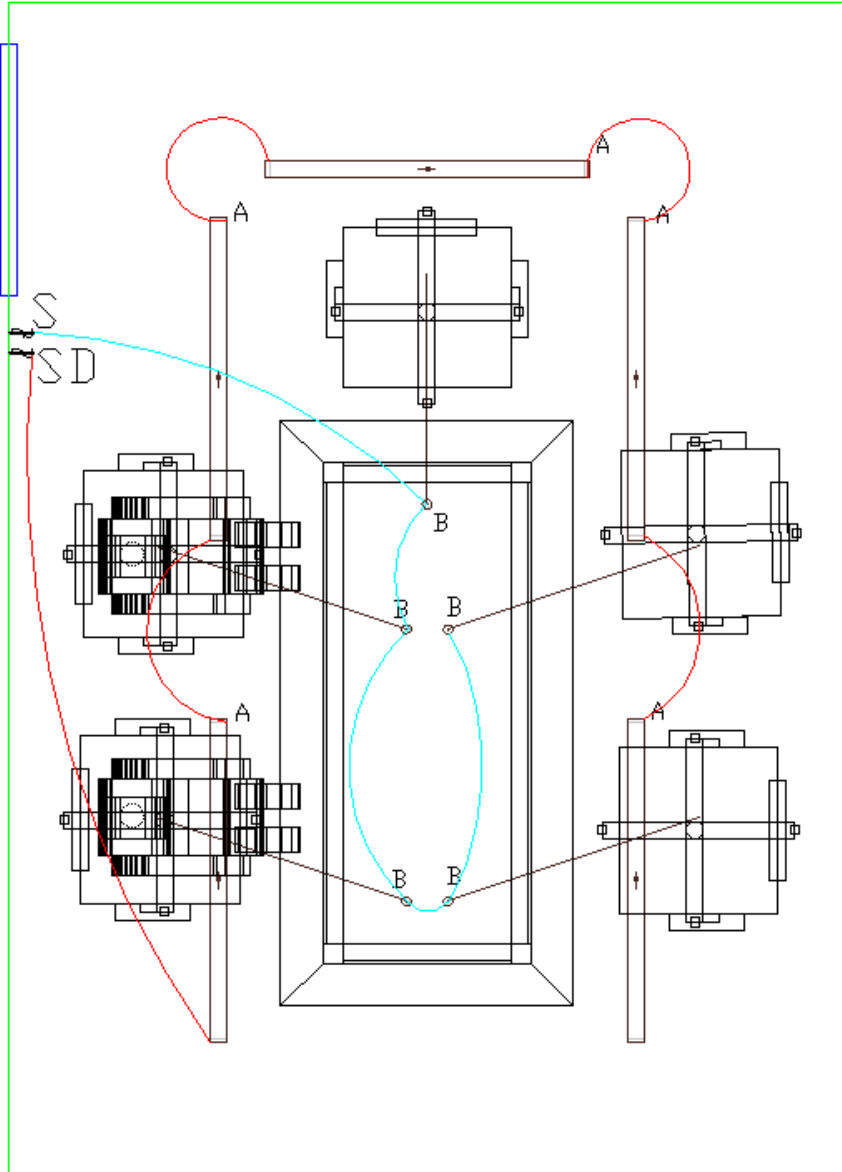


Eric Singley  
Countrywide Conference Room  
February 03, 2006

All files used are located at  
P:/thesis/Feb3



CKT A

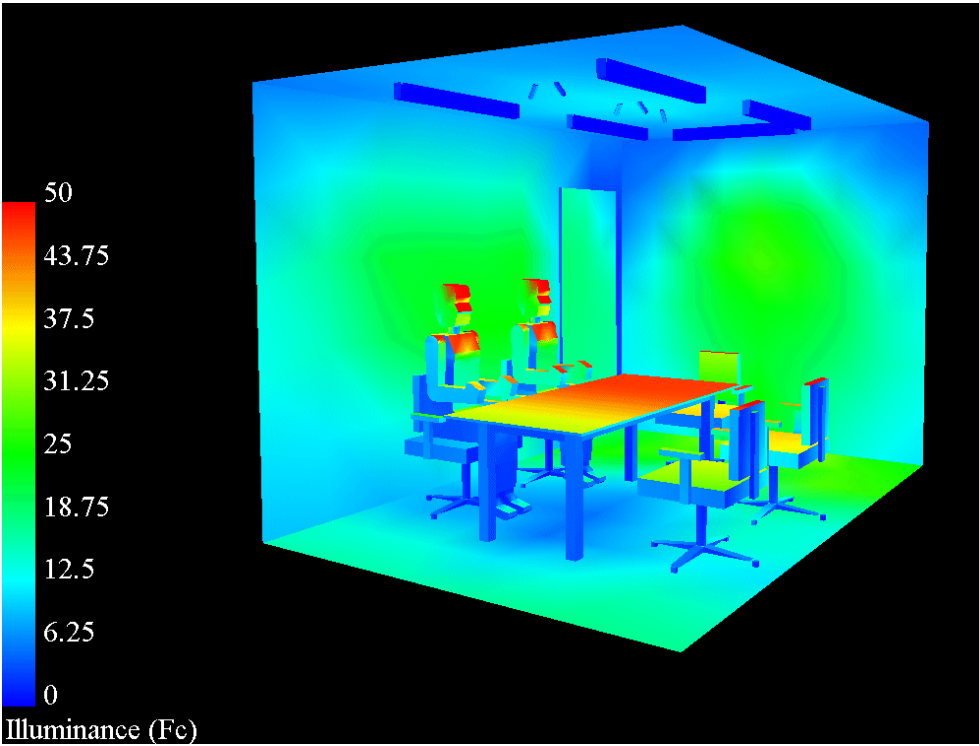
(1) F28T5  
1x4 Direct Fixture

CKT B

Halogen MR11 Spot  
Directional Spot  
Fixture

S : Traditional  
Switch

SD : Dimming  
Switch by  
Lutron (spec  
sheet available)



