araya®

TUNABLE COLOR

Bluetooth™

DDM1C
Warm/Dynamic Dimming Round LED Light Engines

24 V DC Input (Constant Voltage)
1850 Maximum Peak Lumens

Data Sheet

ERP POWER®

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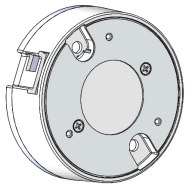
legrand® EcoSystem Enabled c UL us UL Recognized Component Dry or Damp Locations Class 2 Input FC Pb lead-free RoHS 2002/95/EC

1 DESCRIPTION AND ORDERING INFORMATION

DDM1C09

DDM1C12

DDM1C19
(1250 / 1000 / 750 LM)


DDM1C19
(1850 / 1500 LM)

DDM1C19NR

Description

Araya Warm/Dynamic Dimming Modules (DDM1C) mix five colors of LEDs to deliver tunable white light that warms as it dims at 90+ CRI* and color consistency of < 2 MacAdam ellipse. Delivered light dims from 3050 K at full intensity to 1800 K at 5% intensity, and then maintains 1800 K to 1%. The light engines integrate the driver electronics for precise control of current and PWM inputs and LED light output. An MR16 halogen dimming profile is offered. On board closed loop thermal feedback compensates each color channel for thermally induced variations due to changes in CCT, dimming or ambient temperatures. On board closed loop optical feedback measures the lumen depreciation of each channel and re-balances the color model to ensure color consistency over the 50,000 hour life of the module. An in-line manufacturing process captures the spectral characteristics of each LED under multiple conditions, generating a unique color model for each color tuning module. The light engines are compatible with traditional 0–10 V wired controls, feature on-board DMX512-A-RDM, and also Bluetooth Low Energy (BLE) for commissioning. Lutron® EcoSystem compatibility is achieved by using the optional ERP Digital Control Adapter. DDM1C can be paired with Legrand's Wattstopper® Digital Light Management (DLM) interface via an external adapter, to allow automatic fixture commissioning. For simple deployment, scene set allows up to five scenes to be pre-programmed into the light engine during production and recalled at the venue using a 0–10 V recommended dimmer. Commissioning of the light engine, re-programming of scenes, and configuration of DMX channels is done via RDM or the wireless Araya Tunable Color 2.0 iOS app that connects to the embedded radio. The DDM1C family features nominal light emitting surfaces (LES) of 9 mm, 12 mm and 19 mm.

Key Features

- Dimming profile that warms as it dims, launching at 3050 K at full intensity to 1800 K from 5% down to 1%
- 90+ CRI*
- Integrated driver electronics
- On board thermal and optical feedback for color consistency of < 2 MacAdam ellipse over 50,000 hour life
- In-line spectral capture creates unique color model for each light engine
- On board thermal turndown
- Provisions for reflector mounting
- Compatible with 0–10 V wired controls
- On-board Bluetooth Low Energy (BLE) for commissioning
- On-board DMX512-A-RDM, with DMX slots set by RDM or via wireless Araya Tunable Color 2.0 iOS app
- Lutron EcoSystem compatibility via optional Digital Control Adapter
- Wattstopper DLM compatibility via an optional adapter
- Scene set enables up to five scenes to be preprogrammed and recalled using a 0–10 V recommended dimmer
- Light emitting surface (LES): 9 mm, 12 mm and 19 mm (nominal)
- Zhaga compliant footprint and front heat sink mounting

Tunable Color 2.0 iOS App

Photometrics and Part Numbers

Dimming Range: 3050–1800 K	Nominal Wattage	Dimming Profile	DDM1C09		DDM1C12		DDM1C19 / 19NR		
			Typical Peak Lumens	Part Number	Typical Peak Lumens	Part Number	Typical Peak Lumens	Part Number (DDM1C19)	Part Number (DDM1C19NR)
Specifications**	35 W	MR16	N/A	N/A	N/A	N/A	1850	80.002.084.01	N/A
	25 W	MR16	N/A	N/A	N/A	N/A	1500	80.002.085.01	N/A
	25 W	MR16	950	80.002.057.01	1000	80.002.060.01	1250	80.002.063.01	80.002.066.01
	18 W	MR16	750	80.002.058.01	900	80.002.061.01	1000	80.002.064.01	80.002.067.01
	12 W	MR16	480	80.002.059.01	500	80.002.062.01	750	80.002.065.01	80.002.068.01
CRI (Ra) Across Tuning Range	> 90*								
Dimming	100% to 1% in increments of 1% at constant CCT								
Nominal Color Consistency	< 2 MacAdam ellipse (±0.002 Duv from ANSI C78.377-2008 curve)*								
Color Consistency Over Life	Calibration maintains original color points over life*								
Lumen Maintenance	L70 (70% of initial lumens) at 50,000 hours								

*From 2000–3050 K, down to 5% dim level. **Lumen and wattage range is within +/- 10% of the nominal value. Peak efficacy is not necessarily at typical peak lumens.

2 ELECTRICAL & MECHANICAL SPECIFICATIONS

2.1 Electrical Specifications

Input Voltage	24 V DC
Nominal Power Input	35, 25, 18 and 12 Watts
Nominal Current Input	35 W: 1.46 A; 25 W: 1.04 A; 18 W: 0.75 A; 12.5 W: 0.5 A
Power Supply Classification	Class 2
Power Connector	Molex 874380243 (requires Molex 874390200)
Control Connector	Molex 874370543 (requires Molex 874390700)
Control Options[1]	0–10 V, DMX512-A-RDM[2], Lutron® EcoSystem, Wattstopper® DLM
CCT and Dimming Control Connections	Connector harness, 24 gauge leads

1. DMX channel configuration is done via RDM or wireless Tunable Color iOS app. Lutron EcoSystem requires optional Digital Control Adapter. Wattstopper DLM compatibility requires optional external adapter from Wattstopper.
2. Remote Device Management or RDM is a protocol enhancement to DMX512-A that allows bi-directional communication between a lighting or system controller and attached RDM compliant devices over a standard DMX line.

2.1a Control Specifications

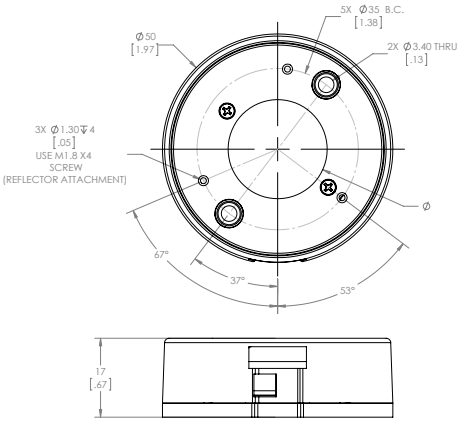
PROTOCOL	1 DIMMING	NOTES
DMX512-A-RDM [1]	1% (3050–1800 K) [2]	1. Refer to the separate DMX Lookup Tables for specific programming values and information. 2. Factory setting or RDM command.
0–10 V	~1% (3050–1800 K) [3]	3. Factory setting.
LUTRON ECOSYSTEM [4, 5]	1% (3050–1800 K) [6]	4. Requires external Digital Control Adapter. 5. Refer to the separate Lutron EcoSystem Lookup Tables for specific programming values and information. 6. Factory setting.
WATTSTOPPER DLM [7]	1% (3050–1800 K) [8]	7. Requires external LMFC-LXI adapter by Wattstopper. 8. Factory setting.

2 ELECTRICAL & MECHANICAL SPECIFICATIONS

2.2 Mechanical Specifications

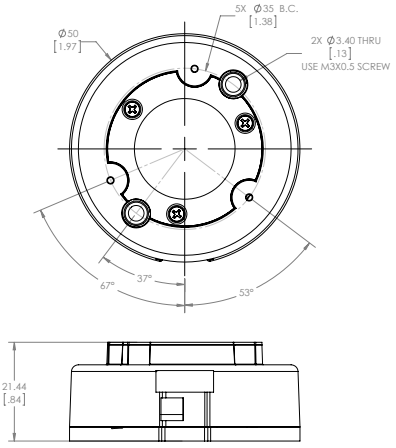
Dimensions	Diameter:	1.97 inches (50 mm)
	Height:	0.67 inches (17 mm); DDM1C19NR: 0.84 inches (21.44 mm)
Light Emitting Surface	9 mm, 12 mm and 19 mm (nominal)	
Weight	0.12 pounds (0.06 kg)	
Heat Sink Attachment	Front mount, M2.5 or 4-40 Screws	
Max Case Temperature	≤ 90 °C	

