K199 CALIFORNIA - LED ACORN

The K199 California luminaire was one of the original acorn styles that graced the streets of North American towns and cities, particularly in Southern California. Teamed with King Luminaire's high performance LED engines it makes for a perfect solution for city streets, parks, schools and commercial areas.

King Luminaire

PROJECT: _____

PREPARED BY: _____

DATE: _____

PRODUCT SPECIFICATIONS

LED ENGINE
Light engine shall be an array of 36, 42, 54 or 63 solid state Cree X-Series high power LEDs (light emitting diodes) mounted to a multi-sided, vertical heat sink of highly conductive aluminum. The LED emitters are mounted to removable circuit boards such that they are in full thermal contact with the vertical heat sink. The vertical heat sink is open at the bottom and vented at the top to provide appropriate dynamic airflow cooling for the LED array. The emitters are arranged in various patterns on each face of the vertical heat sink to provide the required light distribution.

OPTICS
The LED arrays include optical baffles constructed of optical grade ABS plastic with a vacuum metallized reflective surface or clear acrylic precision refractors over each diode. Both optical options are designed to efficiently control light distribution in IESNA Type IV & V for the B3 and Type III & V for the R1.

LUMINAIRE CONSTRUCTION
All K199 California cast components shall consist of a heavy grade A319 cast aluminum. The main body, or capital, acts as an enclosure for the driver assembly and is of adequate thickness to give sufficient structural rigidity. The capital shall have an opening at the base tenon body to allow the luminaire to be mounted to a tenon of 3-1/2" maximum diameter. The luminaire shall be locked in place by means of heavy duty, stainless steel setscrews.

GLOBE ASSEMBLY
The protective globe shall be molded of either; rippled polycarbonate Miles Makrolon GP/OP Thermoplastic Polymer, or equivalent, or rippled acrylic Acrylite Plus Acrylic Polymer, or equivalent, having a minimum thickness of 0.125".

The globe assembly is a self-contained unit consisting of the globe, rugged cast locking ring, and the LED light engine and optical control. The LED light engine is of a modular design, and is able to be quickly removed from the globe assembly. The globe assembly is secured to the main housing by means of a spring-tensioned, twist-locking Rotolock™ unit to allow tool-less removal of the globe, while maintaining a secure seal between the globe assembly and the main body of the luminaire, making the K199 California suitable for an outdoor environment.

High performance protection against water or dust particle ingress is available by means of a non-porous, closed-cell silicon rubber o-ring gasket which is highly efficient in sealing against particle ingress over a wide temperature range (-40°F to 310°F).

DRIVER
The LED universal dimmable driver will be class 2 and capable of 120 - 277V or 347 - 480V input voltage, greater than 0.9 power factor, less than 20% total harmonic distortion. The case temperature of the driver can range from -40°C up to 70°C. Each LED system comes with a standard surge protection designed to withstand up to 20kV/10kA of transient line surge as per IEEE C62.41.2 C High. An in-line ferrite choke is utilized to provide protection against EFT's. The driver assembly will be mounted on a heavy duty fabricated galvanized steel bracket to allow complete tool-less maintenance.

PHOTOMETRICS
Fixtures are tested to IESNA LM79 specifications. These reports are available upon request.

CHROMATICITY
High output LEDs come standard at 3000 & 4000K (+/- 300K) with a minimum nominal 70 CRI. Additional CCT emitters are available upon request.

LUMEN MAINTENANCE
Reported (TM21) and Calculated (L70) reports are available upon request with a minimum calculated value of 100,000 hrs.

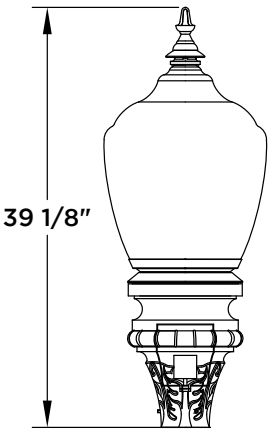
WIRING
All internal wiring and connections shall be completed so that it will be necessary only to attach the incoming supply connectors to Mate-N-Lok connectors or to a terminal block. Mate-N-Lok shall be certified for 600V operation. Internal wire connectors shall be crimp connector only and rated at 1000V and 150°C. All wiring to be CSA certified and/or UL listed, type SFF-2, SEWF-2, or SEW-2 No. 14 gauge, 150°C, 600V, and color coded for the required voltage.

