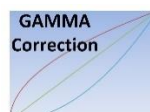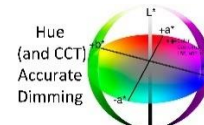# Converging Systems – ILC-640d DALI II DT-8 Encoder

Data Sheet / Installation Manual

Calibrated CCT

GAMMA Correction

Hue (and CCT) Accurate Dimming

16-BIT CONTROL
.001% low-end dimming support

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ILC-640d^{TM}

Data Sheet and Installation Instructions

1   DESCRIPTION

Description

The Converging Systems ILC-640d^{TM} ("**Controller**") is a member of the Converging Systems ILC-xxx^{TM} lighting controller product line which provides support for targeted DALI-2^{TM} Tunable White (TW) fixtures and enables compatibility with virtually any lighting and automation panels in the marketplace. The ILC-640d supports 1 to 64 TW (& mono) fixtures +compatible with the DALI-2 specification (color type Tc of Part 209 of the IEC 62386 standard). It is planned that up to four **Controllers** in the future will be able to be interconnected to a single Ethernet-based Converging Systems' e-Node 4x00 gateway ("**Gateway**") allowing for up to 256 DALI-2 fixtures to be supported from a single networked Gateway. Alternative dealer-configured e-Node 2000/4000 gateways can also be set up to support up to 254 ILC-100/200/300/400/450^{TM} controllers using CAT5 or better cabling to support non-DALI-2 fixtures including linear tape, and third-party full color/full color temperature fixtures using Converging Systems **Pure Mode** lighting standard. In addition, an alternative e-Node 2100/4100 dmx gateway is available which is designed to support up to 32 connected DMX fixtures (per each Gateway) which expands the range of compatible lighting and fan devices
*Note: Depending upon the supported luminaire, between 1-10 downstream fixtures can be supported with a single ILC-460 controller being driven from a single 24v or 48v power supply.

Key Features

• Custom profiling available for partner DALI fixtures enabling fine-tuning & accuracy of control • 8 bit and 16-bit precision (selectable with RDM) • On-board discovery and addressing with all popular lighting and automation platforms • Support of a DALI fixtures full range of CCT support (from warmest to coolest) • Dimming to .001% with specific DMX Personalities	• Ability to drive supported fixtures up to 230 feet away (with a single power supply and a single ILC-400 • Selectable gamma correction (with applicable personalities) • Easy DIN-RAIL mounting

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2   ELECTRICAL AND CONTROL SPECIFICATIONS

2.1 Electrical Specifications

Functionality/Class	DALI II Encoder
Power Supply Voltage/Current Requirement	Requires external 15v dc 300ma or greater Class 2 (low-voltage) constant voltage power supply. Typically input voltage for these PSU range from 120vac~240vac **Note: This is an absolute requirement. Connection of PSU that provide more power will damage the ILC-640d and will void the warranty.**
Nominal Current (no load)	--30ma
Flammability rating according to UL94	V0

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2.2   Functional Specifications

Control Option	DALI II DT-8 Support of Tunable White and Monochrome Fixtures		
Color Space Control	XY	CCT + INT ✔	RGB/RGBW
Adjustment Precision	HSB/HSV -- 8/16 bit	CCT – 8/16 bit	RGBW – 8/16 bit
Dimming Ranges*	8bit .5% to 100%		@16bit - .001% to 100%
DIN Mounting	Yes	Yes	Yes
Overcurrent protection			
Dangerous CLASS 1 protection	Yes	Yes	Yes
Availability	WIP	Shipping	WIP
UL Certification	UL certification		
Photometric Information (for detail see partner documentation for output data)			
CRI	*		
Lumen Output	*		
Certifications/Compliances			
UL certification	UL certification		
Standards compliance	See Section 5		

*   Dependent upon the functionality of the DALI Fixture

2.3   Recommended Power Supplies (PSU) --constant voltage only per each ILC-640d

Manufacturer	Model	Input Voltage/Current	CSI PN	Qty of Fixtures per ILC-640d (single PSU req'd for each ILC-640d + up 64 fixture)			
				1-64	65-128	129-191	292-156
Meanwell	MDR-10-15	120-240vac/10w.0.6a	21-1052-001	✔One	✔Two	✔Three	✔Four
Meanwell	HDR-15-15	120-240vac/1.0a	21-1053-001	✔One	✔Two	✔Three	✔Four

Notes:

➢   DO NOT hot swap the connected luminaries

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- Only use constant voltage power supplies. **If alternative power supplies are desired to be used, please contact Converging Systems in advance.** Failure to utilize non-approved power supplies may VOID your warranty
- Observe proper color coding of the output wires. Failure to observe proper wiring will VOID the warranty
- Connect only to DALI fixtures/decoders that comply with DT8 specification as outlined in Section 5.
- Only connect to approved downstream fixtures supported by Converging Systems. Converging Systems shall not be responsible for damage sustained to any connected luminaire (fixture) if these instructions are not followed.

3 MECHANICAL SPECIFICATIONS

Dimension	Width 3.52" (89.7mm)	Length 2.12" (53.6mm)	Depth 2.4" (60.96mm)*
Weight	3.3 ounces (126.56 grams)		
Compatible DIN RAIL mounting systems	Compliance with DIN 43880 (compatible with standard 15mm x 6.2 mm hole pattern) (Verify if your DIN Rail is compatible)		
DIN Latching	Positive dual base latching system		
Color	Base-Black (similar to RAL 9005) Top-Light Gray (similar to RAL 7035)		
Mounting Information			
ILC-640d mounting	Mounting orientation – horizontal or vertical Note: No air gap space is required for ILC-640d		
Associated DIN Rail Power Supply Units	Vertical mounting recommended (for heat dissipation). Please allow -5mm air space for device mounted to the left and right of PSU, -40 mm air space above and 20mm air space below required.		

