Digital Control Adapter (DCA)
Data Sheet
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1 DESCRIPTION AND KEY FEATURES

Description
The Digital Control Adapter (DCA) enables fixtures powered by Lumenetix-araya LED modules to be controlled by standard lighting protocols. The adapter converts standards-based lighting protocols to a digital link that connects to the Lumenetix-araya modules.

The standards supported are:
• EcoSystem by Lutron®

Key Features
• 12V or 24V.
• Compatible with Lumenetix-araya CTM1 color tuning modules, and DDM1 warm/dynamic dimming modules.
• Enables Lutron EcoSystem compatible product offerings.
• Each adapter is addressable.
• Controls continuous dimming from 100% - 1% in increments of 1%.
• Controls continuous color tuning from:
  – 1650-4000K — CTM1B, Bluetooth-integrated
  – 1650-8000K — CTM1C, Bluetooth-integrated
• Controls dimming from 3050K at full intensity to 1800K at 1% intensity:
  – DDM1B, Bluetooth-integrated
  – DDM1C, Bluetooth-integrated
# General Specifications and Ordering Codes

## Power

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector Type</td>
<td>2 position Molex Pico-SPOX</td>
</tr>
<tr>
<td>Wire Size</td>
<td>24 AWG</td>
</tr>
<tr>
<td>Operating Voltage</td>
<td>12V DC to 24V DC</td>
</tr>
<tr>
<td>Absolute Maximum Voltage</td>
<td>28V DC</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>0.25 W</td>
</tr>
<tr>
<td>Reverse Voltage Protection</td>
<td>40V DC</td>
</tr>
<tr>
<td>ESD protection</td>
<td>Special handling not required</td>
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## Environment

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating Temperature</td>
<td>0° C to 65° C</td>
</tr>
<tr>
<td>Location Type</td>
<td>Dry</td>
</tr>
</tbody>
</table>

### Lutron® EcoSystem Input (DCA-1A)* (DISCONTINUED - NO LONGER AVAILABLE)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector Type</td>
<td>Refer to “Wiring Specifications” Section</td>
</tr>
<tr>
<td>Wire Size</td>
<td>16 AWG solid wire (EcoSystem input); 24 AWG stranded wire (Lux output)</td>
</tr>
<tr>
<td>Wiring Class</td>
<td>EcoSystem Input: Class 1 or Class 2; LX Output: Class 2</td>
</tr>
<tr>
<td>Line Voltage Miswire Protection</td>
<td>277V AC (EcoSystem Input)</td>
</tr>
<tr>
<td>Ordering Codes</td>
<td>DDM0 / DDM1 (1800 - 3050K): 45.020.008.04 (EAECOS1; one channel)</td>
</tr>
<tr>
<td></td>
<td>CTM0 / CTM1: 45.020.008.05 (EAECOS2; two channel)</td>
</tr>
</tbody>
</table>

### DMX Input (DCA-1B)* (DISCONTINUED - NO LONGER AVAILABLE)

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector Type</td>
<td>Refer to “Wiring Specifications” Section</td>
</tr>
<tr>
<td>Wire Size</td>
<td>24 AWG stranded wire (DMX input and Lux output)</td>
</tr>
<tr>
<td>Wiring Class</td>
<td>DMX Input: Class 1 or Class 2; LX Output: Class 2</td>
</tr>
<tr>
<td>Ordering Codes</td>
<td>DDM0 / DDM1 (1800 - 3050K); CTM0 / CTM1 (1650 - 4000K): 45.020.008.02 (EADDB-40-R)</td>
</tr>
<tr>
<td></td>
<td>CTM0 (2700 - 6000K): 45.020.008.03 (EADDB-60-R)</td>
</tr>
</tbody>
</table>

