

RA & RL Retrofit - Adjustable and LED Downlight Series

Dimming Guide and Step-down Transformer Application Note



The RA & RL LED Series provides continuous dimming to 5% nominal with reverse or forward phase cut dimmers.

RL4 Series - 80CRI

RL460WH827PK
RL460SN827PK
RL460WH830PK
RL460SN830PK
RL460WH835PK
RL460WH830
RL460SN830-C
RL460WH835

RL56 Series - 80CRI

RL560WH6827
RL560SN6827
RL560WH6830
RL560SN6830
RL560WH6835
RL560WH-R
RL560WH-C
RL560WH6835R

RA4 Series

RA406927WH
RA406930WH
RA406927NFLWH
RA406930NFLWH
RA406930WHR

RA56 Series

RA5606927WH
RA5606930WH
RA5606927NFLWH
RA5606930NFLWH
RA5606930WHR

RL4 Series - 90CRI

RL460WH927PK
RL460SN927PK
RL460WH930PK
RL460SN930PK
RL460WH935PK
RL460WH930
RL460WH935

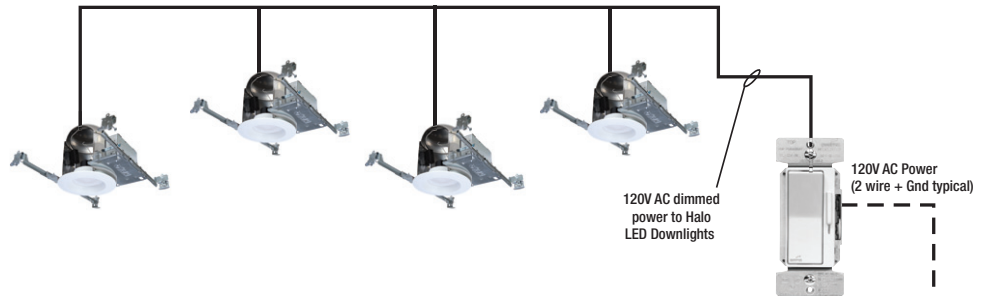
RL56 Series - 90CRI

RL560WH6927
RL560SN6927
RL560WH6930
RL560SN6930
RL560WH6935
RL560WH6930R
RL560WH6935R

Phase Control Dimming

RL56

Recessed Housing
Installation



Eaton's Cooper Wiring Device business AL (All-Load) Series dimmers offer versatile options to set the mood and reduce energy consumption. Visit www.cooperwiringdevices.com/ALSeries for more information.



| Dimmer Features | ACCELL (AAL06) | DEVINE (DAL06P) | SKYE (SAL06P) | TRACE (TAL06P) |
|--------------------------|-------------------------------|--------------------------|--------------------------|--------------------------|
| Rapid Start feature | Selectable ON or OFF | Fully adjustable | Fixed ON | Fully adjustable |
| Adjustable high-end trim | • | | | |
| Adjustable low-end trim | • | • | • | • |
| Wiring configurations | Single-pole or multi-location | Single-pole or three-way | Single-pole or three-way | Single-pole or three-way |
| Color change kits | • | • | | • |

Note: The Rapid Start feature is used to ensure the right amount of power boost during start-up. When a dimmer with Rapid Start is turned on from a low dimmer setting, the LED lighting may exhibit a momentary flash. Select dimmer models offer an adjustment of the Rapid Start feature. The user may wish to adjust this setting to reduce the boost and resulting momentary flash. If this capability is desired, the user should select dimmer models designated as "fully adjustable" or "selectable ON or OFF".

RL4 & RL56 - 80CRI - 2700K, 3000K, 3500K, 4000K

RL4 Series - 80CRI

RL460WH827PK
 RL460SN827PK
 RL460WH830PK
 RL460SN830PK
 RL460WH835PK
 RL460WH830
 RL460SN830-C
 RL460WH-R
 RL460WH-C
 RL460WH835