- Depth without DIN Rail-with low-profile DIN Rail 2.47" (62.74mm)

4 WARNINGS AND NOTICES

IMPORTANT! Typically, DALI Fixtures are Class 1 luminaires (line voltage) and should not be installed by those who are not licensed or qualified.

IMPORTANT! Read all instructions before beginning. If not qualified, do not attempt installation. Contact a qualified electrician.

IMPORTANT! Even though the ILC-640d and e-Node 4x00 are Class 2 devices, DALI fixtures are typically line voltage (Class 1) luminaires according to the National Electric Code and should not be installed by those who are not licensed or qualified.

WARNING! These products may represent a possible shock or fire hazard if improperly installed or attached in any way. Products should be installed in accordance with these instructions, current electrical codes, and/or the current National Electric Code.

WARNING! Turning off connected lights via DALI does not disconnect power to the fixtures (which is typically Class 1/line voltage).

WARNING! The Class 1 power supply providing power to the ILC-640d must be protected by a circuit breaker (20a max).

IMPORTANT! Converging Systems does not guarantee the performance of any connected device in your environment. Customer assumes all risks, including any damage to Converging Systems' products, associated with (a) the type, load rating and quality of the device or (b) any use or installation not in accordance with the documentation available from Converging Systems, either with the product or at www.convergingsystems.com

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5   STANDARDS AND COMPATIBILITY

The ILC-640d provides full support for the DALI Type 6 (DT6), partial support for DALI Type 7 (DT7) and DALI Type 8 (DT8) devices. Type 6 (DT6) is defined by the IEC 62386 standard part 207 (LED Modules). Type 7 (DT7) is defined by the IEC 62386 standard part 208 (Switching Modules) and Type 8 (DT8) is defined the IEC 62386 standard part 209 (Color Control). Not all DALI devices are compatible with these standards. Consult https://www. dali-alliance.org/products for a current list of DALI certified fixtures and their level of compatibility. For more information on the level of DALI support, see the table below

DALI Type 6	Part 207 is fully supported by the ILC-640d

DALI Type 7	Part 208 is partially supported by the ILC-640 including
	  ➢ Switching On/Off
	  ➢ Setting of properties specified by DALI Part 7 for DT6 devices

DALI Type 8	Part 209 is partially supported by the ILC-640 limited to
	  ➢ Control features granted by DALI Part 7 for DT6 devices
	  ➢ Setting of properties granted by the DALI Part 7 for DT6 devices
	  ➢ CCT Color Control
	  ➢ Setting of CCT related properties (coolest/warmest color temperatures)
	Note: Support XY Color Control and RGB Color control are not currently available and are awaiting the availability of products in the marketplace supporting these standards.

6   AC POWER / LOW VOLTAGE / DALI BUS WIRING

6.1   AC WIRING (to 15vdc PSU and continuing to DALI fixture wiring connector—AC side)
Note: Since is a Class 1 wiring instruction, all wiring should be performed by a qualified or licensed electrician.
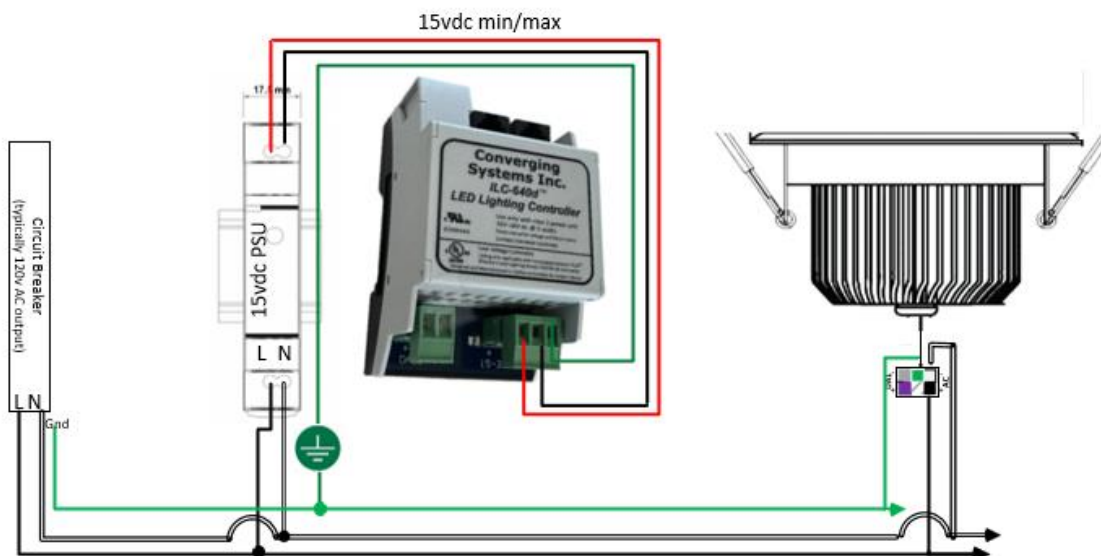

Figure 1

Typically, DALI fixture are Class 1 rated devices (i.e., they require a direct AC connection to the DALI multi-conductor harness which carries both (i) line voltage driver power as well as (ii) low-voltage signaling lines). Suitable wiring should be installed to support both

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the required 15vdc output Power Supply Unit/PSU (typically only 200ma) as well as the load requirements). Verify the wattage requirements of the DALI fixtures to calculate the suitability of a typical 20a circuit and the wiring utilized.