### Lutron® EcoSystem Input (DCA-2)**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Connector Type</td>
<td>Refer to “Wiring Specifications” Section</td>
</tr>
<tr>
<td>Wire Size</td>
<td>24 AWG</td>
</tr>
<tr>
<td>Wiring Class</td>
<td>EcoSystem Input: Class 1 or Class 2; DMX Output: Class 2</td>
</tr>
<tr>
<td>Line Voltage Miswire Protection</td>
<td>277V AC (EcoSystem Input)</td>
</tr>
<tr>
<td>Ordering Codes</td>
<td>DDM1B and DDM1C (Bluetooth-integrated): 80.005.001.02 (EAECOS1-G2; one channel)</td>
</tr>
<tr>
<td></td>
<td>CTM1B and CTM1C (Bluetooth-integrated): 80.005.002.02 (EAECOS2-G2; two channel)</td>
</tr>
</tbody>
</table>

*LX Output is used with CTM Zero, CTM One, DDM Zero and DDM One (DISCONTINUED - NO LONGER AVAILABLE).**DMX Output is used with CTM 1B, CTM1C and DDM 1C.
3 MECHANICAL DRAWING & WIRING SPECIFICATIONS

Mechanical Drawing

Wiring Specifications

<table>
<thead>
<tr>
<th>Pin</th>
<th>Wire Color</th>
<th>Pin Function</th>
<th>Wiring Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lutron EcoSystem Interface (Input)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>E1</td>
<td>Violet</td>
<td>Non-polarized Bus Terminal</td>
<td>2 Position Terminal Block 16 AWG solid wire Lutron PN: C-CBL-216-GR-1</td>
</tr>
<tr>
<td>E2</td>
<td>Violet / White</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Power</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Red</td>
<td>Power 12V DC or 24V DC (+)</td>
<td>2 Position Molex Pico-SPOX Lumenetix PN: 28.002.001.01 Length: 610 mm (24 inches)</td>
</tr>
<tr>
<td>P2</td>
<td>Black</td>
<td>Power Common (-)</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Module Interface (LX or DMX Output)*</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>N/A</td>
<td>Reserved for future use</td>
<td></td>
</tr>
<tr>
<td>M2</td>
<td>N/A</td>
<td>Reserved for future use</td>
<td></td>
</tr>
<tr>
<td>M3</td>
<td>Brown</td>
<td>Digital Common</td>
<td></td>
</tr>
<tr>
<td>M4</td>
<td>Orange</td>
<td>Lumenetix-araya Module Bus, Data -</td>
<td>5 Position Molex Pico-SPOX Lumenetix PN: 28.020.002.01 Length: 610 mm (24 inches)</td>
</tr>
<tr>
<td>M5</td>
<td>Option-1: White with Orange Stripe (Option-2: Green)</td>
<td>Lumenetix-araya Module Bus, Data +</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>DMX Interface (Input)</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>D1</td>
<td>Option-1: Brown (Option-2: Black)</td>
<td>Digital Common</td>
<td>3 Position Molex Pico-SPOX 24 AWG stranded wire Lumenetix PN Option-1: 28.020.001.02 (Lumenetix PN Option-2: 28.020.001.01) Length: 610 mm (24 inches)</td>
</tr>
<tr>
<td>D2</td>
<td>Option-1: White with Orange Stripe (Option-2: Violet)</td>
<td>DMX Data +</td>
<td></td>
</tr>
<tr>
<td>D3</td>
<td>Option-1: Orange (Option-2: Gray)</td>
<td>DMX Data -</td>
<td></td>
</tr>
</tbody>
</table>

CAUTION: The power cable should ONLY be plugged into the 2-pin power receptacle provided. Insertion of the cable into any other slot will damage the Digital Control Adapter unit.

*LX Output is used with CTM Zero, CTM One, DDM Zero and DDM One (DISCONTINUED - NO LONGER AVAILABLE).