RL56 Series - 80CRI

RL560WH6827
 RL560SN6827
 RL560WH6830
 RL560SN6830
 RL560WH6835
 RL560WH-R
 RL560WH-C
 RL560WH6835R

LED Rated Dimmers

| Dimmer Make | Dimmer Series | Dimmer Model # | Dimmer Rating | Dimmer Max Wattage | Minimum Luminaires (per circuit) | Maximum Recommended Luminaires (per circuit) | Max Dimming percentage (%) | Min Dimming percentage (%) | Start Time |
|-------------|---------------|----------------|-----------------------------|--|----------------------------------|--|----------------------------|----------------------------|---------------------|
| Lutron | Diva | DVCL-153P | INC/HAL/CFL/LED | 600(INC/HAL), 150 (LED/CFL) | 1 | 15 | 90% | 1% | ≥1 sec |
| Lutron | Maestro | MACL-153M | INC/CFL/LED | 600(INC), 150(LED/CFL) | 1 | 15 | 83% | 1% | ≥1 sec |
| Leviton | IllumaTech | IPL06-10Z | INC/LED/CFL | 600(INC), 150(CFL/LED) | 1 | 15 | 95% | 1% | ≥1 sec ¹ |
| Leviton | IllumaTech | 6674 | INC/LED/CFL | 600(INC), 150(CFL/LED) | 1 | 15 | 96% | 1% | ≤1 sec ¹ |
| CWD | DEVINE | DAL06P | INC/HAL/FLR/MLV/ELV/CFL/LED | 600(INC/HAL/FLR/MLV/ELV), 300(CFL/LED) | 1 | 30 | 98% | 1% | ≤1 sec ² |
| CWD | ACCELL | AAL06P | INC/HAL/FLR/MLV/ELV/CFL/LED | 600(INC/HAL/FLR/MLV/ELV), 300(CFL/LED) | 1 | 30 | 98% | 1% | ≤1 sec |
| CWD | TRACE | TAL06P | INC/HAL/FLR/MLV/ELV/CFL/LED | 600(INC/HAL/FLR/MLV/ELV), 300(CFL/LED) | 1 | 30 | 98% | 1% | ≤1 sec |
| CWD | SKYE | SAL06P | INC/HAL/FLR/MLV/ELV/CFL/LED | 600(INC/HAL/FLR/MLV/ELV), 300(CFL/LED) | 1 | 30 | 99% | 1% | ≤1 sec ² |
| CWD | SKYE | SLC03PC-PTA | INC/HAL/CFL/LED | 600(INC/HAL), 300(CFL/LED) | 1 | 30 | 99% | 1% | ≥1 sec |
| CWD | DEVINE | DLC03P | INC/HAL/CFL/LED | 600(INC/HAL), 300(CFL/LED) | 1 | 30 | 99% | 1% | ≤1 sec |