Luminaire Data: Fixture (A)

Lamp Data:

Manufacturer: Se 'lux International  
Catalog number: M6R1-1T5-MP

Type and Color: FP28/841/ECO  
Number per luminaire: 1  
Total lumens per luminaire: 2600

<u>Room surface dirt depreciation (RSDD)</u>	% Expected DD : 15 Distribution Direct RCR 1.57
RSDD :	0.97
<u>Lamp lumen depreciation (LLD)</u>	
Percent Rated Lumens vs. lamp life chart on T5 lamp cut sheat.	LLD 0.94
<u>Ballast factor</u>	
Ballast Factor: greater than .85 for T8 and T5 twin-tube lamps, equal to 1.0 for T5 lamps	
<u>Luminaire dirt depreciation (LDD)</u>	
Maintenance Category	IV
Operating Atmosphere	Clean
Maintenance Period	18 months
LDD	0.85

Luminaire Data: Fixture (B)

Manufacturer: ERCO  
 Catalog number: 88100000

Lamp Data:

Type and Color: 20MR11/SP/10 FTB  
 Number per luminaire: 1  
 Total lumens per luminaire: 5500 CBCP

<u>Room surface dirt depreciation (RSDD)</u>	% Expected DD : 15 Distribution Direct RCR 1.57
RSDD : 0.97	
<u>Lamp lumen depreciation (LLD)</u>	
Lumen Maintenance Curve. Image saved in cut sheat folder.	LLD 0.975
<u>Ballast factor</u>	
Halogen Lamp	
<u>Luminaire dirt depreciation (LDD)</u>	
Maintenance Category	IV
Operating Atmosphere	Clean
Maintenance Period	18 months
LDD	0.85

**Power Density**

No spot

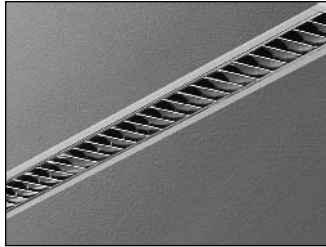
$$31W / \text{Lamp} * 5 \text{ lamps} = 155 W$$

$$155 W / 140 \text{ ft}^2 = 1.11 W/\text{ft}^2$$

w spots (nothing dimmed)

$$155W + 20W/\text{spot} * 5\text{spots} = 255 W$$

$$255 W / 140 \text{ ft}^2 = 1.82 W/\text{ft}^2$$



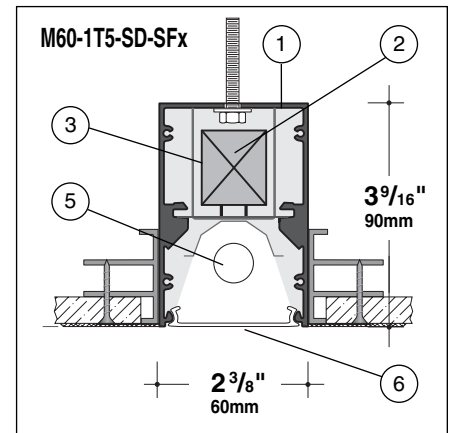
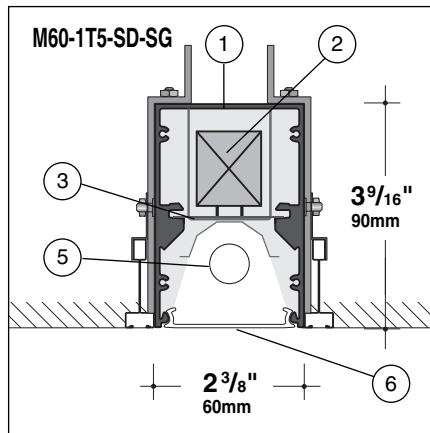
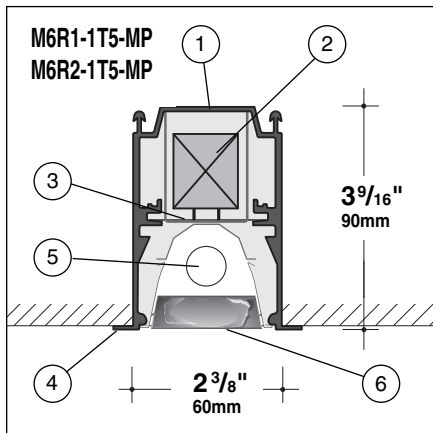
**Project** \_\_\_\_\_ **Type:** \_\_\_\_\_ **Qty** \_\_\_\_\_

**Fixture Series** \_\_\_\_\_ **Lamp Type** \_\_\_\_\_ **Shielding** \_\_\_\_\_ **Mounting** \_\_\_\_\_ **Linear Footage** \_\_\_\_\_ **Finish** \_\_\_\_\_ **Voltage** \_\_\_\_\_

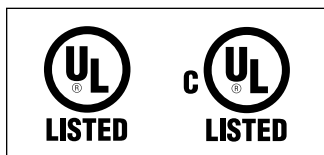
**Options** (refer to separate data sheets for ordering codes and details)