THERMALS
Fixtures tested by a DOE sanctioned test facility to determine the maximum in-situ solder-point or junction-point temperatures of the LED emitters. This report is available upon request.

FINISH
Housing is finished with a 13 step KingCoat™ SuperDurable polyester TGIC powder coat. Standard colors include strobe white, brown metal, marina blue, gate gray, Chicago bronze, standard gold, standard black, federal green and rain forest. Please see our website for a complete list of colors. RAL and custom color matches are available.

MISCELLANEOUS
All exterior hardware and fasteners, wholly or partly exposed, shall be stainless steel alloy. All internal fasteners are stainless steel or zinc coated steel. All remaining internal hardware is stainless steel, aluminum alloy, or zinc coated steel.

WARRANTY
The K199 California LED luminaire comes with a 7 year limited warranty.



CERTIFICATION:
CSA US Listed
Suitable for wet locations
ISO 9001
IP66
ARRA Compliant
LM79 / LM80 Compliant

DRIVER INFO:
>0.9 Power Factor
<20% Total Harmonic Distortion
120 - 277V & 347 - 480V
-40°C Min. Case Temperature
70°C Max. Case Temperature
Surge Protection: ANSI C136.2
extreme level 20kV/10kA

EPA:
1.55 sq. ft.

FIXTURE WEIGHT:
36 lbs

C US

Contact King Luminaire for product specifications that are exempt from CSA Certification
06-04-2019

POWER & LUMENS

Test Voltage: 120V
Nominal Color Temperature: 3000K & 4000K[1]
1036 Engine Series: 36 Emitters (40 - 75W)
1054 Engine Series: 54 Emitters (100W)
LED Engine + Driver Rated Life = 100,000 hrs[2]