1. Flash at startup
2. Slight shimmer

CWD = Eaton's Cooper Wiring Device Business

Dimmer Rating - Load Type

INC = Incandescent

HAL = Halogen

FLR = Fluorescent

MLV = Magnetic Low Voltage

ELV = Electric Low Voltage

CFL = Compact Fluorescent

LED = Light Emitting Diode

RA4 & RA56 - 90CRI - 3000K, 3500K, 4000K and RL4 & RL56 - 90CRI - 3000K, 3500K, 4000K

RA4 Series

RA406930WH
RA406930WHR

RA56 Series

RA5606930WH
RA5606930WHR

RL4 Series - 90CRI

RL460WH930PK
RL460WH935PK
RL460WH930
RL460WH935

RL56 Series - 90CRI

RL560WH6930
RL560SN6930
RL560WH6935
RL560WH6930R
RL560WH6935R

LED Rated Dimmers

| Dimmer Make | Dimmer Series | Dimmer Model # | Types of Dimmer | Dimmer Max Wattage | Minimum Luminaires (per circuit) | Maximum Recommended Luminaires (per circuit) | Max Dimming percentage (%) | Min Dimming percentage (%) | Start Time |
|-------------|---------------|----------------|-----------------------------|--|----------------------------------|--|----------------------------|----------------------------|------------|
| Lutron | Diva | DVCL-153P | INC/HAL/CFL/LED | 600(INC/HAL), 150 (LED/CFL) | 1 | 15 | 91% | 2% | ≤1 sec |
| Lutron | Maestro | MACL-153M | INC/CFL/LED | 600(INC), 150(LED/CFL) | 1 | 15 | 83% | 2% | ≤1 sec |
| Leviton | IllumaTech | IPL06-10Z | INC/LED/CFL | 600(INC), 150(CFL/LED) | 1 | 15 | 97% | 1% | ≤1 sec |
| Leviton | IllumaTech | 6674 | INC/LED/CFL | 600(INC), 150(CFL/LED) | 1 | 15 | 98% | 1% | ≤1 sec |
| CWD | DEVINE | DAL06P | INC/HAL/FLR/MLV/ELV/CFL/LED | 600(INC/HAL/FLR/MLV/ELV), 300(CFL/LED) | 1 | 30 | 98% | 1% | ≤1 sec |
| CWD | ACCELL | AAL06P | INC/HAL/FLR/MLV/ELV/CFL/LED | 600(INC/HAL/FLR/MLV/ELV), 300(CFL/LED) | 1 | 30 | 98% | 1% | ≤1 sec |
| CWD | TRACE | TAL06P | INC/HAL/FLR/MLV/ELV/CFL/LED | 600(INC/HAL/FLR/MLV/ELV), 300(CFL/LED) | 1 | 30 | 98% | 1% | ≤1 sec |
| CWD | SKYE | SAL06P | INC/HAL/FLR/MLV/ELV/CFL/LED | 600(INC/HAL/FLR/MLV/ELV), 300(CFL/LED) | 1 | 30 | 98% | 1% | ≤1 sec |
| CWD | SKYE | SLC03PC-PTA | INC/HAL/CFL/LED | 600(INC/HAL), 300(CFL/LED) | 1 | 30 | 99% | 1% | ≤1 sec |
| CWD | DEVINE | DLC03P | INC/HAL/CFL/LED | 600(INC/HAL), 300(CFL/LED) | 1 | 30 | 97% | 1% | ≤1 sec |

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Dimmer Rating - Load Type

INC = Incandescent

HAL = Halogen

FLR = Fluorescent

MLV = Magnetic Low Voltage

ELV = Electric Low Voltage

CFL = Compact Fluorescent

LED = Light Emitting Diode

RA4 & RA56 - 90CRI - 2700K and RL4 & RL56 - 90CRI - 2700K & 3000K

RL4 Series - 90CRI

RL460WH927PK
RL460SN927PK
RL460SN930

RL56 Series - 90CRI

RL560WH6927
RL560SN6927

RA4 Series

RA406927WH
RA406927NFLWH

RA56 Series

RA5606927WH
RA5606927NFLWH

LED Rated Dimmers

| Dimmer Make | Dimmer Series | Dimmer Model # | Types of Dimmer | Dimmer Max Wattage | Minimum Luminaires (per circuit) | Maximum Recommended Luminaires (per circuit) | Max Dimming percentage (%) | Min Dimming percentage (%) | Start Time |
|-------------|---------------|----------------|-----------------------------|--|----------------------------------|--|----------------------------|----------------------------|---------------------|
| Lutron | Diva | DVCL-153P | INC/HAL/CFL/LED | 600(INC/HAL), 150 (LED/CFL) | 1 | 15 | 89% | 1% | ≥1 sec |
| Lutron | Maestro | MACL-153M | INC/CFL/LED | 600(INC), 150(LED/CFL) | 1 | 15 | 81% | 1% | ≥1 sec |
| Leviton | IllumaTech | IPL06-10Z | INC/LED/CFL | 600(INC), 150(CFL/LED) | 1 | 15 | 92% | 1% | ≥1 sec |
| Leviton | IllumaTech | 6674 | INC/LED/CFL | 600(INC), 150(CFL/LED) | 1 | 15 | 95% | 1% | ≤1 sec |
| CWD | DEVINE | DAL06P | INC/HAL/FLR/MLV/ELV/CFL/LED | 600(INC/HAL/FLR/MLV/ELV), 300(CFL/LED) | 1 | 30 | 98% | 1% | ≤1 sec ² |
| CWD | ACCELL | AAL06P | INC/HAL/FLR/MLV/ELV/CFL/LED | 600(INC/HAL/FLR/MLV/ELV), 300(CFL/LED) | 1 | 30 | 98% | 1% | ≤1 sec ¹ |
| CWD | TRACE | TAL06P | INC/HAL/FLR/MLV/ELV/CFL/LED | 600(INC/HAL/FLR/MLV/ELV), 300(CFL/LED) | 1 | 30 | 98% | 1% | ≤1 sec |
| CWD | SKYE | SAL06P | INC/HAL/FLR/MLV/ELV/CFL/LED | 600(INC/HAL/FLR/MLV/ELV), 300(CFL/LED) | 1 | 30 | 97% | 1% | ≤1 sec |
| CWD | SKYE | SLC03PC-PTA | INC/HAL/CFL/LED | 600(INC/HAL), 300(CFL/LED) | 1 | 30 | 98% | 1% | ≤1 sec |
| CWD | DEVINE | DLC03P | INC/HAL/CFL/LED | 600(INC/HAL), 300(CFL/LED) | 1 | 30 | 100% | 1% | ≤1 sec |