Fixture Series	Lamp Type	Shielding	Mounting	Linear Footage	Finish	Voltage	Options*
<b>M6R1</b> M60 Direct Recessed Continuous Flange  <b>M6R2</b> M60 Direct Recessed Flanged Extrusion Flush Endcap  <b>M60</b> M60 Direct Flangeless Extrusion	1T5 F28T5	<b>MP</b> Silky Specular Parabolic  <b>SD</b> Satine Lens  <b>OD</b> Extra Diffuse Lens	<b>M6R1 and M6R2 only</b> <b>SH</b> Suspension Clips <b>RC</b> Rotating Crossbars <b>R</b> 1/4 - 20 Rod <b>PM</b> Perimeter Mount <b>TS</b> 1" Studs (factory installed)	<b>004</b> 4 foot  <b>008</b> 8 foot  <b>012</b> 12 foot  For other lengths/configurations, indicate nominal length rounded to the next highest foot using three digits. Factory will supply layout drawings. Individual fixtures cannot be field joined.	<b>WH</b> White  <b>BK</b> Black  <b>SV</b> Silver  <b>SP</b> Specify RAL#	<b>120</b>  <b>277</b>  <b>347</b>	<b>TB</b> Lengths to Fit 2' Grid T-Bar Ceiling System** <b>EM</b> Stand-by Battery Pack*** (consult factory) <b>DMA</b> Digital Addressable Dimming (consult factory) <b>DM</b> Dimming*** (specify desired system) <b>FS</b> Single Fusing <b>SI</b> Satine Acrylic Inlay (for MP Louver only) <b>FW</b> Flex Whip (standard) <b>FW1</b> Flex Whip (dimming) <b>FW2</b> Flex Whip (NYC 120V) <b>FW3</b> Flex Whip (NYC 277V) <b>Track</b> (Consult Factory) <b>DL</b> Suitable for Damp Locations
	1T5HO F54T5HO		<b>M60 only</b> <b>SG</b> Slot Grid Recessed <b>SF1</b> Spackle Flange (1/2" dry wall) <b>SF2</b> Spackle Flange (5/8" dry wall) <b>DC</b> Ceiling Panels up to 2" thick (length per submittal drawings) <b>TS</b> 1" Studs (factory installed)				

\* Not all options are available with all voltages. Consult factory for details. \*\*M6R1 only, see pp. 5 and 18 for details. \*\*\*Must be low profile ballasts (1 3/16" wide x 1 3/16" high)



**Union Made**  
**Affiliated with**  
**IBEW Local 363**



**1. Housing** - Continuous, 6063-T5 extruded aluminum profile up to 16 feet long.

**2. Ballast** - Electronic, high power factor, class "P", type "A" sound rating. Specify 120v, 277v, or 347v. Ballast is factory pre-wired with leads to one end of fixture. Consult factory for ballast options.

**3. Gear Tray** - Die formed tray with specular aluminum reflector. Gear tray installs as complete electrical unit and is held in place with 1/4 turn latches. It is fully accessible from below ceiling.

**4. Flange** - (M6R1 and M6R2 only) 5/16" (8mm) wide flange is part of the main extruded body. Specify flush or flanged end plates.

**5. Lamps** - As noted (by others). Other lamp lengths or wattages available; consult factory.

**6. Shielding** - Choose between Silky Specular Parabolic Aluminum louver and Satine Acrylic Lens.

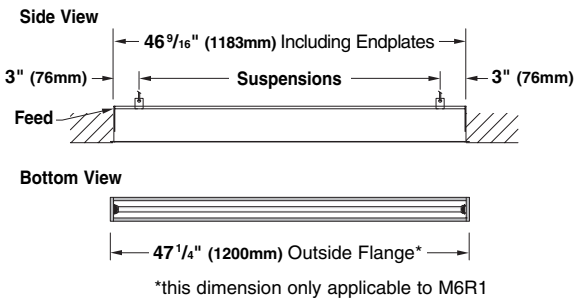
**Interior Luminaire Finish** - Standard interior colors are White (WH), Black (BK) and Silver (SV). RAL colors (SP) are available, please specify RAL#.

SELUX Corp. © 2005  
 PO Box 1060, 5 Lumen Lane  
 Highland, NY 12528-1060  
 TEL: (845) 691-7723  
 FAX: (845) 691-6749  
 E-mail: seluxus@selux.com  
 Web Site: www.selux.com/usa  
 M6R-0705-01 (ss-V1.3)

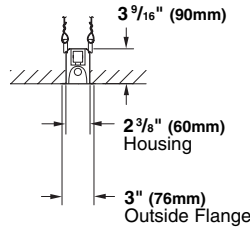
In a continuing effort to offer the best product possible, we reserve the right to change, without notice, specifications or materials that in our opinion will not alter the function of the product. Specification sheets found at www.selux.com/usa are the most recent versions and supercede all other printed or electronic versions.

## M60R1/M60R2 Layout Dimensions

### Nominal 4 foot Individual

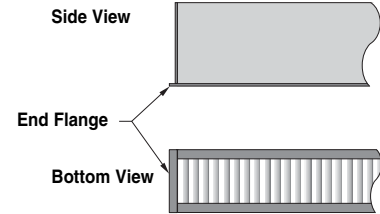


### Typical End View (for all lengths)

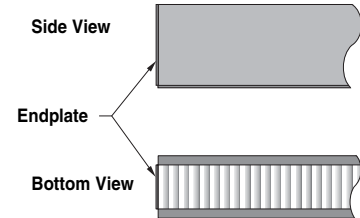


### Endcap Options

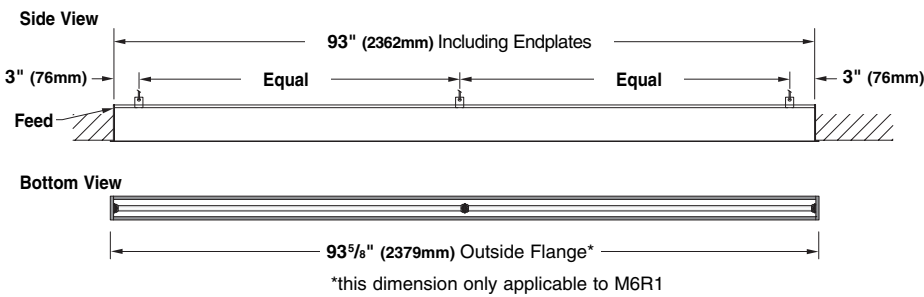
#### M1R1/M1RA1 (Continuous Flange)