DMX Output is used with CTM 1B, CTM1C and DDM 1C.
4 LUTRON ECOSYSTEM CONTROL SYSTEM

4.1 Lutron® EcoSystem Protocol

EcoSystem technology is a control method for LEDs that provides addressing of individual fixtures and status feedback. This makes it easy to digitally assign one or many fixtures without complicated wiring. This opens up an entire suite of energy-saving, system-monitoring and system-control schemes where the design, setup and rezoning are all done within software, making the electrical and control design simple.

The araya® modules attached to different interface boards can be controlled independently or assigned to a single group by the EcoSystem controller.

The EcoSystem control is responsible for saving any configuration settings. Once an interface board is assigned a pair of addresses, assigned addresses are saved in NVRAM. During the EcoSystem discovery process, the user pairs the desired dimming control in the controller to the Dim channel address in the interface board. The same applies for the CCT channel.

- 1 pair 16AWG Eco Loop, 900 feet (field wiring).
- Maximum of 64 addresses on each loop.

EcoSystem Control Systems (recommended list)*

Quantum System
HomeWorks QS
Grafik Eye QS Control Unit with EcoSystem
EnergiSavr Node with EcoSystem
Power Module with EcoSystem

*Recommendations are subject to change. Consult your Lumenetix representative for the most updated list.

Lutron EcoSystem Controller Example

*Fixture refers to a luminaire with one Lumenetix module, and with one address (DDM) or two addresses (CTM).
4 LUTRON ECOSYSTEM CONTROL SYSTEM

4.2 Lutron® EcoSystem Field Wiring

- EcoSystem Digital Loop can be wired as Mains voltage or IEC PELV/NECR Class 2 for maximum wiring flexibility.
- The Loop is polarity insensitive and can be wired in any topology.
- Consult all national and local electrical codes for separation requirements.

<table>
<thead>
<tr>
<th>Wire Gauge</th>
<th>Maximum EcoSystem-Compliant Loop Wire Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.0 mm² (12 AWG)</td>
<td>671 m (2200 ft)</td>
</tr>
<tr>
<td>2.5 mm² (14 AWG)</td>
<td>427 m (1400 ft)</td>
</tr>
<tr>
<td>1.5 mm² (16 AWG)</td>
<td>275 m (900 ft)</td>
</tr>
<tr>
<td>1.0 mm² (18 AWG)</td>
<td>175 m (570 ft)</td>
</tr>
</tbody>
</table>

Drain Wire Connections

Drain wire connections are required as follows.

Shielding

To add another level of protection from electromagnetic noise, a grounded shield is added over the twisted pair wires. When this is enclosed in a protective jacket, to avoid ground loops and electromagnetic contamination of the ground system, all control ground wiring, including cable shields and drain wires, should be treated like sensitive current-carrying conductors. All control ground wires should be insulated (not bare) and the same wiring practices should be observed with ground wires as with other sensitive signals. Care must also be taken when designing control wiring to ensure that each shield is connected to only a single ground point. You should establish this point at a central location, like a control panel or cabinet, and avoid all connection to grounds in the field. A control ground is sometimes referred to as an isolated ground (an oxymoron) for this reason, but the term single-point ground is more accurate.

Method-1

A typical two-pair shielded cable can be prepared for termination to the terminals with the drain wire cut off. This is usually done at the field end of the cable where no shield grounding is desired. You will then use insulating tape or heat-shrink tubing to protect the cable from contamination and to prevent accidental grounding of the shield or drain wire. An accidental ground at this point would almost certainly create an undesirable ground loop.