DDM1C19 (1250 lumens), DDM1C12, DDM1C09

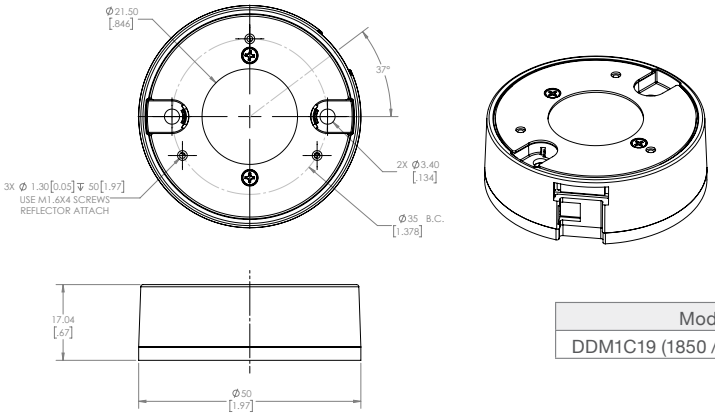


Model	LES Diameter
DDM1C09	9.5 mm (0.37 inches)
DDM1C12	12.75 mm (0.50 inches)
DDM1C19	22 mm (0.87 inches)

DDM1C19NR (1250 lumens) – Raised Face



DDM1C19 (1850 / 1500 lumens)



Model	LES Diameter
DDM1C19 (1850 / 1500 lumens)	21.5 mm (0.85 inches)

3 POWER SUPPLY REQUIREMENTS

3.1 Electrical Specifications

Description and Nominal Power Input	DDM1C 09/12/19/19NR, 12 W	DDM1C 09/12/19/19NR, 18 W	DDM1C 09/12/19/19NR, 25 W	DDM1C19, 35 W
Input Voltage	24 V DC	24 V DC	24 V DC	24 V DC
Nominal Current Input	12.5 W: 0.52 A	18 W: 0.75 A	25 W: 1.04 A	35 W: 1.46 A
Power Supply Classification	Class 2 (UP TO 100 W)	Class 2 (UP TO 100 W)	Class 2 (UP TO 100 W)	Class 2 (UP TO 100 W)

IMPORTANT

DDM1C has on-board drive electronics, including dimming. A dimming driver should NOT be used.

3.2 Recommended Power Supplies (Constant Voltage)

Manufacturer	Part Number	Rated Power	12 W DDM1C	18 W DDM1C	25 W DDM1C (1250 lm)	25 W DDM1C (1500 lm)	35 W DDM1C
Mean Well	APV-25-24	25 W	✓	✓			
High Perfection Tech HK (MagTech)	LP1026-24	30 W	✓	✓	✓		
Mean Well	APV-35-24	35 W	✓	✓	✓		
Efore / Roal	Strato RSLP035-24	36 W	✓	✓	✓		
ERP	VLM40W-24	40 W	✓	✓	✓		
Inventronics	EUV-042S024PS	42 W				✓	✓
ERP	VLM60W-24	60 W				✓	✓
Mean Well	IRM-60-24ST	60 W				✓	✓
Efore / Roal	Strato RSLP070-24	72 W				✓	✓
Mean Well	APV-100-24 **	100 W	✓	✓	✓		
Mean Well	HLG-120H-24A	120 W	✓*	✓*	✓*		
Gre Alpha	XLD200-2-24V-FC	200 W	✓	✓	✓	✓	

CAUTION:

- Using a constant current power supply will damage the light engine, and will void the ERP warranty.
- Using a triac or dimming driver will damage the light engine, and will void the ERP warranty.
- The power supply MUST be evaluated with the light engine(s) that it will be operated with.
- If a recommended power supply from the above list is not used, it will void the ERP warranty.
- If unqualified power supplies are used in a fixture, it will void the ERP warranty.
- It is the responsibility of the fixture manufacturer to ensure that the power supply performance does not change over time. The ERP warranty is void if problems occur as a result of such changes.
- **DO NOT HOT PLUG THE LIGHT FIXTURES.**

*U.L. CLASS 1 — NON-NORTH AMERICA ONLY.
**TESTED WITH A QUANTITY OF THREE 25 W LIGHT ENGINES.

NOTES:

- Recommendations are subject to change. Consult your ERP representative for the most updated list.
- Please contact the power supply manufacturer to verify that the current version of the listed power supply still meets the latest ERP testing approvals / qualifications.
- Power supply qualification process:: if a power supply that is not part of the above list is submitted for testing to ERP (during the design-in phase), it will be qualified or disqualified within two weeks of submission.

4 HEAT SINKING RECOMMENDATIONS

The DDM requires an external heat sink in order to ensure proper operating temperature of the LEDs. The DDM has a conductive aluminum case and an efficient thermal path to the LED array. These features promote efficient thermal management and allow for a simple heat sink design in most applications.

Examples of heat sinking methods are cast or extruded heat sinks. Both carbon and stainless steel are much less efficient at transferring heat than aluminum and therefore are not recommended as heat sink materials. The heat sink mounting surface should be flat and smooth. Metal-to-metal contact surfaces will result in best performance; anodized or unfinished mounting surfaces are recommended. Mounting the DDM on a painted aluminum surface will reduce the performance of the heat sink material.

In many fixtures, the air flow to the heat sinks is obstructed or the heat sink is in an enclosed container with no path to reject heat. The thermal design of the fixture must be optimized so that the maximum temperature is less than the Tc_{max} (maximum case temperature) as indicated in the drawings in the following section. If the Tc_{max} is exceeded in the application, the junction temperature of the LEDs will be higher than that required to meet the L70 life, and the ERP warranty will be void.

IMPORTANT: Most heat sinks are qualified in “free air” at an approximate ambient temperature of 25 °C. If the DDM is installed in an insulated can fixture (IC Can), the light engine may exceed the recommended operating temperature. The heat sink must be evaluated and temperature tested in the fixture at applicable ambient temperatures for the desired application.

5 CASE TEMPERATURE MEASUREMENT POINTS

The thermal management characteristics of the heat sink used with the DDM1 should be validated by measuring its case temperature. This test should be done with the DDM1 installed in the fixture at ambient temperature and air flow conditions similar to the end-use installation.

The power draw of the DDM1 family varies by approximately one watt over the CCT range with peak power draw occurring at the CCT shown in the following table. The case temperature should be measured at the following CCT setting.

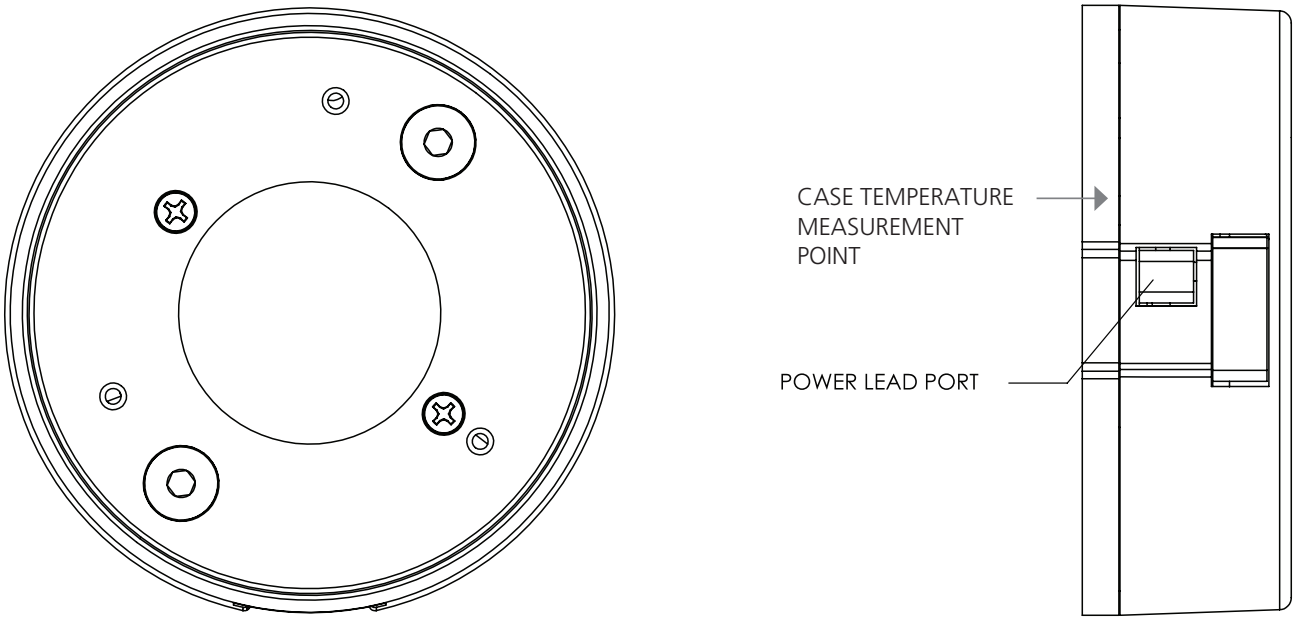
CCT Setting for Case Temperature (T_C) Measurement

CCT range	CCT Setting to Measure T_C
3050–1800 K	3050 K

The proper case temperature measurement location is on the narrow metal band, next to the power lead port; see figure below.
The case temperature reading should be made after the unit has reached steady state, where the case temperature levels out.
It is recommended to design the thermal management system for a case temperature of 90 ˚C.