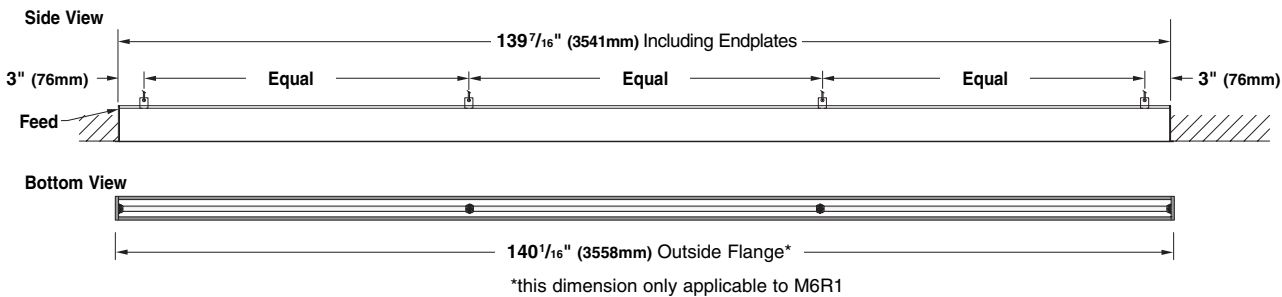
#### M1R2/ M1RA2 (Flush End)



### Nominal 8 foot Individual



### Nominal 12 foot Individual



Suspension clips supplied spaced nominally every 4 feet.  
 Fixture supplied with 7/8 knockout for feed location in end plate 3/4" below top of fixture.

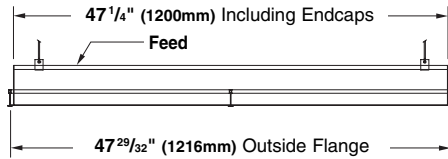
	T5 or T5HO Lamp		
	M6R1		M6R2
	Including Endplates	Outside Flange	Including Endplates
<b>4 foot individual</b>	46.57" (1183.0mm)	47.24" (1200.0mm)	46.57" (1183.0mm)
<b>8 foot individual</b>	92.99" (2362.0mm)	93.60" (2379.0mm)	92.99" (2362.0mm)
<b>12 foot individual</b>	139.41" (3541.0mm)	140.08" (3558.0mm)	139.41" (3541.0mm)

For other lengths, lamping, continuous runs or configurations please specify overall length (in feet), accessories desired and sketch/drawing of configuration. SELUX will detail project drawings upon order and supply submittal drawings for approval. Individual fixtures cannot be field joined. If you have any questions please contact SELUX customer service or applications engineering for assistance (1-800-SELUX-CS).

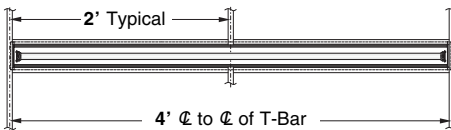
## M6R1 T-Bar Layout Dimensions (option - TB)

### Nominal 4 foot Individual

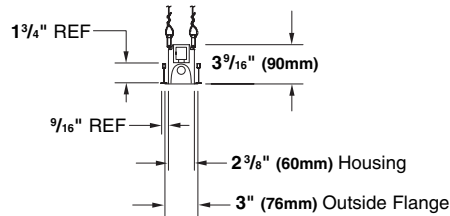
Side View



Bottom View

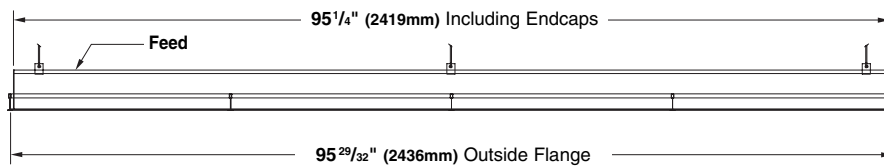


### Typical End View (all lengths)

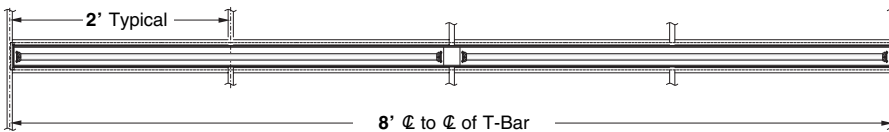


### Nominal 8 foot Individual

Side View



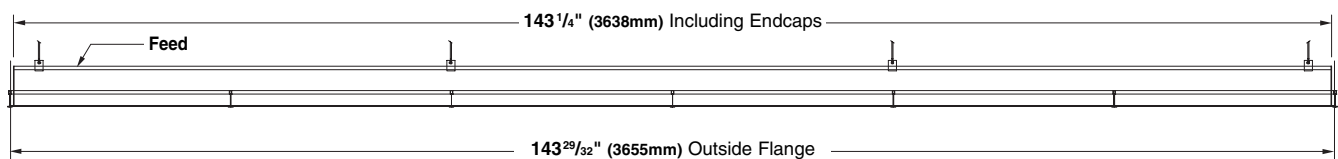
Bottom View



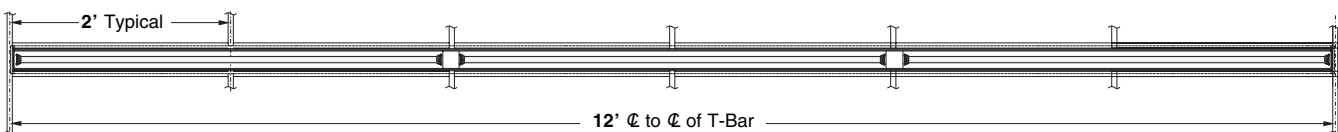
**Fixture supplied with 7/8  
knockout located 6" from end  
in top of fixture.**