- Connect AC to the input side of a 15vdc Power Supply Unit (PSU).
- Connect the Output Side of the PSU to the ILC-640d using applicable CL-2 or CL-3 rated wire.
- Splice in another AC connection from the input side of the 15vdc PSU to the first DALI fixture AC line connector block.
- Continue running the Class 1 (120v) circuit wiring from first DALI fixture to next downstream DALI fixture until all fixtures have been wired for AC power. Splices including T's are acceptable—there is no requirement for daisy-chaining of wiring to DALI fixtures.

Note: Color Coding for DMF DALI fixture: the Black and White leads are for Class 1 (120vAC) input only. Do not under any circumstance connect the Class 1 wiring to the Gray (or Pink) and Purple Lines which are reserved for the low-voltage DALI bus.

Make sure grounds are connected to (i) all of the DALI fixtures as well as to (ii) the Ground Pin on each and every ILC-640d device. This is important for not only safety but also reliability of DALI data communication.

6.2   LOW VOLTAGE (DC power) WIRING for the ILC-640d

Note: This section details Class 2 wiring that is permitted to be performed by those experienced with low-voltage Class 2 wiring.

The ILC-640d requires a 15v DC (>350ma) constant voltage source. There is no limitation as to the distance the ILC-640d is installed from the required power supply. Simply use appropriate gauge of wire depending upon the distance. Applicable low-voltage wiring should be connected from the output side of the 15vDC PSU top the ILC-640. See Figure 1 above for more detail. Typically for short runs, 18/3 is sufficient (remember to run the grounds).

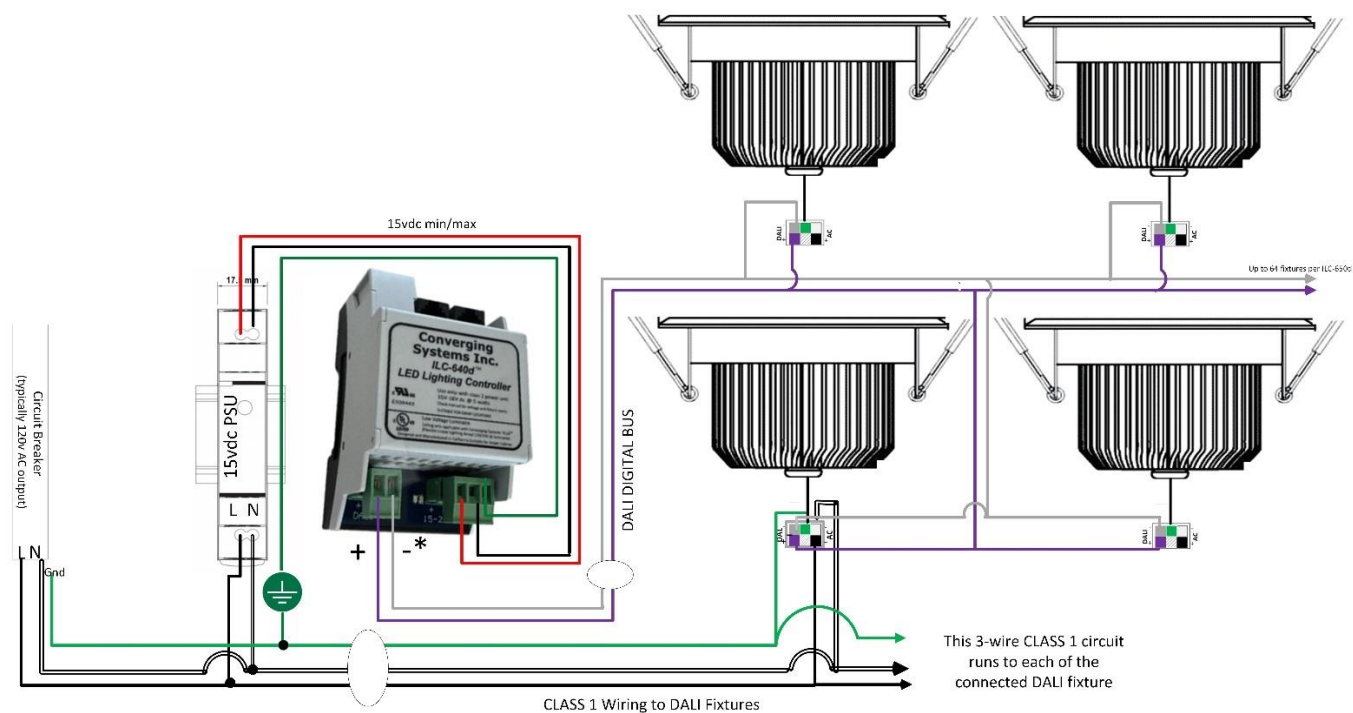| Cable Type	From Compatible Power Supply Unit (PSU) to ILC-460
CL2-CL-3 18 awg. typical for standard runs*	-Connect + and – leads from the PSU to the + and – terminals above. -Run a separate ground wire to an electrical/earth ground

Note: See voltage drop table for longer and shorter runs

6.3   DALI WIRING (digital bus)

Applicable low-voltage wiring should be connected from the 2-pin green connector on the ILC-640d to the first DALI fixture and then to each downstream fixture. Splices including T's are acceptable—there is no requirement for daisy-chaining of wiring to DALI fixtures.