1. Flash at startup
2. Slight shimmer

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Dimmer Rating - Load Type

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ELV = Electric Low Voltage

CFL = Compact Fluorescent

LED = Light Emitting Diode

Dimmer Notes:

- 1) Start time is measured at the lowest dimmer setting.
- 2) Some LED rated dimmers have a "rapid start" design used to provide a momentary power boost for LED and CFL lamps during start-up. When a LED luminaire is on a dimmer with "rapid start" the boost may cause a momentary flash of the LED lighting. This "flash" is generated by the dimmer, and may be more noticeable when the dimmer is at a low setting. A solution is available in the following CWD dimmers which provide adjustment capability of the "rapid start": Devine (DAL06P), Accell (AL06P), and Trace (TAL06P). Refer to product specifications online at www.cooperwiringdevices.com for more details.

Dimming Guide Disclaimer:

- 1) CC is Cooper Controls, part of Eaton's Cooper Lighting business. CWD is Eaton's Cooper Wiring Devices business. Cooper Controls and Cooper Wiring Devices brand names, where identified above, are trade names or trademarks of Eaton or its Affiliates.
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- 2) Testing conducted by Cooper Lighting is not a substitute for and does not imply certification by an independent laboratory or any other standards certification.
Refer to the manufacturer specifications for more detailed information on product certifications and standards.
- 3) This is a representative list of typical dimmers as tested by Cooper Lighting for performance with the designated LED luminaires only. Test data contained in this literature is based upon dimmers obtained in the marketplace. Information about these other manufacturers products is obtained from packaging and published information made available by the manufacturer and is deemed to be reliable, but has not been verified.
Dimmer performance and perceived limitations of the dimmers are based on factors outside of Cooper Lighting's control. The specifications of these dimming controls and their conditions of use may change without notice to Cooper Lighting or any other user.
Cooper Lighting makes no specific recommendation on product selection and there are no warranties of performance or compatibility implied.
Installer must ensure proper local and national electrical codes are followed; and that the dimmer application and condition of use is per dimmer manufacturer instructions and guidelines.

Application Note - H277, H347 and H347200 step-down transformers are qualified to drive multiple Halo LED on a single circuit in Non-IC construction. Installation of these transformers with individual LED fixtures on circuits with multiple LED loads is not recommended. This is not recommended due to resulting multiple inductive currents pulled by each transformer; in this situation the majority of the power would then be reactive (VARS) and not real (WATTS). If H277, H347 or H347200 transformers should be used individually on each LED fixture in a single circuit, then that circuit should be sized for lowered power factor as well as increased apparent power on the circuit. H277, H347 and H347200 are UL/cUL listed for use with Halo recessed housings: H750T, H750TCP, H7T, H7TNB, H7RT.

Step Down Transformers

H277 = Steps 277 line voltage down to 120 volts. Attaches to knockout on first fixture’s junction box in a circuit and is 300VA rated. H277 is a UL recognized Component listed under the luminaire UL/cUL listing for Halo Non-IC housings.

H347 and H347200 = Steps 347 line voltage down to 120 volts. Attaches to knockout on first fixture’s junction box in a circuit. H347 is 75VA and H347200 is 200VA rated. H347 is a CSA/UL Listed Component for use under the luminaire UL/cUL listing with Halo Non-IC housings.

Transformer Load - H277 (300VA)

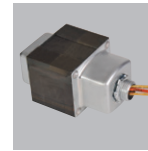
1. H277 Transformer at full loading consumes a maximum of 16W of power.
2. When a dimmer or switch is on the secondary (120V) side of the transformer, power is consumed by the transformer when the dimmer or switch is in “OFF” mode at 6.5W and in “ON” mode at 16W maximum under full loading.
3. When a dimmer or switch is on the primary (277V) side ahead of the transformer, power is consumed only in “ON” mode to a maximum of 16W under full loading. (Use of a dimmer ahead of the transformer is not recommended)

Transformer Load - H347 (75VA)

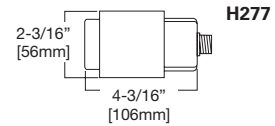
1. H347 Transformer at full loading consumes a maximum of 15W of power.
2. When a dimmer or switch is on the secondary (120V) side of the transformer, power is consumed by the transformer when the dimmer or switch is in “OFF” mode at 2.5W and in “ON” mode at 15W maximum under full loading.
3. When a switch is on the primary (347V) side ahead of the transformer, power is consumed only in “ON” mode to a maximum of 15W under full loading. (Use of a dimmer ahead of the transformer is not recommended)