### Nominal 12 foot Individual

Side View



Bottom View



For other lengths, lamping, continuous runs or configurations please specify overall length (in feet), accessories desired and sketch/drawing of configuration. SELUX will detail project drawings upon order and supply submittal drawings for approval. Individual fixtures cannot be field joined. If you have any questions please contact SELUX customer service or applications engineering for assistance (1-800-SELUX-CS).



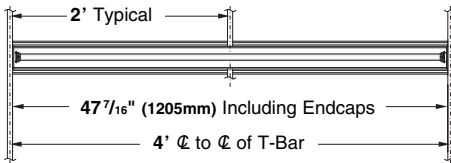
## M60 Slot Grid Layout Dimensions

### Nominal 4 foot Individual

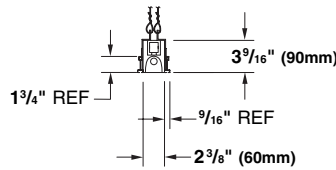
Side View



Bottom View

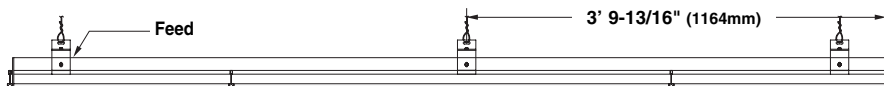


### Typical End View (all lengths)

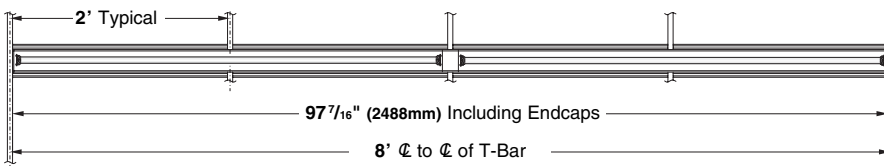


### Nominal 8 foot Individual

Side View



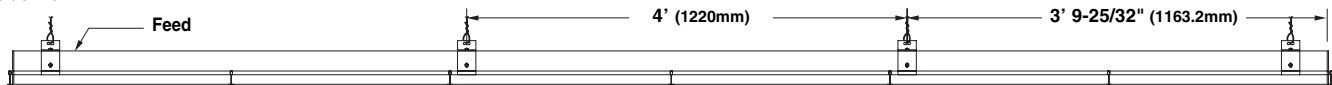
Bottom View



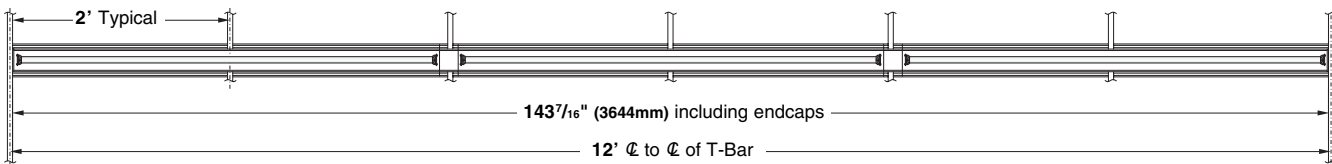
Fixture supplied with 7/8 knockout located 6" from end in top of fixture.

### Nominal 12 foot Individual

Side View



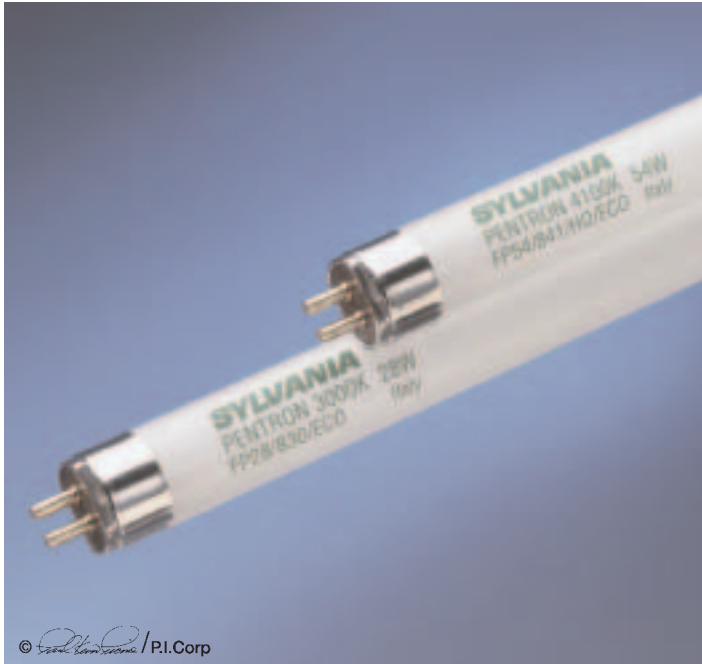
Bottom View



For other lengths, lamping, continuous runs or configurations please specify overall length (in feet), accessories desired and sketch/drawing of configuration. SELUX will detail project drawings upon order and supply submittal drawings for approval. Individual fixtures cannot be field joined. If you have any questions please contact SELUX customer service or applications engineering for assistance (1-800-SELUX-CS).