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See section 4.3.1 below for wire type.

Note: Power for the DALI bus is generated and regulated by the ILC-640v provided it is properly connected to a 15vDC incoming power supply with at 250ma of available current.

6.3.a Power Cable Type (from 15v power supply to ILC-640d)

Cable Type	From Compatible Power Supply Unit (PSU) to ILC-460
CL2-CL-3 18 awg. typical for standard runs*	-Connect + and – leads from the PSU to the + and – terminals above. -Run a separate ground wire to an electrical/earth ground

Note: See voltage drop table for longer and shorter runs

6.3.b Load Cable Type (from ILC-460 to Supported fixture)

Cable Type	Type	Gauge	Max Run from ILC-460 to last fixture
Thermostat cable	Solid	20 awg.	230 feet
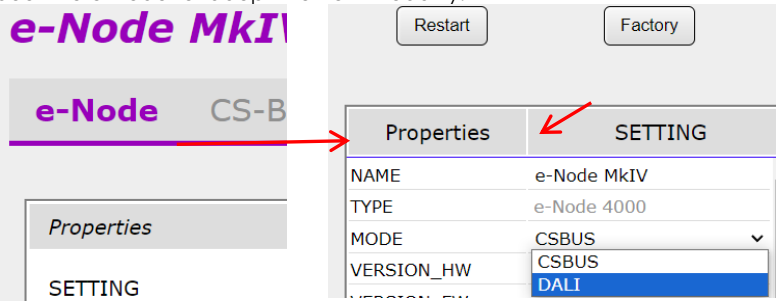
6.4   e-Node 4x00 WIRING (from IP Gateway to ILC-640d)
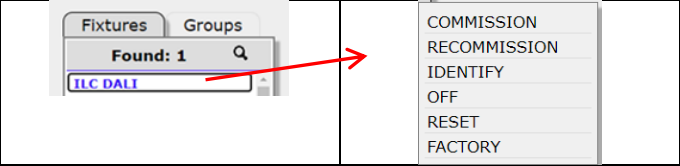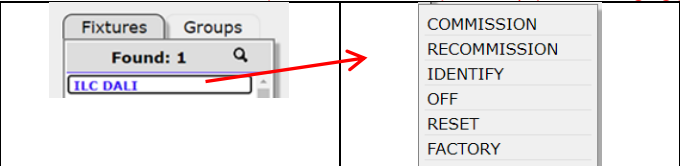
For commissioning/addressing and operation, one e-Node 4000 or e-Node 4100 must be provided for within the system. The e-Node 4x00 IP Gateway provides a built-in web-page for DALI fixture discovery, for the assignment of fixtures into Groups and finally for the tools to interface with all popular automation and lighting systems available in the marketplace!.

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In order to connect to the e-Node 4x00, it is necessary to connect a CS-Bus cable between Port 0 on the e-Node and either CS-Bus (black RJ-25) port on the first ILC-640. Currently, only one ILC-640d can operate with an e-Node. In subsequent releases of e-Node firmware (cloud-based update), up to four (4) ILC-640d controllers will be able to be daisy-chained to a single e-Node 4x00.

To provide power to the e-Node (black and red lines below):

- Connect e-Node to either a POE switch with the Ethernet cable , or
- Connect e-Node to alternative DC power (12v~24vDC). One option would be to simply utilize any one of the 15vDC power supplies within your DALI installation, or secure an optional external 12vDC power supply and connect it separate from the power supply being used for to power the ILC-640d..

To provide data connectivity to the ILC-640d from the e-Node (golden lines below).

- Connect a CS-BUS cable from Port 0 on the e-Node to the either black RJ-25 port on the ILC-640d.

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5 Commissioning

Type	Step	Detail
E-1	Set-up e-Node (4x00)	See Quick Start Guide for e-Node
E-2	Set DALI Mode within e-Node	By default, the e-Node's mode of operation is set to **CSBUS** mode (for Pure Mode operation). For **DALI** use, you must change this default mode to **DALI** in order to discover and use connected ILC-640d devices (connected to Port 0 on the e-Node). Select the **e-Node/SETTINGS** tab to reveal the Properties window. Here, select the **MODE** field and select **DALI** from the pull-down and hit **Restart** to reboot the e-Node to adopt the new modality.
ILC-1	Discover ILC-640d devices	Select the **Dali** tab and within the **Fixtures** window, select 🔍 which will auto-discover (i) all (up to 4) connected ILC-640d controllers (and auto-assign **U**nique **ID**s to each), as well as (ii) any previously Commissioned DALI-2 devices/fixtures (see Step 7 for more information). ***UIDs are required only for the e-Node to properly communicate with ILC-640d controllers-duplicate UIDs will cause problems for this process***. Note: *Make sure all control systems (i.e., C4/NICE/Crestron, etc.) are powered off during this process for they may be issuing similar inquires on the bus which will interfere with this discovery.*

ILC-2	Commission DALI Fixtures	Within the **Dali** tab/**Fixtures** window, select the first ILC-640d discovered and right click to expose a pop up and select **COMMISSION** which will (i) automatically delete any previous commissioning information within each connected DALI-2 fixture, and (ii) auto-generate/write new parameters to those same fixtures including an auto-assigned/ unique DALI address (from 1 to 64) for each as well. Continue for each ILC-640d controller devices available until all DALI-2 fixtures are commissioned. **This will override any previous DALI address assigned to each DALI-2 fixture.** **Note:** If later you want to add additional DALI fixtures (up to maximum of 64 permitted), select **RECOMMISSION** instead of **COMMISSION** to expedite the add-on process (by not changing previously assigned values).