Maximum case temperature: 90 ˚C

DDM1C has on-board thermal protection to reduce the current to the LEDs when the maximum case temperature is exceeded. This prevents unacceptably high LED junction temperatures by slightly dimming the light engine.



Case Temperature Measurement Point

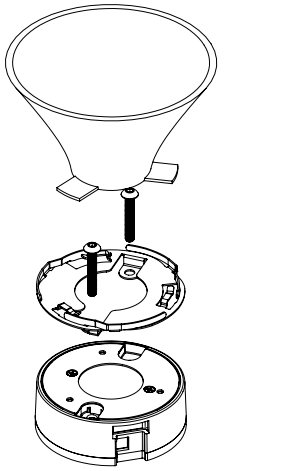
6 SECONDARY OPTICS

6.1 Attaching Compatible DDM1C Reflectors

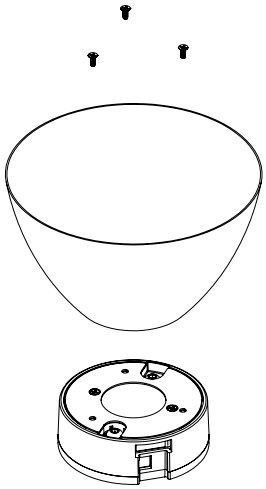
DDM1C19 (1850 / 1500 lumens) accepts either twist-to-lock reflectors with the Xicato XSA-242 adapter ring, or reflectors for direct attachment to the light engine. DDM1C09, DDM1C12 and DDM1C19 have provisions for TE Type-2 clip reflectors. DDM1C19NR accepts twist-to-lock reflectors with an attachment collar. The fastener specifications are shown in the following table while mounting hole locations are shown in the figures below.

DDM1 Secondary Optics Fastener Specifications

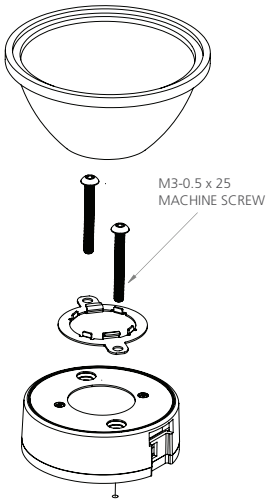
DDM1C Reflector	Fastener specifications	Screw length	Notes
Twist Lock w/ XSA-242 Adapter Ring	M3-0.5 x 18	18 mm	Machine screws; attach to heat sink (not directly to light engine)
Direct Attachment	M1.6 x 4	4 mm	Thread forming; use flat head screws
TE Type 2 Clip	M3-0.5 x 25	25 mm	Machine screws; attach to heat sink (not directly to light engine)
Twist Lock w/ Collar (DDM1C19NR)	2 - 28; M1.8 x 6	6 mm	Thread forming; use flat head screws



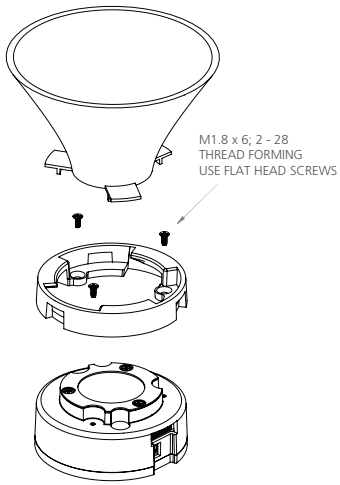
DDM1C19 (1850 / 1500 lm): Twist-Lock Style Reflectors with Xicato XSA-242 Adapter Ring



DDM1C19 (1850 / 1500 lm): Direct Attachment Reflectors



DDM1C19 (1250 lm) / DDM1C12 / DDM1C09: TE Type 2 Clip Reflectors (by Khatod)



DDM1C19NR (1250 lm): Twist-Lock Style Reflectors with Attachment Collars

6 SECONDARY OPTICS

6.2 Compatible Reflectors for DDM1C09 and DDM1C12

Compatible Reflectors for DDM1C09

Manufacturer	M. Part Number	beam angle (deg)	outer dim (mm)	height (mm)	optical finish	optical finish 2	attach method
Khatod EASY	KCLP 1858ME		72	52	honeycomb lens	none	Zhaga Screw 35mm
Khatod EASY	KCLP 1858WI		72	52	bug eye lens	none	Zhaga Screw 35mm
Khatod Lyra	PLJT 1521				diffuser ball white		TE Type II

Compatible Reflectors for DDM1C12

Manufacturer	M. Part Number	beam angle (deg)	outer dim (mm)	height (mm)	optical finish	optical finish 2	attach method
Diffractive Optics	P13827	20	69	33	specular	superfacet, diamond	P13688, screw 35mm
Diffractive Optics	P13829	30	69	33	specular	superfacet, diamond	P13688, screw 35mm
Diffractive Optics	P13767	20	75	42.3	specular	superfacet, diamond	P13688, screw 35mm
Diffractive Optics	P13831	30	75	42.3	specular	superfacet, diamond	P13688, screw 35mm
Diffractive Optics	P13771	20	85	43.3	specular	superfacet, diamond	P13688, screw 35mm
Diffractive Optics	P13833	30	85	43.3	specular	superfacet, diamond	P13688, screw 35mm
Diffractive Optics	P13775	20	92	43.3	specular	superfacet, diamond	P13688, screw 35mm
Diffractive Optics	P13781	30	92	43.3	specular	superfacet, diamond	P13688, screw 35mm
Diffractive Optics	P13713	20	75	37	specular	faceted	P13688, screw 35mm
Diffractive Optics	P13715	35	75	37	specular	faceted	P13688, screw 35mm
JORDAN	11324 10 10101	25	111	66	specular	super facet	none
JORDAN	11324 00 10101	40	111	66	specular	super facet	none
JORDAN	11323 90 15101	40	75	42	specular	square sf	none
JORDAN	11415 60 10101	35	75	43	specular	fish scale sf	none
JORDAN	11415 40 10101	20	75	43	specular	fish scale sf	none
Khatod	KCLP 1682 ST (1429ST)	20	65	35	diffuse	none	TE Type II
Khatod	KCLP 1683 ST (1430ST)	24	65	35	diffuse	none	TE Type II
Khatod	KCLP 1685 ST (1432ST)	32	65	35	diffuse	none	TE Type II
Khatod	KCLP 1684 ST	28	65	35	diffuse	none	TE Type II
Khatod	KCLP 1687 ST	31	65	35	diffuse	none	TE Type II
Khatod	KCLP 1688 ST	38	65	35	diffuse	none	TE Type II
Khatod	KCLP 1689 ST	42	65	35	diffuse	none	TE Type II
Khatod	KCLP 1690 ST	50	65	35	diffuse	none	TE Type II
Khatod	KCLP 1691 ST	56	65	35	diffuse	none	TE Type II
Khatod EASY	KCLP 1858ME		72	52	honeycomb lens	none	Zhaga Screw 35mm
Khatod EASY	KCLP 1858WI		72	52	bugeye lens	none	Zhaga Screw 35mm
Khatod Lyra	PLJT 1521				diffuser ball white		TE Type II
Nata	3990-E	24	75	43	diffuse	super facet	none
Nata	3991-E	36	75	43	diffuse	super facet	none
Nata	3992-E	25	85	50.5	diffuse	super facet	none
Nata	3993-E	40	85	50.5	diffuse	super facet	none
Nata	4-1405E	16	98	66.4	specular	facets	none
Nata	4-1406E				diffuse	super facet	none
Nata	2-1535E		75	44	m-diffuse	super facet	none
Nata	4-1664E	24	111	65	m-diffuse	super facet	none / 3 tabs
Nata	4-1666E	38	111	65	diffuse	super facet	none / 3 tabs
Nata	4-1667E	45	111	61.3	m-diffuse	super facet	none
Nata	4-1820E	60	111	65	diffuse	super facet	none / 3 tabs
Widegerm	3205-BL	36	82	45	diffuse	faceted	none
Widegerm	1021-CZ, -LG	~43	50	24.5	satin	faceted	none
Widegerm	1128-CZ, -LG	~28	50	24.5	satin	none	none
Widegerm	2201-medium LES	10	72	43	diffuse	faceted	none
Widegerm	2202-medium LES	36	72	43	m-specular	faceted	none

NOTE: Reflectors have been recommended based on independent optical tests conducted by ERP, and should be used as guidelines.
Final reflector evaluation should be made by fixture manufacturers with all optics in place.