Method-2

A typical two-pair shielded cable can be prepared for termination to the terminals with the drain wire cut off. The drain wire, which is an uninsulated conductor, is sleeved with a insulating tubing to prevent accidental grounding. The crimp-on lug is valuable in this instance to retain the tubing. Insulating tape or heat-shrink tubing is again used to protect the cable from contamination and to prevent accidental grounding, since any accidental connection between the drain wire and a chassis, frame, or enclosure would almost certainly create a ground loop.
5 WIRING DIAGRAMS

5.1.1 Lutron® EcoSystem Input; DCA-1A (24V DC)
DDM0 (one channel); CTM0 (two channel)

Notes:
1. 24V power (red/black) is Class-2 rated.
2. Module Data +/- (white with orange stripe/orange) to araya® modules is Class-2 rated.
3. Adapter is configured at factory for EcoSystem inputs.
4. DCA may be installed in the luminaire only.
5. One EcoSystem address (1 channel for warm-dim) per DDM module/DCA kit.
6. Two EcoSystem addresses (1 channel for CCT control and 1 channel for dimming control) per CTM module/DCA kit.
7. EcoSystem Channel 1 is always Intensity control. EcoSystem Channel 2 is always CCT control.
8. In the EcoSystem programming mode, EcoSystem Channel 1 controls the intensity from 100%-1%. EcoSystem Channel 2 controls the CCT range from 1650 - 4000K and 2700 - 6000K.
9. CAUTION: The power cable should ONLY be plugged into the 2-pin power receptacle provided. Insertion of the cable into any other slot will damage the Digital Control Adapter unit.
10. LX Output used with this system.
5 WIRING DIAGRAMS

5.1.2 Lutron® EcoSystem Input; DCA-1A (12V DC)
DDM1 (one channel); CTM1 (two channel)

Notes:
1. 12V power (red/black) is Class-2 rated.
2. Module Data +/- (white with orange stripe/orange) to araya® modules is Class-2 rated.
3. Adapter is configured at factory for EcoSystem inputs.
4. DCA may be installed in the luminaire only.
5. One EcoSystem address (1 channel for warm-dim) per DDM module/DCA kit.
6. Two EcoSystem addresses (1 channel for CCT control and 1 channel for dimming control) per CTM module/DCA kit.
7. EcoSystem Channel 1 is always Intensity control. EcoSystem Channel 2 is always CCT control.
8. In the EcoSystem programming mode, EcoSystem Channel 1 controls the intensity from 100%-1%. EcoSystem Channel 2 controls the CCT range from 1650 - 4000K.
9. CAUTION: The power cable should ONLY be plugged into the 2-pin power receptacle provided. Insertion of the cable into any other slot will damage the Digital Control Adapter unit.
10. LX Output used with this system.
Notes:
1. 24V power (red/black) is Class-2 rated.
2. Module Data +/- (white with orange stripe/orange) to araya® modules is Class-2 rated.
3. Adapter is configured at factory for DMX (including Bluetooth) inputs.
4. DCA may be installed in the luminaire only.
5. CAUTION: The power cable should ONLY be plugged into the 2-pin power receptacle provided. Insertion of the cable into any other slot will damage the Digital Control Adapter unit.
6. LX Output used with this system.
5 WIRING DIAGRAMS

5.2.2 DMX Input; DCA-1B (12V DC)
DDM1; CTM1

Notes:
1. 12V power (red/black) is Class-2 rated.
2. Module Data +/- (white with orange stripe/orange) to araya® modules is Class-2 rated.
3. Adapter is configured at factory for DMX (including Bluetooth) inputs.
4. DCA may be installed in the luminaire only.
5. CAUTION: The power cable should ONLY be plugged into the 2-pin power receptacle provided. Insertion of the cable into any other slot will damage the Digital Control Adapter unit.
6. LX Output used with this system.

For DMX inputs:
OPTION-1
Brown is Digital Common.
White with Orange Stripe is Data Positive.
Orange is Data Negative.

OPTION-2
Black is Digital Common.
Violet is Data Positive.
Gray is Data Negative.

Brown is Digital Common.
Orange is Data Negative.
White with Orange Stripe is Data Positive.
NOTE: This wire may be shipped in GREEN color in some existing versions of this cable assembly.

12V DC, Class 2
AC to DC Power Supply

Line in Voltage (refer to power supply)

The Constant Hot/Live must not be wired to a switching device. This may be put on a relay for maintenance.