ILC-3	Other Actions Possible	Within the **Dali** tab/**Fixtures** window, select the first ILC-640d discovered and right click to expose a pop up and select **COMMISSION** which will (i) automatically delete any previous commissioning information within each connected DALI-2 fixture, and (ii) auto-generate/write new parameters to those same fixtures including an auto-assigned/ unique DALI address (from 1 to 64) for each as well. Continue for each ILC-640d controller devices available until all DALI-2 fixtures are commissioned. **This will override any previous DALI address assigned to each DALI-2 fixture.** **Note:** If later you want to add additional DALI fixtures (up to maximum of 64 permitted), select **RECOMMISSION** instead of **COMMISSION** to expedite the add-on process (by not changing previously assigned values).

ILC-4	Understanding DALI Groups	Background. DALI fixtures need to be assigned into logical **DALI**. **Groups** (up to 16 per Controller) by the installer to initiate the addressing process. Those **DALI Groups** can **then, *and only then*, be controlled by third-party automation/lighting systems with a public addressing scheme referred to as ZGN addressing** (described in Step 9) **but not with** proprietary DALI Group Addresses! **THIS IS IMPORTANT**
ILC-5	Assign Group Names	Select the **Dali** tab/**Settings** window, and select the ILC-640d Controller to which your first set of DALI fixture(s) is/are connected. Next, select the **Groups** window, where you will see factory default group names for 16 available groups (for that Controller). It is recommended that you change each GROUP name for ease of identification that matches your setup. Simply mouse/highlight on any GROUP name, then edit its name and hit **Enter.**
ILC-6	Complete Tasks for all other Controllers	Repeat the directions here for each additional Controller (if present) connected to the common e-Node, until all DALI fixtures connected to all Controllers have been programmed.
ILC-7	Understanding how third-party automation and lighting systems will control those Groups	Background. On ZGN

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ZGN has three octets-Z.G.N separated by periods

Example: ZGN of 2.3.1 refers to
Zone=2
Group=3
Node=1

Zone (highest/largest level- Similar to a floor)

Group (middle level—similar to a room)

Node (lowest level-similar to particular device in location)

The **ZGN** addressing scheme is a hierarchical schema that permits automation systems
-to address individual DALI Groups for the smallest granularity of control (traditional approach), **OR**
-to address multiple DALI Groups as a virtual unit (often through "phantom devices" with phantom addresses) in order to streamline the programming requirements for the installer (it is easier to send one command to turn off all lights in a building than 100 separate commands to achieve the same goal).

Relationship between ZGN address and Groups.
The table below can be used to understand the default **ZGN** addresses for DALI Groups supported by each Controller. These **ZGN** addresses (and not DALI addresses) are the only addresses that can be used by automation systems for control. **Note**: Many systems will auto-imported these **ZGN** addresses as part of their commissioning process.

	Contrl 1	Contrl 2	Contrl 3	Contrl 4
Group 1	1.1.0	2.1.0	3.1.0	4.1.0
Group 2	1.2.0	2.2.0	3.2.0	4.2.0
Group 3	1.3.0	2.3.0	3.3.0	4.3.0
Group 4	1.4.0	2.4.0	3.4.0	4.4.0
~	~	~	~	~
Group 16	1.16.0	2.16.0	3.16.0	4.16.0

ILC-8	Understanding Phantoms	Within any HA or Lighting System (i.e., Lutron et al.), you could create a phantom or wildcard address of **1.0.0** to control all DALI Groups 1-16 within Controller 1 (with the second "0" being the wildcard for Groups 1~16). Similarly, a **0.0.0** would control all DALI Groups connected to a single e-Node (the first "0" covering all **Z**ones, the second "0" covering all **G**roups, and the final "0 covering all **N**odes already set to "0" here). For more information on addressing, review the *Instruction Manual* or applicable *Integration Note*.

ILC-9	Reference to Other Features	*Appendix 1*
		
		Other Features
		
		Fixture Identification (individual or group)
		
		-Within the **Dali/Fixtures** tab, select the target ILC-640d controller.
		-For Individual Identification.
		    Within the **DALI/Groups** (for that pre-selected ILC-640d), select the **Fixture #** (1~64) until it shows ON/gold (see left figure above). Note: the specific light will flash until you deselect the Fixture (hit "**Gold**" highlight)
		-For Group Identification.
		    Within the **DALI/Groups** (for that pre-selected ILC-640d), select the **Group #** (1~16) until it shows ON/gold (see above). Note: the selected Group lights will flash until you deselect the Group (hit "**Gold**" highlight again)
		
		Fixture Fade Rate Settings (individual or group)
		Individual / Group

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-Within the **Dali/Fixtures** tab, select the target ILC-640d
-<u>For Individual Fixture Setting (see left figure above)</u>
   Within the same Fixture tab, right click on a **Fixture #** "(1~64) to expose a popup. Select a provided Fade Rate (only those on list are supported).
-<u>For Group Fixture Setting (see right figure above)</u>
   Within the **DALI/Groups** (for that pre-selected ILC-640d),right click on a **Group Name** to expose a popup. Select a provided Fade Rate (only those on list are supported).