6 SECONDARY OPTICS

6.3 Compatible Reflectors for DDM1C19 (1250 lumens)

Manufacturer	M. Part Number	beam angle (deg)	outer dim (mm)	height (mm)	optical finish	optical finish 2	attach method
JORDAN	11324 10 10101	25	111	66	specular	super facet	none
JORDAN	11324 00 10101	40	111	66	specular	super facet	none
Khatod EASY	KCLP 1858ME		72	52	honeycomb lens	none	Zhaga Screw 35mm
Khatod EASY	KCLP 1858WI		72	52	bugeye lens	none	Zhaga Screw 35mm
Khatod EASY	KCLP 1799 CR	asym			specular	none	Zhaga Screw 35mm
Khatod	KCLP 1682 CR (1429CR)	11	65	35	specular	none	TE Type II
Khatod	KCLP 1682 ST (1429ST)	20	65	35	diffuse	none	TE Type II
Khatod	KCLP 1683 ST (1430ST)	24	65	35	diffuse	none	TE Type II
Khatod	KCLP 1432 CR		65	35	specular	none	TE Type II
Khatod	KCLP 1685 ST (1432ST)	32	65	35	diffuse	none	TE Type II
Khatod	KCLP 1684 ST	28	65	35	diffuse	none	TE Type II
Khatod	KCLP 1687 CR	27	65	35	specular	none	TE Type II
Khatod	KCLP 1687 ST	31	65	35	diffuse	none	TE Type II
Khatod	KCLP 1688 CR	37	65	35	specular	none	TE Type II
Khatod	KCLP 1688 ST	38	65	35	diffuse	none	TE Type II
Khatod	KCLP 1689 ST	42	65	35	diffuse	none	TE Type II
Khatod	KCLP 1690 ST	50	65	35	diffuse	none	TE Type II
Khatod	KCLP 1691 ST	56	65	35	diffuse	none	TE Type II
Khatod	PLJT 1521				diffuser ball white		TE Type II
Nata	3990-E	24	75	43	diffuse	super facet	none
Nata	3991-E	36	75	43	diffuse	super facet	none
Nata	3992-E	25	85	50.5	diffuse	super facet	none
Nata	3993-E	40	85	50.5	diffuse	super facet	none
Nata	4-1149E2	39	111	65	m-diffuse	super facet	none
Nata	4-1150E5	39	111	65	m-diffuse	super facet	none
Nata	4-1405E	16	98	66.4	specular	facets	none
Nata	4-1406E				diffuse	super facet	none
Nata	2-1535E		75	44	m-diffuse	super facet	none
Nata	4-1536E	20	110	65.3	m-diffuse	super facet	none
Nata	4-1537E	30	110	62	diffuse	super facet	none
Nata	4-1664E	24	111	65	m-diffuse	super facet	none / 3 tabs
Nata	4-1666E	38	111	65	diffuse	super facet	none / 3 tabs
Nata	4-1667E	45	111	61.3	m-diffuse	super facet	none
Nata	4-1820E	60	111	65	diffuse	super facet	none / 3 tabs
Widegerm	3150-CZ	~14	82	45	m-specular	faceted	none
Widegerm	3158-CZ	15	91.5	47	diffuse	faceted	none
Widegerm	3163-CZ	22	91.5	47	m-specular	faceted	none
Widegerm	3205-BL	36	82	45	diffuse	faceted	none
Widegerm	2094-CZ	15	72	45	m-specular	faceted	none
Widegerm	2095-CZ	23	72	45.5	m-specular	faceted	none
Widegerm	2202-medium LES	36	72	43	m-specular	faceted	none

NOTE: Reflectors have been recommended based on independent optical tests conducted by ERP, and should be used as guidelines.
Final reflector evaluation should be made by fixture manufacturers with all optics in place.

6 SECONDARY OPTICS

6.4 Compatible Reflectors for DDM1C19NR (1250 lumens)

Manufacturer	M. Part Number	beam angle (deg)	outer dim (mm)	height (mm)	optical finish	optical finish 2	attach method
Diffractive Optics	P7076 (xsa-17)						XSM T/L
Diffractive Optics	P6645						XSM T/L
Diffractive Optics	P6680						XSM T/L
Diffractive Optics	P7899 (xsa-22)	40	49.3	28.6	specular	faceted	XSM T/L
Diffractive Optics	P6764 (xsa-21)	60	50	29	specular	none	XSM T/L
JORDAN	11324 10 10101	25	111	66	specular	super facet	direct screws
JORDAN	11324 00 10101	40	111	66	specular	super facet	direct screws
Nata	3990-E	24	75	43	diffuse	super facet	none
Nata	3991-E	36	75	43	diffuse	super facet	none
Nata	3992-E	25	85	50.5	diffuse	super facet	none
Nata	3993-E	40	85	50.5	diffuse	super facet	none
Nata	4-1149E2	39	111	65	m-diffuse	super facet	none
Nata	4-1405E	16	98	66.4	specular	facets	none
Nata	4-1406E				diffuse	super facet	none
Nata	2-1535E		75	44	m-diffuse	super facet	none
Nata	4-1536E	20	110	65.3	m-diffuse	super facet	none
Nata	4-1537E	30	110	62	diffuse	super facet	none
Nata	4-1664E	24	111	65	m-diffuse	super facet	none / 3 tabs
Nata	4-1666E	38	111	65	diffuse	super facet	none / 3 tabs
Nata	4-1667E	45	111	61.3	m-diffuse	super facet	none
Nata	4-1820E	60	111	65	diffuse	super facet	none / 3 tabs
Widegerm	3159-CZ	34	91.5	47	m-specular	faceted	none
Widegerm	3205-BL	36	82	45	diffuse	faceted	none
Widegerm	2202-medium LES	36	72	43	m-specular	faceted	none

NOTE: Reflectors have been recommended based on independent optical tests conducted by ERP, and should be used as guidelines. Final reflector evaluation should be made by fixture manufacturers with all optics in place.

6 SECONDARY OPTICS

6.5a Compatible Reflectors for DDM1C19 (1850 / 1500 lumens) - Part-1

Manufacturer	M. Part Number	beam angle (deg)	outer dim (mm)	height (mm)	optical finish	optical finish 2	attach method
JORDAN	11324 10 10101	25	111	66	specular	super facet	none
JORDAN	11324 00 10101	40	111	66	specular	super facet	none
Khatod	KCLP 1682 ST (1429ST)	20	65	35	diffuse	none	XSA242 + KE1950W
khatod	KCLP 1683 CR (1430CR)	26	65	35	specular	none	XSA242 + KE1950W
khatod	KCLP 1683 ST (1430ST)	24	65	35	diffuse	none	XSA242 + KE1950W
khatod	KCLP 1685 ST (1432ST)	32	65	35	diffuse	none	XSA242 + KE1950W
khatod	KCLP 1688 CR	37	65	35	specular	none	XSA242 + KE1950W
khatod	KCLP 1688 ST	38	65	35	diffuse	none	XSA242 + KE1950W
khatod	KCLP 1689 ST	42	65	35	diffuse	none	XSA242 + KE1950W
khatod	KCLP 1690 ST	50	65	35	diffuse	none	XSA242 + KE1950W
khatod	KCLP 1691 ST	56	65	35	diffuse	none	XSA242 + KE1950W
khatod	PLJT 1866	n/a			diffuse ball		T/L XSM242
Nata	3990-E	24	75	43	diffuse	super facet	none
Nata	3991-E	36	75	43	diffuse	super facet	none
Nata	3992-E	25	85	50.5	diffuse	super facet	none
Nata	3993-E	40	85	50.5	diffuse	super facet	none
Nata	2-1050A	25	65	44	satin	none	XSA242
Nata	2-1131E	18	68	51	m-diffuse	facets	XSA242
Nata	2-1132E	30	68	51	m-diffuse	super facet	XSA242
Nata	2-1133E	45	68	51	m-diffuse	super facet, flare	XSA242
Nata	4-1149E2	39	111	65	m-diffuse	super facet	none
Nata	4-1150E5	39	111	65	m-diffuse	super facet	none
Nata	4-1405E	16	98	66.4	specular	facets	none
Nata	4-1406E				diffuse	super facet	none
Nata	2-1535E		75	44	m-diffuse	super facet	none
Nata	4-1536E	20	110	65.3	m-diffuse	super facet	none
Nata	4-1537E	30	110	62	diffuse	super facet	none
Nata	4-1664E	24	111	65	m-diffuse	super facet	none / 3 tabs
Nata	4-1666E	38	111	65	diffuse	super facet	none / 3 tabs
Nata	4-1667E	45	111	61.3	m-diffuse	super facet	none
Nata	4-1820E	60	111	65	diffuse	super facet	none / 3 tabs
Nata	3-1903M	40	79	51	m-diffuse	super facet	XSA242
Nata	4-1983E	24	110	65	specular	super facet	XSA242
Nata	2834A	43	70	43.5	satin	none	XSA242
Nata	4-1966E	7	111	65	m-diffuse	super facet	XSA242

NOTE: Reflectors have been recommended based on independent optical tests conducted by ERP, and should be used as guidelines.
Final reflector evaluation should be made by fixture manufacturers with all optics in place.