To learn more about the B3 Optic, please see the B3 Optic Information Sheet

Photometric Test Report Number	Decorative Option	Color Temperature	IES Distribution	Nominal Watts	Engine Series	Delivered Lumens[3]	Efficacy (LM/W)[3]	mA @ Emitter	Driver Output Current	BUG Rating	HID Equivalent[4]
0100NB3AR4X04030XXJ	Open	3000	Type IV	40	1036	3905	103.0	333	2000	-	50-70
0100NB3AR4X04040XXH	Open	4000	Type IV	40	1036	4053	102	333	2000	1-3-3	50-70
0100NB3AR5X04030XXB	Open	3000	Type V	40	1036	2324	57.2	333	2000	2-3-2	50-70
0100NB3AR5X04040XXA	Open	4000	Type V	40	1036	2897	70	333	2000	2-3-2	50-70
0100SB3AR4X04030XXJ	SST	3000	Type IV	40	1036	3117	83.1	333	2000	1-3-3	50-70
0100SB3AR4X04040XXA	SST	4000	Type IV	40	1036	2890	71.4	333	2000	1-3-2	50-70
0100SB3AR5X04030XXJ	SST	3000	Type V	40	1036	3555	92.3	333	2000	-	50-70
0100SB3AR5X04040XXA	SST	4000	Type V	40	1036	2816	70.2	333	2000	2-3-2	50-70
0100WB3AR4X04030XXB	SST/Struts	3000	Type IV	40	1036	1969	48.6	333	2000	1-3-2	50-70
0100WB3AR4X04040XXA	SST/Struts	4000	Type IV	40	1036	2637	65.3	333	2000	1-3-2	50-70
0100WB3AR5X04030XXB	SST/Struts	3000	Type V	40	1036	2218	54.8	333	2000	2-3-2	50-70
0100WB3AR5X04040XXA	SST/Struts	4000	Type V	40	1036	2730	63.9	333	2000	2-3-2	50-70
0100NB3AR4X06030XXJ	Open	3000	Type IV	60	1036	6178	103.1	500	3000	-	70-100
0100NB3AR4X06040XXH	Open	4000	Type IV	60	1036	5884	102	500	3000	1-3-3	70-100
0100NB3AR5X06030XXB	Open	3000	Type V	60	1036	3286	53.4	500	3000	2-3-2	70-100
0100NB3AR5X06040XXH	Open	4000	Type V	60	1036	6231	105	500	3000	3-3-3	70-100
0100SB3AR4X06030XXJ	SST	3000	Type IV	60	1036	4530	79.6	500	3000	1-3-3	70-100
0100SB3AR4X06040XXA	SST	4000	Type IV	60	1036	4093	66.8	500	3000	1-3-3	70-100
0100SB3AR5X06030XXB	SST	3000	Type V	60	1036	3278	53.3	500	3000	2-3-2	70-100
0100SB3AR5X06040XXA	SST	4000	Type V	60	1036	4022	65.5	500	3000	2-3-2	70-100
0100WB3AR4X06030XXB	SST/Struts	3000	Type IV	60	1036	2754	45.1	500	3000	1-3-2	70-100
0100WB3AR4X06040XXX	SST/Struts	4000	Type IV	60	1036	4119	67.6	500	3000	1-3-1	70-100
0100WB3AR5X06030XXB	SST/Struts	3000	Type V	60	1036	3121	51.2	500	3000	2-3-2	70-100
0100WB3AR5X06040XXA	SST/Struts	4000	Type V	60	1036	3736	59.5	500	3000	2-3-2	70-100
0100NB3AR4X07530XXJ	Open	3000	Type IV	75	1036	7540	94.8	667	4000	-	100-150
0100NB3AR4X07540XXH	Open	4000	Type IV	75	1036	7733	98	667	4000	1-3-4	100-150
0100NB3AR5X07530XXB	Open	3000	Type V	75	1036	3837	50.5	667	4000	2-3-2	100-150
0100NB3AR5X07540XXH	Open	4000	Type V	75	1036	7644	102	667	4000	3-3-3	100-150
0100SB3AR4X07530XXJ	SST	3000	Type IV	75	1036	6017	76	667	4000	1-3-3	100-150
0100SB3AR4X07540XXH	SST	4000	Type IV	75	1036	6876	92	667	4000	1-3-3	100-150
0100SB3AR5X07530XXB	SST	3000	Type V	75	1036	3802	50.1	667	4000	2-3-2	100-150
0100SB3AR5X07540XXA	SST	4000	Type V	75	1036	4746	62.6	667	4000	3-3-3	100-150
0100WB3AR4X07530XXB	SST/Struts	3000	Type IV	75	1036	3222	42.7	667	4000	1-3-3	100-150
0100WB3AR4X07540XXA	SST/Struts	4000	Type IV	75	1036	4391	58	667	4000	1-3-3	100-150
0100WB3AR5X07530XXB	SST/Struts	3000	Type V	75	1036	3624	48.3	667	4000	2-3-2	100-150
0100WB3AR5X07540XXA	SST/Struts	4000	Type V	75	1036	4328	57.3	667	4000	3-3-2	100-150
0100NB3AR4X10030XXJ	Open	3000	Type IV	100	1054	7050	78.8	533	4800	-	150-200
0100NB3AR4X10040XXH	Open	4000	Type IV	100	1054	8729	97	533	4800	1-3-4	150-200
0100NB3AR5X10030XXB	Open	3000	Type V	100	1054	5723	54.6	533	4800	3-3-2	150-200
0100NB3AR5X10040XXH	Open	4000	Type V	100	1054	9941	105	533	4800	3-3-4	150-200
0100SB3AR4X10030XXJ	SST	3000	Type IV	100	1054	6546	68	533	4800	1-3-4	150-200
0100SB3AR4X10040XXA	SST	4000	Type IV	100	1054	5904	57.1	533	4800	1-3-3	150-200
0100SB3AR5X10030XXB	SST	3000	Type V	100	1054	5450	51.9	533	4800	3-3-3	150-200
0100SB3AR5X10040XXA	SST	4000	Type V	100	1054	6482	57.4	533	4800	3-3-3	150-200
0100WB3AR4X10030XXB	SST/Struts	3000	Type IV	100	1054	4224	41	533	4800	1-3-3	150-200
0100WB3AR4X10040XXA	SST/Struts	4000	Type IV	100	1054	5378	51.7	533	4800	1-3-3	150-200
0100WB3AR5X10030XXB	SST/Struts	3000	Type V	100	1054	4976	48.2	533	4800	3-3-3	150-200
0100WB3AR5X10040XXA	SST/Struts	4000	Type V	100	1054	5344	53.2	533	4800	3-3-3	150-200

B3 = 3rd Generation Baffled Array
Lens: Acrylic Rippled
Decorative Options: Solid Spun Top (SST), Solid Spun Top with Rings and Struts (SST/Struts) or No Decorative Option (Open)