Other Actions Available
-OFF. Turns off a Group or Fixture as available
-**Clear**. Resets Fade Rate
-**Erase**. De-commissions the DALI fixture (TBD)

Type	Step	Detail
INT-1		

5 Integration with 3rd party Platforms

Type	Step	Detail
INT-LUT	Interfacing with Lutron	(see the Lutron Quick Start Guide --under Gateways) The Lutron Tab allows supported Lutron platforms to control supported DALI fixture. **Overview of Settings and Operations** -**SYSTEM**. Enter **HOMEWORKS LEAP platform-QSX (or other platform)**. -**ADAPTOR_IP**. Enter the IP address for your Lutron processor. Find IP address within Lutron's Designer/**Activate-Processors.** -**LOGIN/PASSWORD**. Enter a Username and Passphrase (password) that were previously created within Designer within **Tools/Configure Integration.** (If not available, please create within Designer.) -**CONNECTION**. Select **ENABLED** to start the IP connection. Once the status indicator turns to **CONNECTED,** you can proceed. *You must see "Connected" before proceeding.* -**Lutron Device.** Within this tab, you will see all discovered real and phantom keypads and loads. ***Phantoms are imported see Quick Start Guide for more information.*** -**Lutron Table**. Within this tab you will (i) assign any real (or phantom) Lutron button press/operation to trigger a targeted response with a supported DALI device or (ii) enable an existing Lutron load (real or phantom) to drive a matching output state from a supported DALI device.
INT-GEN	Interfacing with Other Automation Systems	For other third-party automation systems, existing certified drivers available for the e-Node will automatically support our supported DALI-2 fixtures. These systems may in some cases automatically import all DALI (customized) **Group Names** as well as their **device type** (monochrome or bi-white or other) as well as their **ZGN** addressing assignments as well as their DALI assigned Name. See our Integration Partner Guides for more information. Here is an example of an automatic import using NICE (ELAN) automaton platform. **ZGN:** 1.1.0 · **ZGN:** 3.2.0 **Type**: Monochrome Dimming · **Type**: Tunable White **ILC-640d controller:** 1 of 4 · **ILC-640d controller:** 3 of 4

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		DALI Group #: 1 Description: Monochrome dimming	DALI Group #: 3 Description: TW dimming	
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DALI Group #: 1
Description: Monochrome dimming

Name	Dimmer(Kelvin Multi-Ch.) Device
Display Name	Dimmer(Kelvin Multi-Ch.) Device
System ID	35971
Device Type	Dimmer(Kelvin Multi-Ch.) Device
Device Class	Controller Setting ▼
Include in UI	✓
Location	None ▼
Address (Z.G.N)	1.1.0

DALI Group #: 3
Description: TW dimming

Name	Dimmer Device
Display Name	Dimmer Device
System ID	35985
Device Type	Dimmer Device
Device Class	Controller Setting ▼
Include in UI	✓
Location	None ▼
Address (Z.G.N)	3.2.0

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Appendix 1

Backgrounder on DALI Groups-Optimizing Speed of Operation

Overview:.

The ILC-640d™ DALI II *Encoder* is use to support up to 64 qualified DALI II DT-8 Tunable White (TW) Fixtures. Connected fixtures should be assigned to one of 16 DALI groups and those groups can be controlled individually from third-party automation systems including Lutron, Crestron, Elan/NICE, Control4, RTI, URC, Savant, etc. platforms using existing certified software drivers (available either natively within those platforms or from downloads from the Converging Systems' website—all free of charge) utilizing the Converging Systems e-Node 4x000 gateway as the communication gateway for the ILC-640d device(s).

Efficiency of Transmitting/Processing DALI command strings

It is well known that inherent to the DALI II protocol is the DALI II bus communication standard which is quite slow as compared with other communications standards. This restriction creates engineering challenges for DALI II developers to develop products that appear to operate as seamlessly and instantaneously as other protocols. The baud rate (speed of the data communication transmission line) of the DALI II protocol limits how quickly data can be transmitted from the DALI II *Encoder* (front end) and subsequently transmitted and then processed by the each and every DALI II *Decoder* (back end or DALI II fixtures) on the DALI bus. Converging Systems is well experienced in building *Encoder* and **Decoder** technology for other (faster protocols) including (i) our own CS-BUS/Pure Mode Protocol product line, as well as (ii) our DMX product line conforming to the DMX-512A Protocol standard. These faster baud rate systems can i**nstantaneously** encode (for DMX) as well as decode (for CS-BUS/Pure Mode devices including the Converging Systems ILC-100™/200™/300™/4xx™ line of decoders) digital data such that the responsive of both system is immediate! The Converging Systems Pure Mode standard as well as the DMX-512A standard presents no hint or manifestation of less than immediate response of linear strips, and fixtures when triggered to change color temperature/brightness (or even HSV values with full color devices). Alternatively, the operation of DALI II fixtures traditionally appears less than immediate. The industry has coined the term "popcorning" for this idiosyncrasy which characteristically manifests itself with supported fixtures by lights sporadically turning on in sequence rather than all on at the same time (hence "popcorning").