6 SECONDARY OPTICS

6.5b Compatible Reflectors for DDM1C19 (1850 / 1500 lumens) - Part-2

Manufacturer	M. Part Number	beam angle (deg)	outer dim (mm)	height (mm)	optical finish	optical finish 2	attach method
Widegerm	1009T-XC	38	49	30.5	specular	faceted	XSA242 T/L
Widegerm	208x-XM		71.5	54	satin	lightfaceted	XSA242 T/L
Widegerm	2087-XM	19	71.5	54	m-specular	faceted	XSA242 T/L
Widegerm	2096T-XM	50	72	45.5	satin	lightfaceted	XSA242 T/L
Widegerm	2202T-XM	35	72	44	m-diffuse	faceted	XSA242 T/L
Widegerm	3204T-XM	27	82	46	m-diffuse	faceted	XSA242 T/L
Widegerm	3205T-XM	36	82	46	specular	faceted	XSA242 T/L
Widegerm	3207T-XC	-	82	46	satin	none	XSA242 T/L
Widegerm	4219T-XM	20	111	36	diffuse	faceted	XSA242 T/L
Widegerm	4220T-XM	37	111	36	m-specular	faceted	XSA242 T/L
Widegerm	4221T-XM	47	111	36	m-specular	faceted	XSA242 T/L
Widegerm	4201T-XC	15	111	69	diffuse	faceted	XSA242 T/L
Widegerm	4301T-XM	36	111	69	m-diffuse	faceted	XSA242 T/L
Widegerm	4401T-XM	43	111	69	m-diffuse	faceted	XSA242 T/L
Widegerm	3158-CZ	15	91.5	47	diffuse	faceted	none
Widegerm	3159-CZ	34	91.5	47	m-specular	faceted	none
Widegerm	3163-CZ	22	91.5	47	m-specular	faceted	none
Widegerm	3205-BL	36	82	45	diffuse	faceted	none
Widegerm	2094-CZ	15	72	45	m-specular	faceted	none
Widegerm	2095-CZ	23	72	45.5	m-specular	faceted	none
Widegerm	2202-medium LES	36	72	43	m-specular	faceted	none

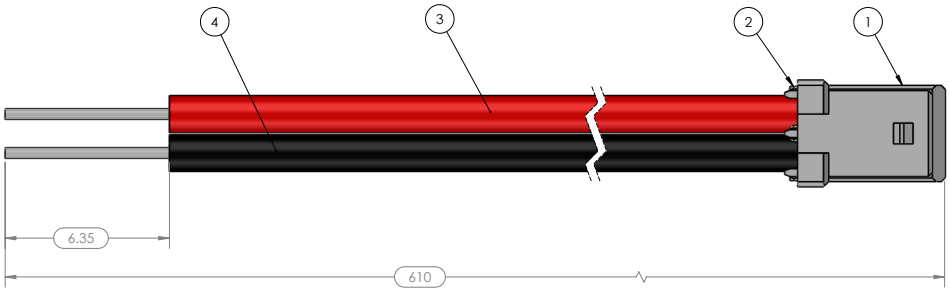
NOTE: Reflectors have been recommended based on independent optical tests conducted by ERP, and should be used as guidelines.
Final reflector evaluation should be made by fixture manufacturers with all optics in place.

7 POWER / CONTROL CABLE ASSEMBLIES

7.1 Power Cable Assembly

Provides power to each light engine.

Part Number: 28.002.001.01



ITEM NO.	PART NUMBER	DESCRIPTION	QTY.
1	874390200	MOLEX CONNECTOR	1
2	874210000	CRIMP	2
3	A2015R-100-ND	24 AWG WIRE, RED	1
4	A2015B-100-ND	24 AWG WIRE, BLACK	1

7.1.2 Pin Allocation Chart for Power Cable Assembly

Pin #	Lead Color	Input
Pin 1	Red	Power 24 V DC
Pin 2	Black	Power Common

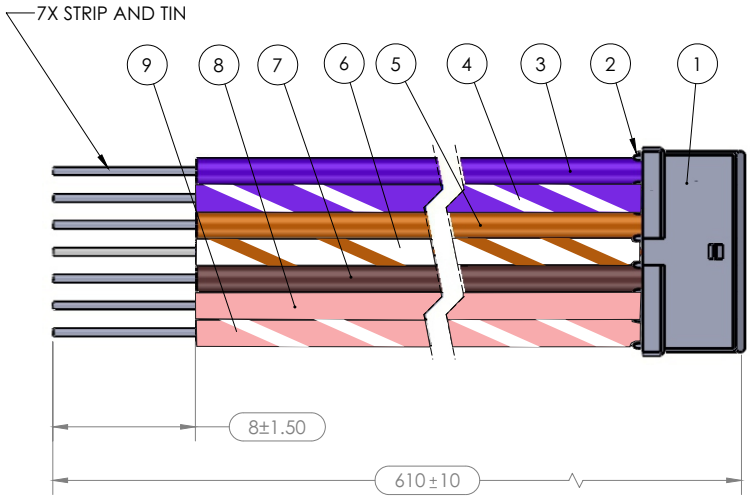
Note: All dimensions are in millimeters.

7 POWER / CONTROL CABLE ASSEMBLIES

7.2 Control Cable Assembly (7-Wire)

Provides 0–10 V and Lutron EcoSystem (with the Digital Control Adapter) control, and RS-485 signals to each light engine.

Part Number: 28.002.002.01



PART NUMBER	MANUFACTURE	DESCRIPTION	QTY.
874390700	MOLEX	CONNECTOR 7-PIN	1
874210000	MOLEX	CONNECTOR CRIMP	7
UL 1061	ANY	WIRE STRANDED TINNED 24AWG 7-32 VIOLET	1
UL 1061	ANY	WIRE STRANDED TINNED 24AWG 7-32 VIOLET WITH WHITE SPIRAL	1
UL 1061	ANY	WIRE STRANDED TINNED 24AWG 7-32 ORANGE	1
UL 1061	ANY	WIRE STRANDED TINNED 24AWG 7-32 WHITE WITH ORANGE SPIRAL	1
UL 1061	ANY	WIRE STRANDED TINNED 24AWG 7-32 BROWN	1
UL 1061	ANY	WIRE STRANDED TINNED 24AWG 7-32 PINK	1
UL 1061	ANY	WIRE STRANDED TINNED 24AWG 7-32 PINK WITH WHITE SPIRAL	1
ALT PART NUMBER	MANUFACTURE	DESCRIPTION	QTY.
A1501H-07P	LDZY	CONNECTOR 7-PIN	1
A1501TF-PT1	LDZY	CONNECTOR CRIMP	7

7.2.2 Pin Allocation Chart for Control Cable Assembly

Pin #	Lead Color	Input
Pin 1	Violet	0–10 V Dimming (+)
Pin 2	Violet with White Spiral*	0–10 V Color (+)
Pin 3	Orange	Data (-)
Pin 4	White with Orange Spiral*	Data (+)
Pin 5	Brown	Digital Common
Pin 6	Pink*	Signal Common for 0–10 V Dimming (-)
Pin 7	Pink with White Spiral*	Signal Common for 0–10 V Color (-)

* Some previous versions of this cable assembly may be shipped with differently colored leads.

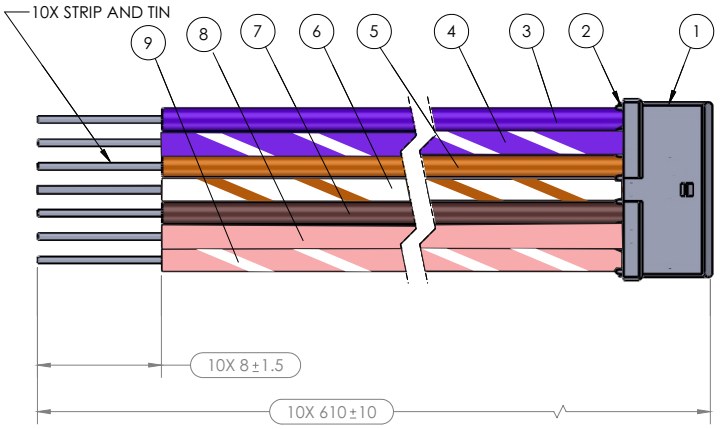
Note: All dimensions are in millimeters.

