

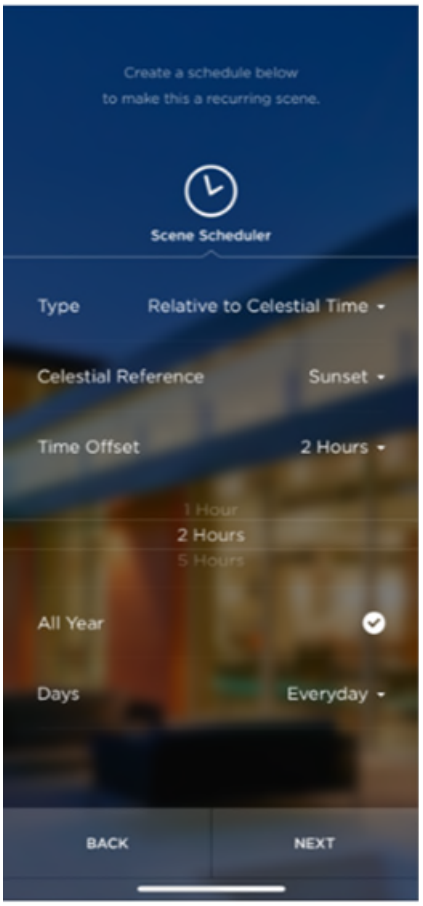
We have created this Tech Note for installers interested in experimenting and implementing Circadian Lighting for Savant platforms. You are free to modify the assumptions given above for the particulars of your installation.

Quick Steps

<table>
<tr><th>Step #</th><th>Test</th><th>Steps</th></tr>
<tr><td>1</td><td>Verify that at least one e-Node (communication device) and one or more connected ILC-xx0 (lighting controllers) have been successfully added to your project.</td><td>-Review the ILC-100/300/400 Quick Start Guides as well as the Savant Integration Note for background on the integration of critical components. Within RacePoint BluePrint software, make sure that one Converging Systems e-Node has been added to your project.
 
-</td></tr>
<tr><td>2</td><td>Create two Data Table entries</td><td>-Within RacePoint BluePrint, select Tools/Settings/Lighting, select the + icon at the bottom left of the Lighting Settings (data table) page.
-Select the Show Advanced Column
-Fill in the entries for two new (hybrid/non-standard) Entities.
<table><tr><th>Controller</th><th>Loc.</th><th>Entity</th><th>Label</th><th>Command</th><th>Ad1</th><th>Ad2</th><th>Ad3</th><th>Ad4</th><th>Ad5</th></tr><tr><td>e-Node</td><td>Rm name</td><td>Switch</td><td>Cir UP</td><td>GroupSwithcON</td><td>Z</td><td>G</td><td>N</td><td></td><td>M1</td></tr><tr><td>e-Node</td><td>Rm Name</td><td>Switch</td><td>Cir DN</td><td>GroupSwithcOff</td><td>Z</td><td>G</td><td>N</td><td></td><td>M2</td></tr></table>Legend
Z-zone address of controller
G-group address of controller
N-node address of controller
M1-number of minutes from start (darkness) to plateau (end of ramp up). Enter 240 (minutes) here.
M2-number of minutes from start (midday sun) to total darkness (end of ramp down). Enter 120 (minutes) here (if you have selected 2 hours in Step 3, or enter 300 (minutes) here if you have selected 5 hours in Step 3.
-As usual Generate Services, fill in any additional detail as specified above and Upload to Master</td></tr>
<tr><td>2</td><td>Create within the Savant Pro App/Scene Manager a Circadian Up scene with schedule</td><td>-Within the Savant Pro App, Scene Manager select the + icon to develop a new Scene, then select the Build New option,
-Next select Lighting/applicable Room and pick the Cir Up (radial checkbox) and select ON</td></tr>
</table>

<table>
<tr>
<td></td>
<td></td>
<td>-Hit Done, Next, Next to enter the Scene Scheduler
<table>
<tr><td>Type</td><td>Relative to Celestial</td></tr>
<tr><td>Celestial Reference</td><td>Sunrise</td></tr>
<tr><td>Time Offset</td><td>15 or 30 minutes (before sunrise)</td></tr>
<tr><td>All Year</td><td>Select</td></tr>
<tr><td>Days</td><td>Select as appropriate</td></tr>
</table>


-Hit Skip, then Name your Scene and set a picture and Save</td>
</tr>
<tr>
<td>3</td>
<td>Create within the Savant Pro App/Scene Manager a Circadian Down scene with schedule</td>
<td>-Within the Savant Pro App, Scene Manager select the + icon to develop a new Scene, then select the Build New option,
-Next select Lighting/applicable Room and pick the Cir Down (radial checkbox) and select ON
-Hit Done, Next, Next to enter the Scene Scheduler
<table>
<tr><td>Type</td><td>Relative to Celestial</td></tr>
<tr><td>Celestial Reference</td><td>Sunset</td></tr>
<tr><td>Time Offset</td><td>2 hours (before sunset
Note: there are two relevant choices 2 hours and 5 hours- either can work</td></tr>
<tr><td>All Year</td><td>Select</td></tr>
</table>
</td>
</tr>
</table>

		Days | Select as appropriate  -Hit Skip, then Name your Scene and set a picture and Save

Additional Notes

-Currently, Circadian Up starts from darkness and proceed through a wide-range of hues finally ending up with 6500K (non-day sun). Circadian Down currently starts from any Circadian Level being displayed and fades to darkness. As a workaround to make sure Circadian Down works as intended, you may want to create a macro that runs through the following commands:

-Set Level to Sun, 240

-Run Circadian Down with the appropriate timing set within RacePoint BluePrint such that it completes its full range of output within 15 to 30 minutes after sunset.

-Contact Converging Systems for more information here.