Transformer Load - H347200 (200VA)

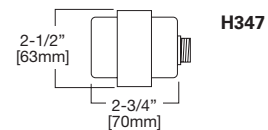
1. H347200 Transformer at full loading on 120V side consumes a maximum of 28W of power.
2. When a dimmer or switch is on the secondary (120V) side of the transformer, power is consumed by the transformer when the dimmer or switch is in “OFF” mode at 9.2W and in “ON” mode at 28W maximum under full loading.
3. When a switch is on the primary (347V) side ahead of the transformer, power is consumed only in “ON” mode to a maximum of 28W under full loading. When a switch is on the primary (277V) side ahead of the transformer, power is consumed only in “ON” mode to a maximum of 12W under full loading. (Use of a dimmer ahead of the transformer is not recommended)



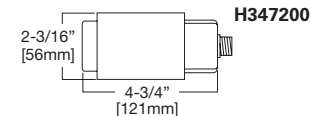
H277
277V Step Down Transformer,
300VA



H347
347V Step Down Transformer,
75VA

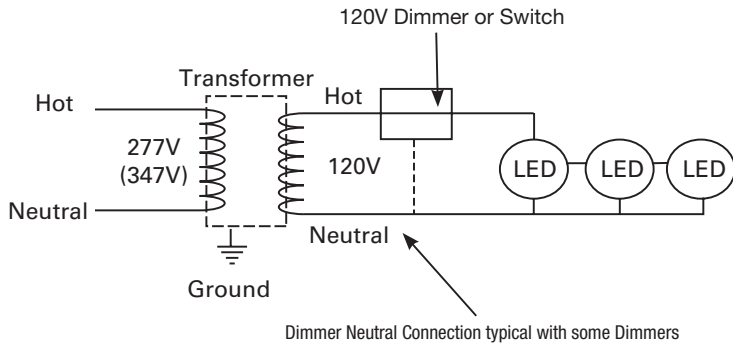


H347200
347V Step Down Transformer,
200VA

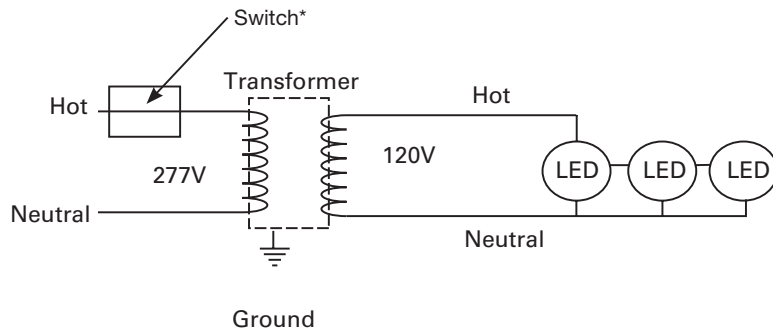


| RL56 Retrofit LED Downlight Series | | | |
|--|-----------|-------------------|-------------------|
| RL56 Maximum Units on Step Down Transformer Powered Circuits | | | |
| | VA Rating | Max # of Fixtures | Max # of Fixtures |
| H277 | 300 | 18 | 16 |
| H347 | 75 | 4 | 4 |
| H347200 | 200 | 12 | 10 |

Transformer with Dimmer/Switch on 120V Secondary

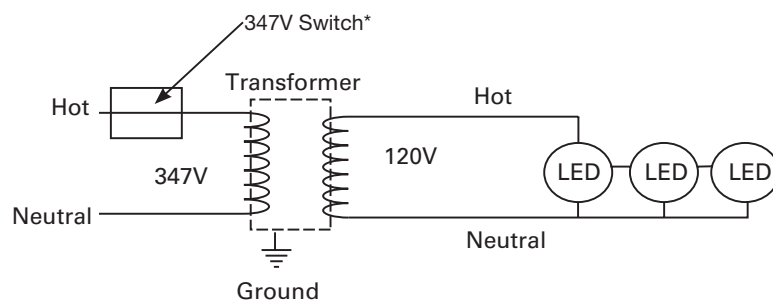


Transformer with Switch on 277V Primary



*Use of a dimmer ahead of the transformer is not recommended

Transformer with Switch on 347V Primary



*Use of a dimmer ahead of the transformer is not recommended