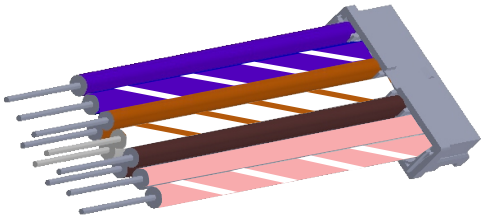
7 POWER / CONTROL CABLE ASSEMBLIES

7.3 Control Cable Assembly (7+3 Wire)

Provides dual-DMX control and RS-485 signals to each light engine.

Part Number: 28.002.002.05





ITEM NO.	PART NUMBER	MANUFACTURE	DESCRIPTION	QTY.
1	874390700	MOLEX	CONNECTOR 7-PIN	1
2	874210000	MOLEX	CONNECTOR CRIMP	7
3	UL 1061	ANY	WIRE STRANDED TINNED 24AWG 7-32 VIOLET	1
4	UL 1061	ANY	WIRE STRANDED TINNED 24AWG 7-32 VIOLET WITH WHITE SPIRAL	1
5	UL 1061	ANY	WIRE STRANDED TINNED 26AWG 7-34 ORANGE	2
6	UL 1061	ANY	WIRE STRANDED TINNED 26AWG 7-34 WHITE WITH ORANGE SPIRAL	2
7	UL 1061	ANY	WIRE STRANDED TINNED 26AWG 7-34 BROWN	2
8	UL 1061	ANY	WIRE STRANDED TINNED 24AWG 7-32 PINK	1
9	UL 1061	ANY	WIRE STRANDED TINNED 24AWG 7-32 PINK WITH WHITE SPIRAL	1
ITEM NO.	ALT PART NUMBER	MANUFACTURE	DESCRIPTION	QTY.
1	A1501H-07P	LDZY	CONNECTOR 7-PIN	1
2	A1501TF-PT1	LDZY	CONNECTOR CRIMP	7

7.3.2 Pin Allocation Chart for Control Cable Assembly

Pin #	Lead Color	Input
Pin 1	Violet	0–10 V Dimming (+)
Pin 2	Violet with White Spiral*	0–10 V Color (+)
Pins 3a / 3b (TOP / BOTTOM)	Orange	Data (-)
Pins 4a / 4b (TOP / BOTTOM)	White with Orange Spiral*	Data (+)
Pin 5a / 5b (TOP / BOTTOM)	Brown	Digital Common
Pin 6	Pink*	Signal Common for 0–10 V Dimming (-)
Pin 7	Pink with White Spiral*	Signal Common for 0–10 V Color (-)

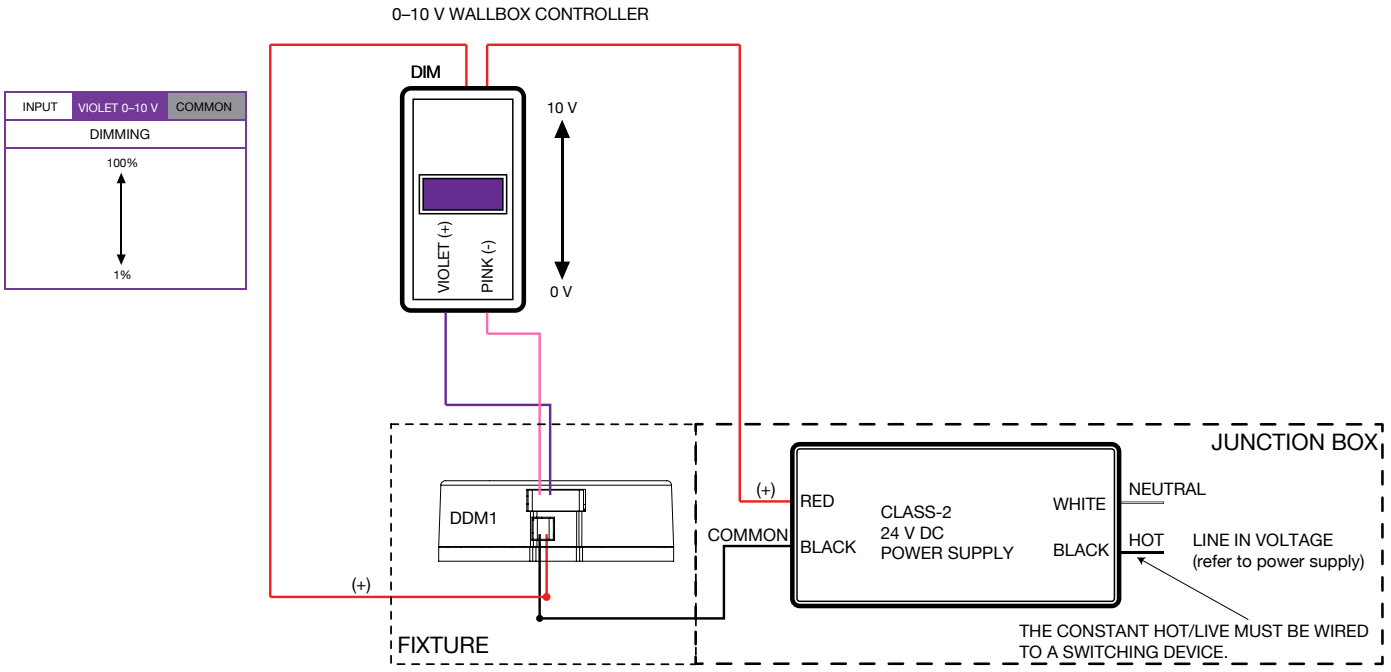
* Some previous versions of this cable assembly may be shipped with differently colored leads.

Note: All dimensions are in millimeters.

8 0–10 V WIRING DIAGRAMS

Please refer to the separate 0–10 V Protocol and Wiring Specifications Guide, for more detailed information.

8.1 0–10 V Analog Control of CCT and Dimming



Lead Color and Input

Lead Color	Input
Red	Power 24 V DC (+)
Black	Power Common (-)
Violet	0–10 V Dimming (+)
Pink	Signal Common for 0–10 V Dimming (-)

Notes:

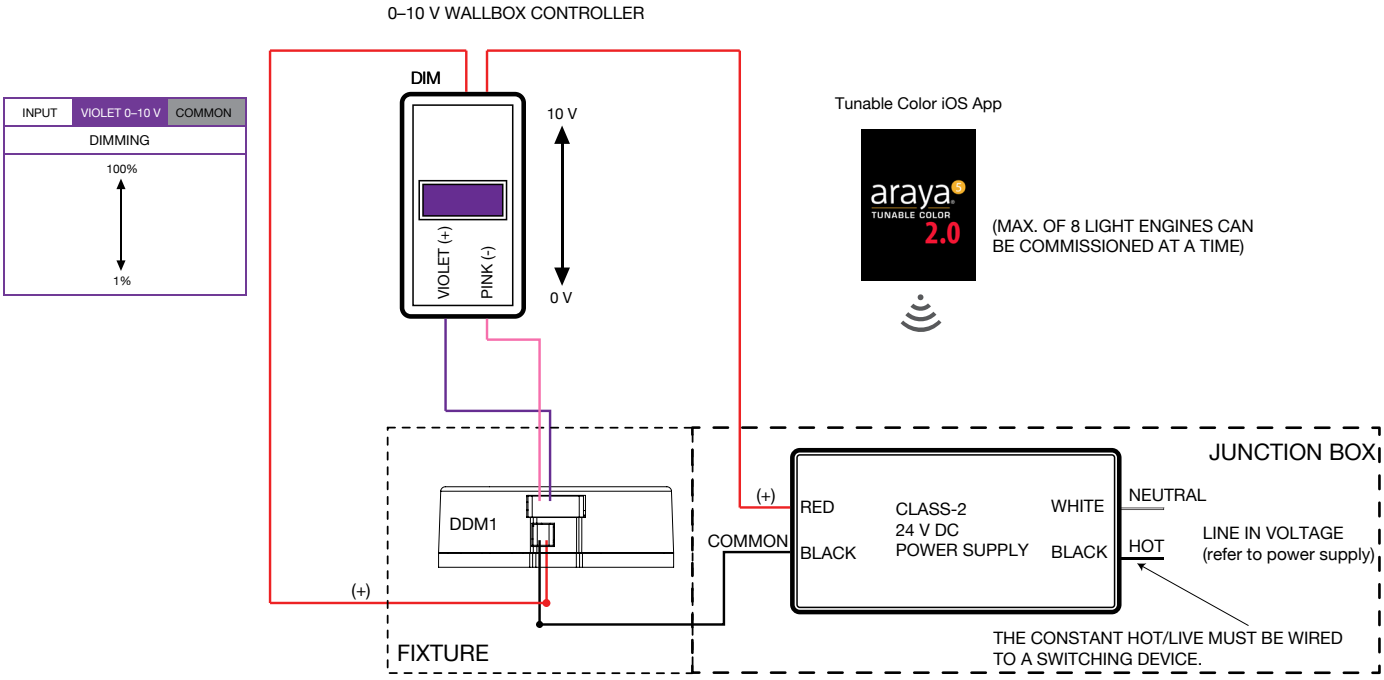
1. DDM sources current to 0–10 V control at 0.2 mA nominal capacity.
2. Only pins 1 and 6 are used in the control cable assembly.