# PENTRON® ECO® & PENTRON® HO ECO®

## T5 Linear Fluorescent Lamps



- High Performance T5 lamps
  - 104 LPW max. for PENTRON ECO
  - 94 LPW max. for PENTRON HO ECO
  - Designed for high frequency electronic ballasts
- Designed to pass Federal TCLP test\*
- Nominal 2', 3', 4', and 5'
  - Approx. 2" shorter than T8 lengths
- Miniature Bi-Pin base
- 3000K, 3500K, 4100K, 6500K, 85 CRI
- 93% lumen maintenance
- FP54 average rated life increased:
  - 35,000 hrs. @12 hours/start
  - 25,000 hrs. @3 hours/start
  - all others rated for 20,000 hrs. @3 hours/start
- Greater luminaire design flexibility
- Peak lumen output at 35°C (95°F)

**SYLVANIA PENTRON ECO and PENTRON HO ECO —**  
**A new product line of slender, 5/8" diameter, T5 linear**  
**fluorescent lamps with improved system performance**  
**characteristics compared to T8 & T12 technology.**

Engineered with thermal characteristics which provide improved lumen output in luminaires. PENTRON ECO brings increased design opportunities for unique, highly efficient, low profile lighting.

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.



\* Regulations may vary. Check your local and state regulations.

### Product Availability

PENTRON	Wattage	PENTRON HO	Lamp Length	
			Nominal	Actual
	14W	24W	~2ft	549mm
	21W	39W	~3ft	849mm
	28W	54W	~4ft	1149mm
	35W	80W	~5ft	1449mm

### Application Information

#### Applications

- Indirect
- Shallow recessed
- Cove and valance
- Low profile surface mount
- Sign lighting
- Showcase lighting
- Any place controlled, high-efficiency light is desired

#### Application Notes

1. PENTRON ECO and PENTRON HO lamps are about 2" shorter than T8 & T12 bi-pin lamps.
2. Miniature Bi-Pin bases will not install into T8 & T12 sockets.
3. Miniature Bi-Pin bases require UL Listed 600 Volt rated sockets.
4. Requires high frequency programmed rapid start electronic ballasts for T5s equipped with end-of-life sensing circuit.
5. PENTRON ECO (not PENTRON HO ECO) operates at same current for uniform color and brightness between nominal 2', 3', 4', and 5' lengths.
6. Apply thermal factor in calculations for use in exterior or unheated applications.



### Sample Specification

Lamps shall be PENTRON® ECO® T5 lamps having miniature bi-pin bases and minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K & 6500K) and a Color Rendering Index of 85. The PENTRON ECO T5 lamps shall be operated on dedicated QUICKTRONIC® PS ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

Lamps shall be PENTRON T5 HO ECO lamps having miniature bi-pin bases and a minimum of 93% lumen maintenance. Lamps shall have a correlated color temperature of (3000K, 3500K, 4100K, 6500K) and a CRI of 85. The PENTRON T5 HO ECO lamps shall be operated on dedicated QUICKTRONIC PHO ballasts having a primary voltage of (120V, 277V) with complete system warranty from the manufacturer covering lamps and ballasts.

## System Comparison

### T12/SS vs. OCTRON T8 vs. PENTRON ECO T5

Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F40T12CW/SS	T12	2	Magnetic	0.88	72	4660	0.85	3960	100%	55
F032/841	T8	2	System 32	0.90	59	5310	0.92	4890	123%	83
FP28/841	T5	2	System PS	1.0	62	5200	0.93	4836	122%	78
FP54/841/HO/ECO	T5	1	System PHO	1.0	61	4450	0.93	4140	105%	68

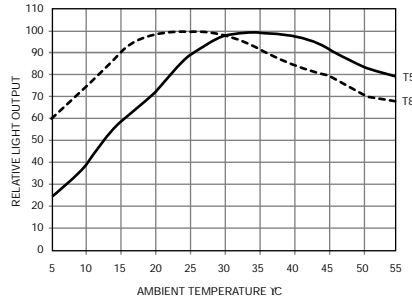
### T12HO/SS vs. OCTRON T8 vs. PENTRON T5 HO ECO

Lamp	Lamp Type	# Lamps	Ballast	BF	System Watts	Initial System Lumens	Lumen Maint.	Mean System Lumens	Relative Light Output	Mean System LPW
F96T12/CW/HO/SS	T12	1	Magnetic	0.94	122	7520	0.82	6170	100%	51
F096/841	T8	1	System 59	1.13	70	6670	0.92	6140	100%	88
FP80/841/HO/ECO	T5	1	System PHO	1.0	89	6150	0.93	5720	93%	64