[1]Color temperature is nominal, please see test report for specific chromaticity information
[2]Contact factory for TM21 information/Driver specification
[3]Due to the continuous advancements in LED technology, luminaire delivered lumen and efficacy is subject to change without notice at the discretion of King Luminaire
[4]Equivalence should always be confirmed by performing a photometric layout, due to the variability of performance requirements and application criteria

POWER & LUMENS

Test Voltage: 120V
Nominal Color Temperature: 3000K & 4000K[1]
1042 Engine Series: 42 Emitters (40 - 75W)
1063 Engine Series: 63 Emitters (100 -120W)
LED Engine + Driver Rated Life = 100,000 hrs[2]

To learn more about the R1 Optic, please see the R1 Optic Information Sheet

Photometric Test Report Number	Decorative Option	Color Temperature	IES Distribution	Nominal Watts	Engine Series	Delivered Lumens[3]	Efficacy (LM/W)[3]	mA @ Emitter	Driver Output Current	BUG Rating	HID Equivalent[4]
0100NR1AR3X04030XXB	Open	3000	Type III	40	1042	3003	76.4	278	1670	1-3-2	50-70
0100NR1AR3X04040XXA	Open	4000	Type III	40	1042	3676	91.2	278	1670	1-4-2	50-70
In Testing	Open	3000	Type V	40	1042	N/A	N/A	278	1670	N/A	50-70
0100NR1AR5X04040XXA	Open	4000	Type V	40	1042	3428	87	278	1670	2-4-2	50-70
0100SR1AR3X04030XXJ	SST	3000	Type III	40	1042	3831	88.5	278	1670	1-3-3	50-70
0100SR1AR3X04040XXA	SST	4000	Type III	40	1042	3208	81.2	278	1670	1-3-2	50-70
0100SR1AR5X04030XXB	SST	3000	Type V	40	1042	2654	67.5	278	1670	-	50-70
0100SR1AR5X04040XXA	SST	4000	Type V	40	1042	3110	78.3	278	1670	2-3-2	50-70
0100WR1AR3X04030XXB	SST/Struts	3000	Type III	40	1042	2270	57.8	278	1670	1-3-2	50-70
0100WR1AR3X04040XXA	SST/Struts	4000	Type III	40	1042	3123	77.3	278	1670	-	50-70
0100WR1AR5X04030XXB	SST/Struts	3000	Type V	40	1042	2256	57.6	278	1670	1-3-2	50-70
0100WR1AR5X04040XXA	SST/Struts	4000	Type V	40	1042	2630	66.4	278	1670	2-3-2	50-70
0100NR1AR3X06030XXB	Open	3000	Type III	60	1042	4181	69.7	417	2500	1-4-2	70-100
0100NR1AR3X06040XXA	Open	4000	Type III	60	1042	5526	85	417	2500	1-4-3	70-100
0100NR1AR5X06030XXB	Open	3000	Type V	60	1042	4434	69.9	417	2500	2-4-2	70-100
0100NR1AR5X06040XXA	Open	4000	Type V	60	1042	5208	81.1	417	2500	2-4-2	70-100
0100SR1AR3X06030XXX	SST	3000	Type III	60	1042	4111	64.3	417	2500	1-4-3	70-100
0100SR1AR3X06040XXA	SST	4000	Type III	60	1042	4905	75.6	417	2500	1-3-3	70-100