Part Number(s):
28.002.001.01 (power cable assembly)
28.002.002.01 (control cable assembly)

NOTE: SOME OLDER VERSIONS OF THE 7-WIRE CONTROL CABLE ASSEMBLY MAY BE SHIPPED WITH DIFFERENTLY COLORED LEADS.

8 0–10 V WIRING DIAGRAMS

8.2 0–10 V Analog Control of Scenes / Tunable Color App to Set or Amend Scenes



Lead Color and Input

Lead Color	Input
Red	Power 24 V DC (+)
Black	Power Common (-)
Violet	0–10 V Dimming (+)
Pink	Signal Common for 0–10 V Dimming (-)

Part Number(s):
28.002.001.01 (power cable assembly)
28.002.002.01 (control cable assembly)

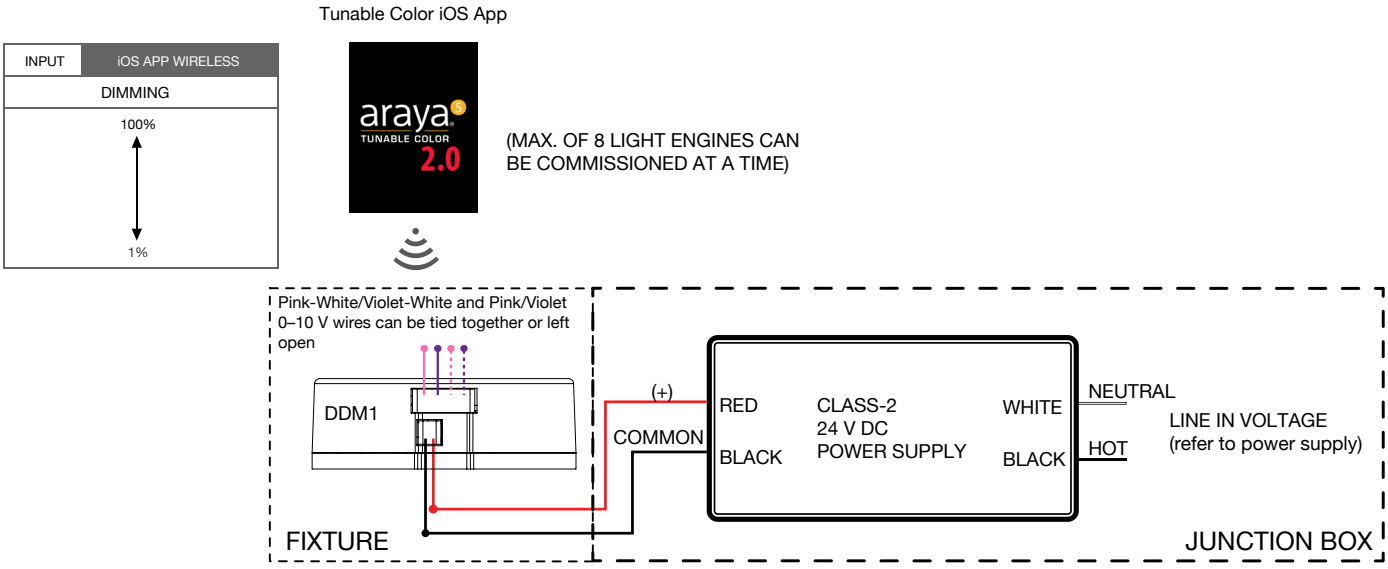
Notes:

1. The 0–10 V line can be set to control scene set by sliding the Stored Scenes button to the “on” position in the Tunable Color iOS App. In this mode, the 0–10 V control will toggle the light between up to 5 preset scenes. A scene is comprised of a Dim level. Individual preset scenes can also be modified and activated with the iOS app.
   See Tunable Color Instruction Manual for more instructions.
2. DDM sources current to 0–10 V control at 0.2 mA nominal capacity.
3. Only pins 1 and 6 are used in the control cable assembly.

NOTE: SOME OLDER VERSIONS OF THE 7-WIRE CONTROL CABLE ASSEMBLY MAY BE SHIPPED WITH DIFFERENTLY COLORED LEADS.

9 BLUETOOTH LE COMMISSIONING

Bluetooth Operation using the Tunable Color iOS App



Lead Color and Input

Lead Color	Input
Red	Power 24 V DC (+)
Black	Power Common (-)
Violet	0–10 V Dimming + (left openn)
Pink	Signal Common for 0–10 V Dimming (-)
Violet with White Spiral	0–10 V Color + (left open)
Pink with White Spiral	Signal Common for 0–10 V Color (-)

Notes:

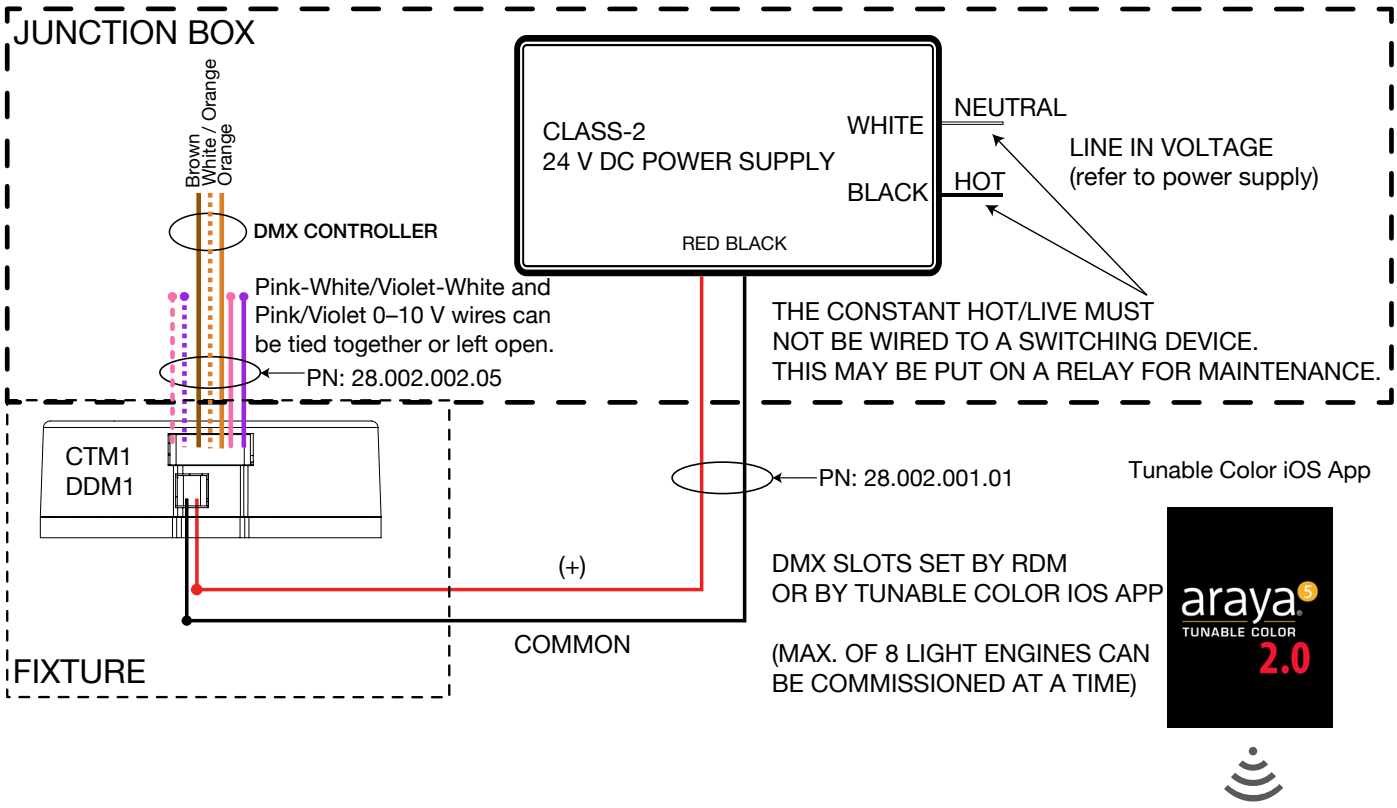
1. Maximum of 8 light engines can be commissioned at a time.
2. Bluetooth operation should be used only for commissioning light engines, NOT controlling them.
3. See Tunable Color Instruction Manual for more details.