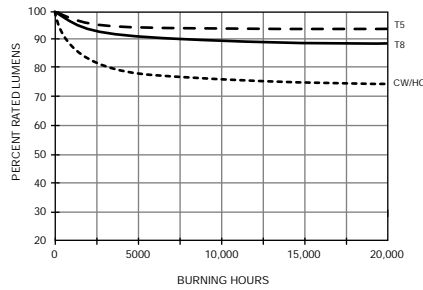
\* Comparison at 25°C

## Technical Information

Lumen Output vs. Temperature T8/T5

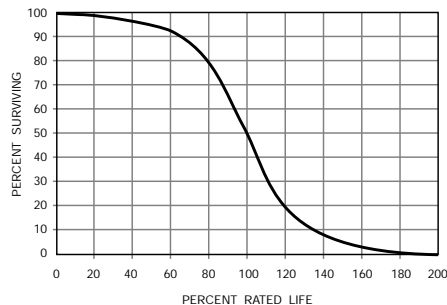


Fluorescent Lamp Lumen Maintenance

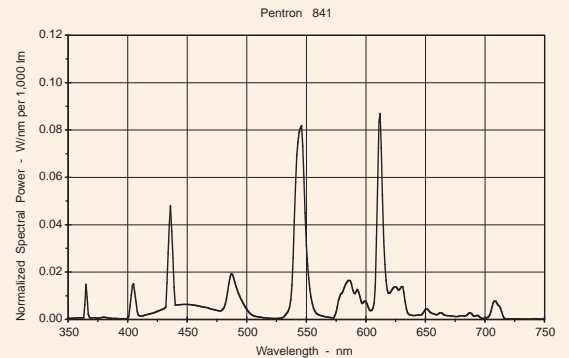
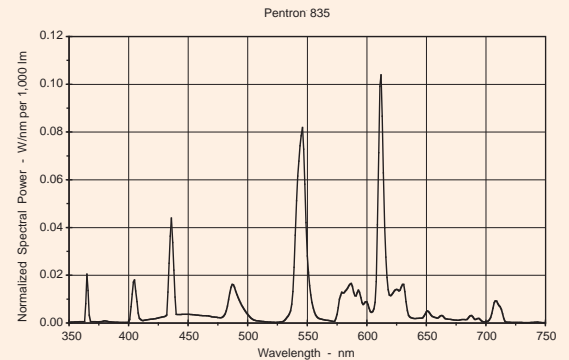
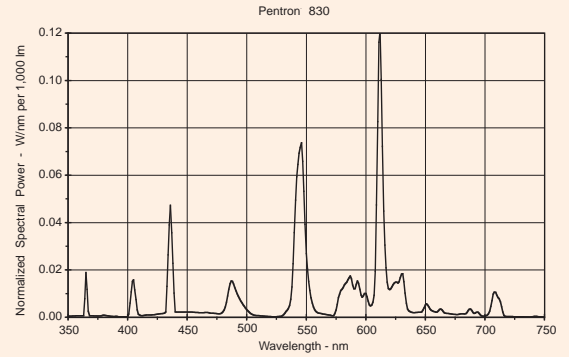


\* Lumen output continues to decrease throughout the life of a fluorescent lamp.

Typical Fluorescent Lamp Mortality



Spectral Power Distributions



## Specify Performance

OSRAM SYLVANIA offers an Exclusive System Warranty: QUICK 60+® LIMITED WARRANTY

One of the key benefits of the OSRAM SYLVANIA PENTRON ECO & PENTRON HO ECO lamps is the operation of the lamps on an electronic ballast. QUICKTRONIC PS & QUICKTRONIC PHO ballasts operate the lamps at full light output with optimal system performance. But more importantly, you receive the benefits of the most comprehensive system warranty in the business.

### What is covered:

FP54/800HO/ECO lamps for up to 36 months

All other PENTRON ECO and PENTRON HO ECO lamps for up to 24 months

QUICKTRONIC PS & QUICKTRONIC PHO ballasts for up to 60 months

If lamps are group re-lamped the lamp warranty can be renewed for an additional period.

See the QUICK 60+ Warranty Guide for additional information.

## Key Ballast Features

100% ballast factor

- QUICKSENSE® technology, (end-of-lamp-life sensing)
- PROStart™, optimal starting conditions that provides up to 100,000 switching cycles for use on occupancy sensors and building control systems
- High Power Factor, (>98%)
- Low Harmonic Distortion, (<10%, with inrush limiting circuitry)
- Starting Temperature: 0°F
- Remote Mounting Distance up to 19 feet, depending on model
- Dimming ballast available: System 54PHO-DIM

See OSRAM SYLVANIA's "BALLAST TECHNOLOGY & SPECIFICATION GUIDE" for further details.

## System Performance Guide\*

### QUICKTRONIC PS ELECTRONIC PENTRON FLUORESCENT SYSTEMS

Item Number	Description	Voltage VAC	Lamp** Type	Rated Lumens* (LM)	No. of Lamps	Ballast Factor (BF)	System Lumens*	Input Wattage (W)	System Efficacy* (lm/W)
49681	QTP1X28/120PSN-E	120	FP28T5/800/ECO	2600	1	1.00	2600	32	81
49682	QTP1X28/277PSN-E	277	FP28T5/800/ECO	2600	1	1.00	2600	32	81
49683	QTP2X28/120PSN-E	120	FP28T5/800/ECO	2600	2	1.00	5200	62	84
49684	QTP2X28/277PSN-E	277	FP28T5/800/ECO	2600	2	1.00	5200	62	84
50890	QTP1X28/120PSN-F	120	FP28T5/800/ECO	2600	1	1.00	2600	32	81
50900	QTP1X28/277PSN-F	277	FP28T5/800/ECO	2600	1	1.00	2600	31	84
50910	QTP2X28/120PSN-F	120	FP28T5/800/ECO	2600	2	1.00	5200	66	79
50920	QTP2X28/277PSN-F	277	FP28T5/800/ECO	2600	2	1.00	5200	65	80