Converging System solution. Converging Systems has worked with its partners primarily DMF Lighting to optimize the DALI II system on both the Encoder side (Converging Systems' manufactured products) as well as on the Decoder side (the DALI II fixture) with value-added engineering designed to minimize if not eliminate the "popcorning" manifestations typically seen with other third-party products. To that end, by following a recommended a simple Standard Operating Procedure Programming procedure, optimal results can be achieved. See the next section for this information.
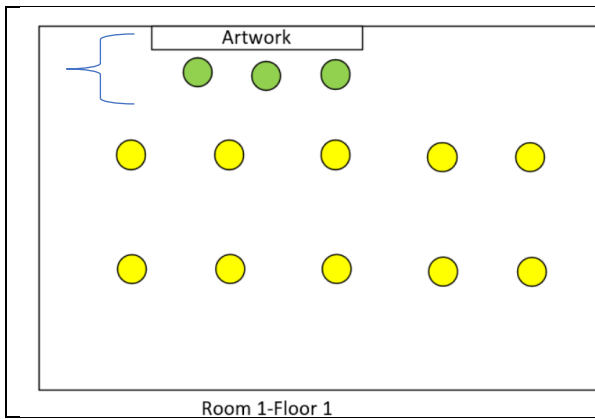
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Standard Operating Procedure for Controlling DALI II fixtures.

Background. The Converging Systems' support of DALI II fixtures allows any or all of 64 those fixtures to be organized quickly into one or more DALI Groups (up to 16). All fixtures that a member of a specific Group can be controlled seamlessly without delay (i.e., fast and without "popcorning") with any supported command sent to that DALI Group. Specifically, all DALI fixtures that are a member of a single DALI group will respond in unison (and without "popcorning"). Additional DALI fixtures that are assigned to other DALI Groups will again all respond in unison without each DALI Group, although the time for the command to reach the 2nd and subsequent DALI Groups is dependent upon the time that the 3rd party automation system takes to send the second (and subsequent) command(s) to the other DALI Groups as well as other factors. This eventuality is beyond the scope of the DALI II encoder (in this case the e-Node and the ILC-640d) and the Converging Systems' partnered DALI II (decoder) fixture. **Note**: Other non-Converging Systems partnered DALI II fixtures may or may not perform as a system as fast as Converging Systems partnered DALI II fixtures primarily because of hardware and/or firmware weaknesses within those fixtures.

Group Assignments. Up to 64 DALI II fixtures that can be supported with a single ILC-640d Decoder. Those fixtures must be assigned to at least one DALI Group (or up to 16 Groups if desired) in order to be controlled from a third-party control platform. using the ILC-640d DALI encoder and the e-Node 4x00 gateway. With proper planning, all DALI fixtures that need to be controlled instantaneously (without popcorning) which may be able to seen within the field of view of the user, should be assigned to a single DALI Group. If secondary DALI groups are desired, those typically should be arranged that any delay in turning on the 2nd and subsequent DALI Groups would be in different areas where any delayed turn on would not be even noticed.

Examples. Typical assignment of DALI II fixtures might include the following:

➢ **Case 1**: Assignment of targeted fixtures into a single bank of artwork lights (i.e., 3 spot lights for the artwork shown with green dots on the below figure).
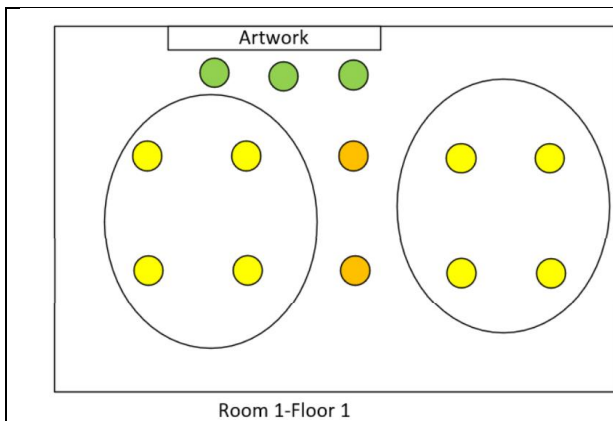
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Room 1-Floor 1

Group 1

F 11	F 12	F 13

ILC-DALI (1)	1 2 3 4 5 6 7 8 9 10 11 12 13
1 GROUP 1	☐☐☐☐☐☐☐☐☐☐ ☑ ☑ ☑

- ➢ **Case 2**:Assignment of targeted fixtures within a larger section with a single room--for illuminating two sections of the room (yellow dot references) without impacting the middle two lights (orange dot reference) or the above spots (green dot references)

Room 1-Floor 1

Group 2

Fix 1	Fix 2	Fix 3	Fix 4	Fix 7	Fix 8	Fix 9	Fix 10

ILC-DALI (1)	1 2 3 4 5 6 7 8 9 10
D 2 GROUP 2	☑ ☑ ☑ ☑ ☐ ☐ ☑ ☑ ☑ ☑

- ➢ **Case 3:** Assignment of targeted fixtures within even a larger section within a single room (for illuminating all overhead lights-see red dots, without impacting the artwork light/green