0100SR1AR5X06030XXB	SST	3000	Type V	60	1042	3936	62.1	417	2500	2-3-2	70-100
0100SR1AR5X06040XXA	SST	4000	Type V	60	1042	4683	72.8	417	2500	2-3-2	70-100
0100WR1AR3X06030XXB	SST/Struts	3000	Type III	60	1042	3401	53.2	417	2500	1-3-2	70-100
0100WR1AR3X06040XXA	SST/Struts	4000	Type III	60	1042	4221	64.9	417	2500	1-3-3	70-100
In Testing	SST/Struts	4000	Type V	60	1042	N/A	N/A	417	2500	N/A	70-100
0100WR1AR5X06040XXA	SST/Struts	4000	Type V	60	1042	3978	61.7	417	2500	2-3-2	70-100
0100NR1AR3X07530XXJ	Open	3000	Type III	75	1042	6609	88.0	566	3400	-	100-150
0100NR1AR3X07540XXH	Open	4000	Type III	75	1042	7596	100	566	3400	2-5-4	100-150
In Testing	Open	3000	Type V	75	1042	N/A	N/A	566	3400	N/A	100-150
0100NR1AR5X07540XXA	Open	4000	Type V	75	1042	6127	77.2	566	3400	3-4-3	100-150
0100SR1AR3X07530XXB	SST	3000	Type III	75	1042	4672	59.3	566	3400	1-3-3	100-150
0100SR1AR3X07540XXA	SST	4000	Type III	75	1042	5790	71.7	566	3400	2-4-3	100-150
0100SR1AR5X07530XXB	SST	3000	Type V	75	1042	4601	58.8	566	3400	-	100-150
0100SR1AR5X07540XXA	SST	4000	Type V	75	1042	5503	69.3	566	3400	3-3-3	100-150
0100WR1AR3X07530XXB	SST/Struts	3000	Type III	75	1042	3981	50.4	566	3400	1-3-3	100-150
0100WR1AR3X07540XXA	SST/Struts	4000	Type III	75	1042	4858	60.8	566	3400	2-3-3	100-150
In Testing	SST/Struts	3000	Type V	75	1042	N/A	N/A	566	3400	N/A	100-150
0100WR1AR5X07540XXA	SST/Struts	4000	Type V	75	1042	4661	58.6	566	3400	3-3-2	100-150
0100NR1AR3X10030XXJ	Open	3000	Type III	100	1063	8462	88.8	444	4000	-	150-175
0100NR1AR3X10040XXH	Open	4000	Type III	100	1063	9454	98	444	4000	2-5-4	150-175
0100NR1AR5X10030XXB	Open	3000	Type V	100	1063	7109	71.0	444	4000	3-5-3	150-175
0100NR1AR5X10040XXA	Open	4000	Type V	100	1063	7861	76.8	444	4000	3-5-3	150-175
0100SR1AR3X10030XXJ	SST	3000	Type III	100	1063	7165	71.5	444	4000	2-3-4	150-175
0100SR1AR3X10040XXA	SST	4000	Type III	100	1063	7333	75.2	444	4000	2-3-4	150-175
0100SR1AR5X10030XXB	SST	3000	Type V	100	1063	6229	62.4	444	4000	-	150-175
In Testing	SST	4000	Type V	100	1063	N/A	N/A	444	4000	N/A	150-175
In Testing	SST/Struts	3000	Type III	100	1063	N/A	N/A	444	4000	N/A	150-175
In Testing	SST/Struts	4000	Type III	100	1063	N/A	N/A	444	4000	N/A	150-175
In Testing	SST/Struts	3000	Type V	100	1063	N/A	N/A	444	4000	N/A	150-175
0100WR1AR5X10040XXA	SST/Struts	4000	Type V	100	1063	6116	59.7	444	4000	3-3-3	150-175