Part Number(s):
28.002.001.01 (power cable assembly)
28.002.002.01 (control cable assembly)

NOTE: SOME OLDER VERSIONS OF THE 7-WIRE CONTROL CABLE ASSEMBLY MAY BE SHIPPED WITH DIFFERENTLY COLORED LEADS.

10 DMX512 WIRING DIAGRAM

Please refer to the separate DMX512-A Protocol and Wiring Specifications Guide, for more detailed information.



Lead Color and Input

Lead Color	Input
Red	Power 24 V DC (+)
Black	Power Common (-)
Violet	0–10 V Dimming (+); Left Open
Pink	Signal Common for 0–10 V Dimming (-); Left Open
Violet with White Spiral	0–10 V Color (+); Left Open
Pink with White Spiral	Signal Common for 0–10 V Color (-); Left Open
Orange (TOP / BOTTOM)	Data (-)
White with Orange Spiral (TOP / BOTTOM)	Data (+)
Brown (TOP / BOTTOM)	Digital Common

Part Numbers:
28.002.001.01 (2-wire power cable assembly)
28.002.002.05 (7-wire control cable assembly)

Notes:

1. The DMX channels can be set by RDM or by using the Tunable Color iOS App.
2. Maximum of 8 light engines can be commissioned at a time using the app.
3. Bluetooth operation should only be used for commissioning light engines, NOT controlling them.
4. The DMX control system should first be powered OFF, and only light engines that are connected to the DMX system should be powered on.
5. If more than one line of DMX is needed, then a DMX Splitter must be used to create multiple independent branches of a DMX signal and/or to extend the usable distance of each branch. Each of the splitter's 4, 6, 8, or 16 output ports generates an independently protected DMX signal.
6. See Tunable Color Instruction Manual for more details.

NOTE: SOME OLDER VERSIONS OF THE 7-WIRE CONTROL CABLE ASSEMBLY MAY BE SHIPPED WITH DIFFERENTLY COLORED LEADS.

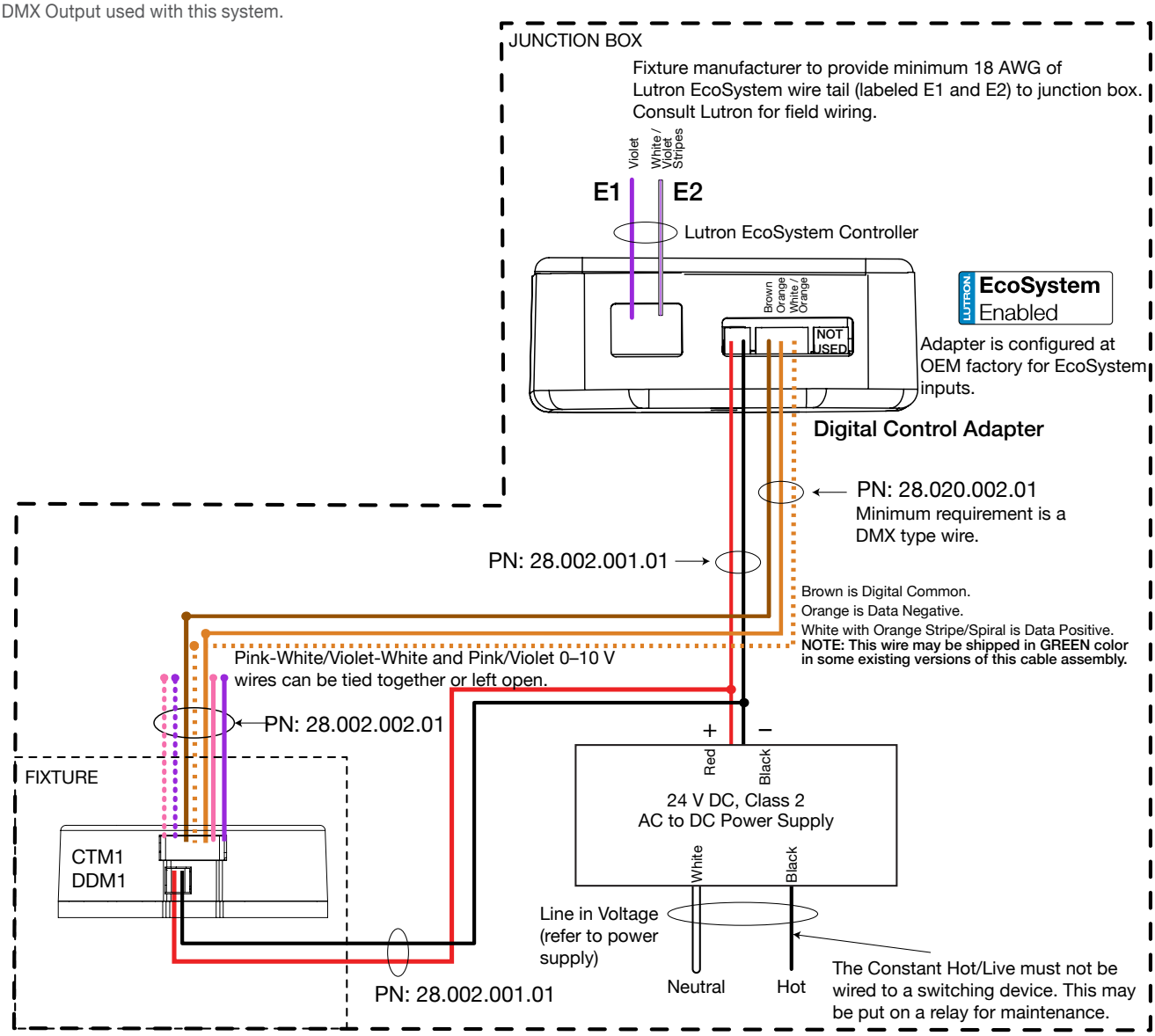
11 LUTRON ECOSYSTEM WIRING DIAGRAM

Lutron® EcoSystem Input with Digital Control Adapter; DCA-2 (24 V DC)

Please refer to the separate Lutron EcoSystem Protocol and Wiring Specifications Guide, for more detailed information.

Notes:

1. 24 V power (red/black) is Class-2 rated.
2. Module Data +/- (white with orange spiral/orange) to Araya light engines is Class-2 rated.
3. Adapter is configured at factory for EcoSystem inputs. The 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 light engine/DCA kit.
6. Two EcoSystem addresses (1 channel for CCT control and 1 channel for dimming control) per CTM light engine/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 1650–8000 K.
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.



12 OPERATION SUMMARY

DDM1C utilizes standard 0–10 V building controls and/or a wireless Tunable Color iOS app for controlling dimming values, and for commissioning and activating Scene presets. The modules deliver tunable white light that warms as it dims, launching at 3050 K at full intensity to 1800 K at 1%. This document describes how to control the DDM1C utilizing 0–10 V controls, the iOS Bluetooth app or a combination of the two.

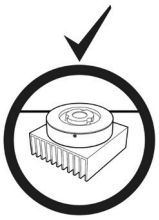
Araya Tunable Color iOS App. The Araya Bluetooth app wirelessly controls the DDM. The app is primarily intended to commission the DDM after installation. A MAXIMUM OF 8 LIGHT ENGINES CAN BE CONTROLLED AT A TIME. Each DDM has a unique address and the operator uses the app to select the desired DDM, turn power on/off and then set Dim and Scene Presets. Consult the Araya Tunable Color instruction manual for detailed instructions.

0–10 V Control of Dimming. The DDM has 0–10 V control wire pairs to control Dimming (instead of iOS app control of Dimming). Dimming is controlled by the violet (+) and gray (-) wires.

0–10 V Control of Stored Scenes. The iOS app can set up to 5 Scene Presets which are recalled using a wired 0–10 V controller. A scene is comprised of a specific Dim level. Individual preset scenes also can be modified and activated with the iOS app.

DMX Channel Configuration. The DDM1C light engines are provided with on board DMX512-A-RDM, with DMX slots set by RDM or via wireless Araya Tunable Color 2.0 iOS app.

On-Off Control. The DDM may be turned on/off by switching the input power from the 12 V supply. To store the settings, the lamp needs to remain on for at least 45 seconds after the DDM is initially set using the iOS app. When Scene Presets are activated using the app, the settings are stored immediately and no wait time is needed. The lamp may also be turned on/off using the app without switching the power supply, but a power draw of about 1 W will remain.



For long term reliable operation, proper heat sinking is critical.

The DDM diffuser is fragile. Avoid touching the diffuser during handling and assembly.

Do not rest or operate the DDM face down against a table or other solid surface.

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