Room 1-Floor 1

Group 3

Fix 1	Fix 2	Fix 3	Fix 4	Fix 7	Fix 8	Fix 9	Fix 10

ILC-DALI (1)	1 2 3 4 5 6 7 8 9 10 11 12 13
3 GROUP 3	☑ ☑ ☑ ☑ ☑ ☑ ☑ ☑ ☑ ☑ ☐ ☐ ☐

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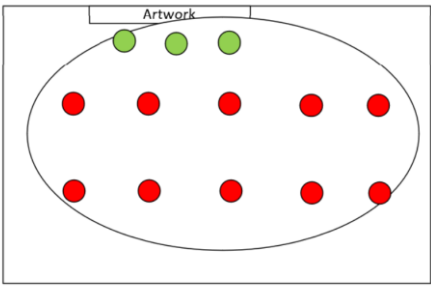> **Case 4**: Assignment of all fixtures within a single room.
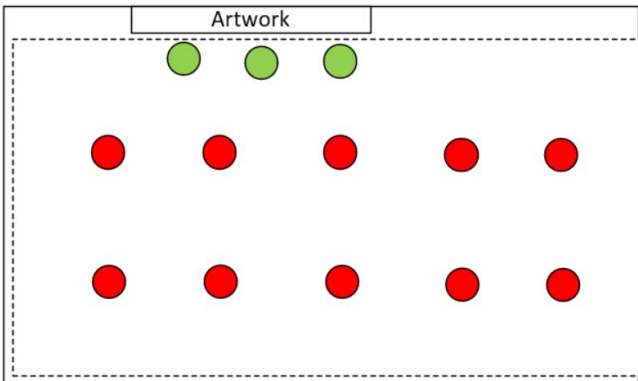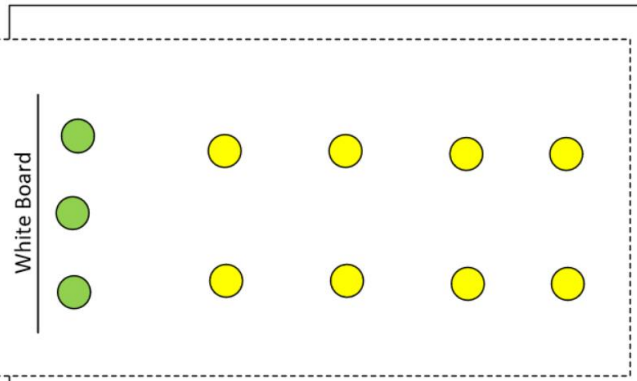
	Group **4**												
	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13

ILC-DALI (1)	1 2 3 4 5 6 7 8 9 10 11 12 13
4 GROUP 4	☑☑☑☑☑☑☑☑☑☑☑☑☑

Room 1-Floor 1

> **Case 5**: an entire floor (with up to 64 fixtures being triggered as a result)

Artwork

White Board

Room 1-Floor 1   Room 2-Floor 1

Group 5

ILC-DALI (1)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	19 20 21 22 23 24
5 GROUP 5	☑☑☑☑☑☑☑☑☑☑☑☑☑☑☑☑☑☑	☑☑☑☑☑☑

> **Case 6:** an entire building (that has 64 fixtures)

Group **6**

ILC-DALI (1)	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18	..	62 63 64
6 GROUP 6	☑☑☑☑☑☑☑☑☑☑☑☑☑☑☑☑☑☑	..	☑☑☑

Standard Operating Procedure for Supporting Macros /Scenes from 3rd Party Automation Systems

V1.2

It is common within automation and lighting platforms that scenes can be programmed to reduce the user interaction to control banks of lights. With just a simple button press, one or more lights can be adjusted to a pre-determined level as well as other more sophisticated actions just as music levels, thermostat levels, etc. can all be controlled in the same fashion.

Background on how these systems send such information to 3rd party devices. There is no standard among the top automation and lighting platforms for the speed at which commands that are part of a scene are sent out to supported devices. Depending upon the transmission speed of the respective communication bus (i.e., serial transmission over RS-232c, IP communication over 10/100/1000 Ethernet, DMX signals over standard DMX-512A buses, or DALI II signals over the DALI II bus), the receiving device (typically called the Decoder must be able to both receive and process those incoming commands reliably(. To that end, the ILC-640d currently has a buffer size sufficient to receive a total of 20 incoming instructions at a time. For many automation platforms, that would be quite sufficient to control 20 DALI groups as a part of a single Macro. Since those DALI Groups can handle up to 64 fixtures each, in most cases only one or two DALI Group commands would need to be transmitted for the execution of a scene ***provided that the advance planning of what fixtures should be adopted into logical DALI Groups to minimize the sending of multiple DALI Group commands***. *See the example [below](). Although both Cases (1 and 2) below will work with no problems, there will be no delay (or popcorning) with [Case 2]() as there may be some popcorning seen in [Case 1]() after the initial triggering of Group 1 when Group 2 is subsequently invoked and then finally when Group 3 is finally invoked serially. Another way of looking at this situation is that parallel processing (Case 2) is faster than serial processing (Case 1).*

Case 1 Inefficient Way to Turn On -lights 1 through 10 in Room 1 (red dots), and -lights 11-13 (green dots), and -all the lights in Room 2 (green dots and yellow dots in Room 2)	Case 2 Efficient Way to Turn On -lights 1 through 10 in Room 1 (red dots), and -lights 11-13 (green dots), and -all the lights in Room 2 (green dots and yellow dots in Room 2)
Send over **three** strings/Group Commands to -**Group 1**: members—red dots in Room 1, then to -**Group 2**: members – green dots in Room 1, then to -**Group 3**: members—green dots in Room 2	Send over just **one** string/Group Commands to a new group called Group 4 with the following members: ❯ all members of Group 1 in Rm 1, **+** ❯ all members of Group 2 in Rm 1, **+** ❯ all members of Group 3 in Rm 2

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Appendix 2

DALI Fixture Documentation Template

(Recommended to fill out this form to facilitate assigning fixtures most efficiently into DALI Groups)

V1.2

Device #	ILC-640d (1st unit)	ILC-640d (2nd unit)	ILC-640d (3rd unit)	ILC-640d (4th unit)
sample	**Bedroom 1 rt1**	**Living Room NE 1**	**Basement NW1**	**Theater**
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