R1 = 1st Generation Refractive Array
Lens: Acrylic Rippled
Decorative Options: Solid Spun Top (SST), Solid Spun Top with Rings and Struts (SST/Struts) or No Decorative Option (Open)

[1]Color temperature is nominal, please see test report for specific chromaticity information
[2]Contact factory for TM21 information/Driver specification
[3]Due to the continuous advancements in LED technology, luminaire delivered lumen and efficacy is subject to change without notice at the discretion of King Luminaire
[4]Equivalence should always be confirmed by performing a photometric layout, due to the variability of performance requirements and application criteria

POWER & LUMENS

Test Voltage: 120V
Nominal Color Temperature: 3000K & 4000K[1]
1042 Engine Series: 42 Emitters (40 - 75W)
1063 Engine Series: 63 Emitters (100 -120W)
LED Engine + Driver Rated Life = 100,000 hrs[2]

To learn more about the R1 Optic, please see the R1 Optic Information Sheet

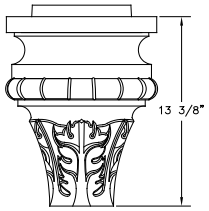
Photometric Test Report Number	Decorative Option	Color Temperature	IES Distribution	Nominal Watts	Engine Series	Delivered Lumens[3]	Efficacy (LM/W)[3]	mA @ Emitter	Driver Output Current	BUG Rating	HID Equivalent[4]
0100NR1AR3X12030XXJ	Open	3000	Type III	120	1063	9777	87.1	555	5000	-	150-200
0100NR1AR3X12040XXH	Open	4000	Type III	120	1063	11101	97	555	5000	3-5-4	150-200
0100NR1AR5X12030XXB	Open	3000	Type V	120	1063	8053	68	555	5000	3-5-3	150-200
0100NR1AR5X12040XXA	Open	4000	Type V	120	1063	8843	73	555	5000	3-5-3	150-200
0100SR1AR3X12030XXJ	SST	3000	Type III	120	1063	7878	70.5	555	5000	2-3-4	150-200
0100SR1AR3X12040XXA	SST	4000	Type III	120	1063	8054	66.3	555	5000	2-3-3	150-200
0100SR1AR5X12030XXB	SST	3000	Type V	120	1063	6968	59.2	555	5000	-	150-200
In Testing	SST	4000	Type V	120	1063	N/A	N/A	555	5000	N/A	150-200
In Testing	SST/Struts	3000	Type III	120	1063	N/A	N/A	555	5000	N/A	150-200
In Testing	SST/Struts	4000	Type III	120	1063	N/A	N/A	555	5000	N/A	150-200
In Testing	SST/Struts	3000	Type V	120	1063	N/A	N/A	555	5000	N/A	150-200
0100WR1AR5X12040XXA	SST/Struts	4000	Type V	120	1063	6825	56.8	555	5000	-	150-200

R1 = 1st Generation Refractive Array
Lens: Acrylic Rippled
Decorative Options: Solid Spun Top (SST), Solid Spun Top with Rings and Struts (SST/Struts) or No Decorative Option (Open)

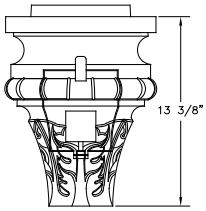
[1]Color temperature is nominal, please see test report for specific chromaticity information
[2]Contact factory for TM21 information/Driver specification
[3]Due to the continuous advancements in LED technology, luminaire delivered lumen and efficacy is subject to change without notice at the discretion of King Luminaire
[4]Equivalence should always be confirmed by performing a photometric layout, due to the variability of performance requirements and application criteria

FIXTURE OPTIONS

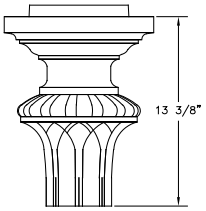
Capital Options



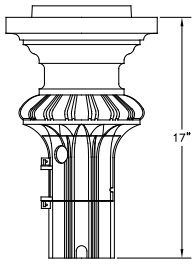
K13



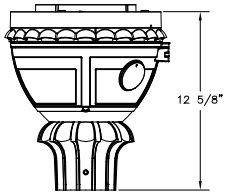
K14 C/W PR



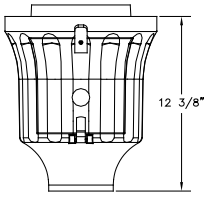
K16



K18 C/W PR

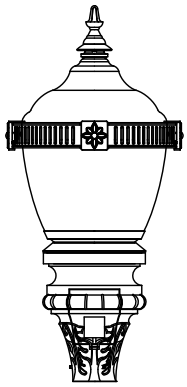


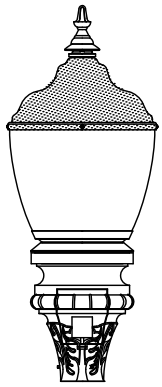
K26 C/W PR

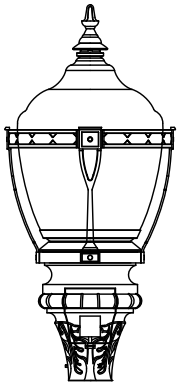


K24 C/W PR

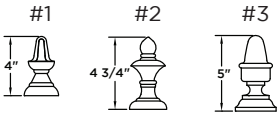
Decorative Options:


GE RING

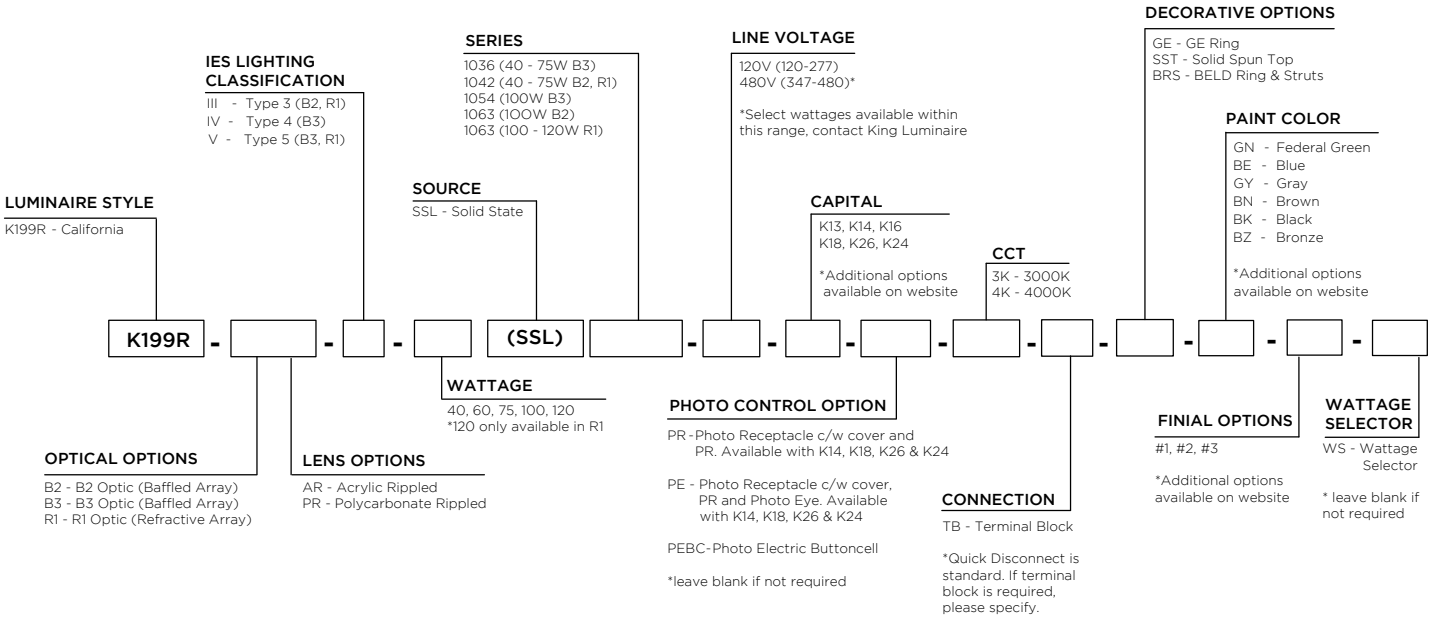

SOLID SPUN ALUMINUM TOP


BELD RING & STRUTS

Finial Options:



HOW TO ORDER


LUMINAIRE STYLE
K199R - California
IES LIGHTING CLASSIFICATION
III - Type 3 (B2, R1)
IV - Type 4 (B3)
V - Type 5 (B3, R1)
SERIES
1036 (40 - 75W B3)
1042 (40 - 75W B2, R1)
1054 (100W B3)
1063 (100W B2)
1063 (100 - 120W R1)
SOURCE
SSL - Solid State
LINE VOLTAGE
120V (120-277)
480V (347-480)*
*Select wattages available within this range, contact King Luminaire
CAPITAL
K13, K14, K16
K18, K26, K24
*Additional options available on website
CCT
3K - 3000K
4K - 4000K
DECORATIVE OPTIONS
GE - GE Ring
SST - Solid Spun Top
BRS - BELD Ring & Struts
PAINT COLOR
GN - Federal Green
BE - Blue
GY - Gray
BN - Brown
BK - Black
BZ - Bronze
*Additional options available on website
K199R
(SSL)
OPTICAL OPTIONS
B2 - B2 Optic (Baffled Array)
B3 - B3 Optic (Baffled Array)
R1 - R1 Optic (Refractive Array)
LENS OPTIONS
AR - Acrylic Rippled
PR - Polycarbonate Rippled
WATTAGE
40, 60, 75, 100, 120
*120 only available in R1
PHOTO CONTROL OPTION
PR - Photo Receptacle c/w cover and PR. Available with K14, K18, K26 & K24
PE - Photo Receptacle c/w cover, PR and Photo Eye. Available with K14, K18, K26 & K24
PEBC - Photo Electric Buttoncell
*leave blank if not required
CONNECTION
TB - Terminal Block
*Quick Disconnect is standard. If terminal block is required, please specify.
FINIAL OPTIONS
#1, #2, #3
*Additional options available on website
WATTAGE SELECTOR
WS - Wattage Selector
* leave blank if not required