White/Blue and Gray/Violet 0-10V wires are tied together

PN: 28.002.002.01

PN Option-1:
28.020.001.02
PN Option-2:
28.020.001.01

PN: 28.002.001.01

PN: 28.002.002.01

PN: 28.002.001.01

PN: 28.002.001.01
5 WIRING DIAGRAMS

5.3.1 Lutron® EcoSystem Input; DCA-2 (24V DC)
DDM1C, Bluetooth-integrated (one channel)
CTM1C, Bluetooth-integrated (two channel)

Notes:
1. 24V power (red/black) is Class-2 rated.
2. Module Data +/- (white with orange stripe/orange) to araya® modules is Class-2 rated.
3. Adapter is configured at factory for EcoSystem inputs. The araya® Tunable Color 2.0 iOS App should be turned on, and the DMX channels should be set to 2, 4, 6, 8.
4. DCA may be installed in the luminaire only.
5. One EcoSystem address (1 channel for warm-dim) per DDM module/DCA kit.
6. Two EcoSystem addresses (1 channel for CCT control and 1 channel for dimming control) per CTM module/DCA kit.
7. EcoSystem Channel 1 is always Intensity control. EcoSystem Channel 2 is always CCT control.
8. In the EcoSystem programming mode, EcoSystem Channel 1 controls the intensity from 100%-1%. EcoSystem Channel 2 controls the CCT range from 1650 - 8000K.
9. CAUTION: The power cable should ONLY be plugged into the 2-pin power receptacle provided. Insertion of the cable into any other slot will damage the Digital Control Adapter unit.
10. DMX Output used with this system.

**JUNCTION BOX**
- Fixture manufacturer to provide minimum 18 AWG of Lutron EcoSystem wire tail (labeled E1 and E2) to junction box. Consult Lutron for field wiring.
- Adapter is configured at OEM factory for EcoSystem inputs.

**Lutron EcoSystem Controller**

**Digital Control Adapter**
- PN: 28.020.002.01
  - Minimum requirement is a DMX type wire.
  - Brown is Digital Common. Orange is Data Negative. White with Orange Stripe is Data Positive.
  - NOTE: This wire may be shipped in GREEN color in some existing versions of this cable assembly.

**FIXTURE**
- PN: 28.002.002.01
  - White/Blue and Gray/Violet 0-10V wires can be tied together or left open.

**24V DC, Class 2 AC to DC Power Supply**
- Line in Voltage (refer to power supply)
- The Constant Hot/Live must not be wired to a switching device. This may be put on a relay for maintenance.
5 WIRING DIAGRAMS

5.3.2 Lutron EcoSystem Input; DCA-2 (12V DC)
DDM1C, Bluetooth-integrated (one channel)
CTM1C, Bluetooth-integrated (two channel)

Notes:
1. 12V power (red/black) is Class-2 rated.
2. Module Data +/- (white with orange stripe/orange) to araya® modules is Class-2 rated.
3. Adapter is configured at factory for EcoSystem inputs. The araya® Tunable Color 2.0 iOS App should be turned on, and the DMX channels should be set to 2, 4, 6, 8.
4. DCA may be installed in the luminaire only.
5. One EcoSystem address (1 channel for warm-dim) per DDM module/DCA kit.
6. Two EcoSystem addresses (1 channel for CCT control and 1 channel for dimming control) per CTM module/DCA kit.
7. EcoSystem Channel 1 is always Intensity control. EcoSystem Channel 2 is always CCT control.
8. In the EcoSystem programming mode, EcoSystem Channel 1 controls the intensity from 100%-1%. EcoSystem Channel 2 controls the CCT range from 1650 - 8000K.
9. CAUTION: The power cable should ONLY be plugged into the 2-pin power receptacle provided. Insertion of the cable into any other slot will damage the Digital Control Adapter unit.
10. DMX Output used with this system.

The Constant Hot/Live must not be wired to a switching device. This may be put on a relay for maintenance.

White/Blue and Gray/Violet 0-10V wires can be tied together or left open.

JUNCTION BOX

Fixure manufacturer to provide minimum 18 AWG of Lutron EcoSystem wire tail (labeled E1 and E2) to junction box. Consult Lutron for field wiring.

Lutron EcoSystem Controller

Adapter is configured at OEM factory for EcoSystem inputs.

Digital Control Adapter

PN: 28.020.002.01
Minimum requirement is a DMX type wire.

Brown is Digital Common.
Orange is Data Negative.
White with Orange Stripe is Data Positive.
NOTE: This wire may be shipped in GREEN color in some existing versions of this cable assembly.

12V DC, Class 2
AC to DC Power Supply

Line in Voltage (refer to power supply)
5 WIRING DIAGRAMS

5.4.1 Lutron® EcoSystem Input; DCA-2 (12V DC)
DDM1B, Bluetooth-integrated (one channel)
CTM1B, Bluetooth-integrated (two channel)

Notes:
1. 12V power (red/black) is Class-2 rated.
2. Module Data +/- (white with orange stripe/orange) to araya® modules is Class-2 rated.
3. Adapter is configured at factory for EcoSystem inputs. The araya® Tunable Color 2.0 iOS App should be turned on, and the DMX channels should be set to 2, 4, 6, 8.
4. DCA may be installed in the luminaire only.
5. One EcoSystem address (1 channel for warm-dim) per DDM module/DCA kit.
6. Two EcoSystem addresses (1 channel for CCT control and 1 channel for dimming control) per CTM module/DCA kit.
7. EcoSystem Channel 1 is always Intensity control. EcoSystem Channel 2 is always CCT control.
8. In the EcoSystem programming mode, EcoSystem Channel 1 controls the intensity from 100%-1%. EcoSystem Channel 2 controls the CCT range from 1650 - 4000K.
9. CAUTION: The power cable should ONLY be plugged into the 2-pin power receptacle provided. Insertion of the cable into any other slot will damage the Digital Control Adapter unit.
10. DMX Output used with this system.

The Constant Hot/Live must not be wired to a switching device. This may be put on a relay for maintenance.

Notes:
1. 12V power (red/black) is Class-2 rated.
2. Module Data +/- (white with orange stripe/orange) to araya® modules is Class-2 rated.
3. Adapter is configured at factory for EcoSystem inputs. The araya® Tunable Color 2.0 iOS App should be turned on, and the DMX channels should be set to 2, 4, 6, 8.
4. DCA may be installed in the luminaire only.
5. One EcoSystem address (1 channel for warm-dim) per DDM module/DCA kit.
6. Two EcoSystem addresses (1 channel for CCT control and 1 channel for dimming control) per CTM module/DCA kit.
7. EcoSystem Channel 1 is always Intensity control. EcoSystem Channel 2 is always CCT control.
8. In the EcoSystem programming mode, EcoSystem Channel 1 controls the intensity from 100%-1%. EcoSystem Channel 2 controls the CCT range from 1650 - 4000K.
9. CAUTION: The power cable should ONLY be plugged into the 2-pin power receptacle provided. Insertion of the cable into any other slot will damage the Digital Control Adapter unit.
10. DMX Output used with this system.

12V DC, Class 2
AC to DC Power Supply

PN: 28.002.001.01

White/Blue and Gray/Violet 0-10V wires are tied together

Brown is Digital Common.
Orange is Data Negative.
White with Orange Stripe is Data Positive.
NOTE: This wire may be shipped in GREEN color in some existing versions of this cable assembly.

FIXTURE

PN: 28.002.002.01

Lutron EcoSystem Controller

JUNCTION BOX

PN: 28.020.002.01

Lutron EcoSystem Input tail (labeled E1 and E2) to junction box. Consult Lutron for field wiring.

Adapter is configured at OEM factory for EcoSystem inputs.