### QUICKTRONIC PHO ELECTRONIC PENTRON HO FLUORESCENT SYSTEMS

Item Number	Description	Voltage VAC	Lamp** Type	Rated Lumens* (LM)	No. of Lamps	Ballast Factor (BF)	System Lumens*	Input Wattage (W)	System Efficacy* (lm/W)
49631	QTP1X39-24/120PSN-E	120	FP24T5/HO/800/ECO	1750	1	1.00	1750	28	63
49632	QTP1X39-24/277PSN-E	277	FP24T5/HO/800/ECO	1750	1	1.00	1750	27	65
49633	QTP2X39-24/120PSN-E	120	FP24T5/HO/800/ECO	1750	2	1.00	3500	54	65
49634	QTP2X39-24/277PSN-E	277	FP24T5/HO/800/ECO	1750	2	1.00	3500	53	66
49631	QTP1X39-24/120PSN-E	120	FP39T5/HO/800/ECO	3100	1	1.00	3100	42	74
49632	QTP1X39-24/277PSN-E	277	FP39T5/HO/800/ECO	3100	1	1.00	3100	42	74
49633	QTP2X39-24/120PSN-E	120	FP39T5/HO/800/ECO	3100	2	1.00	6200	87	71
49634	QTP2X39-24/277PSN-E	277	FP39T5/HO/800/ECO	3100	2	1.00	6200	85	73
49651	QTP1X54/120PSN-E	120	FP54T5/HO/800/ECO	4450	1	1.00	4450	62	72
49652	QTP1X54/277PSN-E	277	FP54T5/HO/800/ECO	4450	1	1.00	4450	61	73
49653	QTP2X54/120PSN-E	120	FP54T5/HO/800/ECO	4450	2	1.00	8900	120	74
49654	QTP2X54/277PSN-E	277	FP54T5/HO/800/ECO	4450	2	1.00	8900	117	76
49660	QTP1X80/120PSN-E	120	FP80T5/HO/800/ECO	6150	1	1.00	6150	91	68
49670	QTP1X80/277PSN-E	277	FP80T5/HO/800/ECO	6150	1	1.00	6150	90	68

\* Comparison at 25°C for 830, 835 & 841 lamps. Lumens slightly lower for 865 lamps.

\*\* Also compatible with other manufacturers' equivalent lamp types that meet ANSI standards.

## Ordering and Specification Information

### PENTRON

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	Nominal length (mm)	Average Rated Life (hours)*	Color Temp	CRI
20907	FP14/830/ECO	Miniature Bi-Pin	14	1200	1350	T-5	549	20,000	3000K	85
20908	FP14/835/ECO	Miniature Bi-Pin	14	1200	1350	T-5	549	20,000	3500K	85
20914	FP14/841/ECO	Miniature Bi-Pin	14	1200	1350	T-5	549	20,000	4100K	85
20988	FP14/865/ECO	Miniature Bi-Pin	14	1100	1300	T-5	549	20,000	6500K	85
20919	FP21/830/ECO	Miniature Bi-Pin	21	1900	2100	T-5	849	20,000	3000K	85
20921	FP21/835/ECO	Miniature Bi-Pin	21	1900	2100	T-5	849	20,000	3500K	85
20924	FP21/841/ECO	Miniature Bi-Pin	21	1900	2100	T-5	849	20,000	4100K	85
20989	FP21/865/ECO	Miniature Bi-Pin	21	1750	2000	T-5	849	20,000	6500K	85
20868	FP28/830/ECO	Miniature Bi-Pin	28	2600	2900	T-5	1149	20,000	3000K	85
20901	FP28/835/ECO	Miniature Bi-Pin	28	2600	2900	T-5	1149	20,000	3500K	85
20902	FP28/841/ECO	Miniature Bi-Pin	28	2600	2900	T-5	1149	20,000	4100K	85
20990	FP28/865/ECO	Miniature Bi-Pin	28	2400	2750	T-5	1149	20,000	6500K	85
20925	FP35/830/ECO	Miniature Bi-Pin	35	3300	3650	T-5	1449	20,000	3000K	85
20926	FP35/835/ECO	Miniature Bi-Pin	35	3300	3650	T-5	1449	20,000	3500K	85
20927	FP35/841/ECO	Miniature Bi-Pin	35	3300	3650	T-5	1449	20,000	4100K	85

\*Based on 3 hrs. per start on electronic programmed start

### PENTRON HO

Item Number	Ordering Abbreviation	Base	Watts	Initial Lumens @25°C	Initial Lumens @35°C	Bulb	Nominal length (mm)	Average Rated Life (hours)*	Color Temp	CRI
20928	FP24/830/HO/ECO	Miniature Bi-Pin	24	1750	2000	T-5	549	20,000	3000K	85
20929	FP24/835/HO/ECO	Miniature Bi-Pin	24	1750	2000	T-5	549	20,000	3500K	85
20931	FP24/841/HO/ECO	Miniature Bi-Pin	24	1750	2000	T-5	549	20,000	4100K	85
20932	FP39/830/HO/ECO	Miniature Bi-Pin	39	3100	3500	T-5	849	20,000	3000K	85
20933	FP39/835/HO/ECO	Miniature Bi-Pin	39	3100	3500	T-5	849	20,000	3500K	85
20934	FP39/841/HO/ECO	Miniature Bi-Pin	39	3100	3500	T-5	849	20,000	4100K	85
20903	FP54/830/HO/ECO	Miniature Bi-Pin	54	4450	5000	T-5	1149	25,000 <sup>1</sup>	3000K	85
20904	FP54/835/HO/ECO	Miniature Bi-Pin	54	4450	5000	T-5	1149	25,000 <sup>1</sup>	3500K	85
20906	FP54/841/HO/ECO	Miniature Bi-Pin	54	4450	5000	T-5	1149	25,000 <sup>1</sup>	4100K	85
20862	FP54/865/HO/ECO	Miniature Bi-Pin	54	4050	4750	T-5	1149	25,000 <sup>1</sup>	6500K	85
20935	FP80/830/HO/ECO	Miniature Bi-Pin	80	6150	7000	T-5	1449	20,000	3000K	85
20936	FP80/835/HO/ECO	Miniature Bi-Pin	80	6150	7000	T-5	1449	20,000	3500K	85
20937	FP80/841/HO/ECO	Miniature Bi-Pin	80	6150	7000	T-5	1449	20,000	4100K	85

\*Based on 3 hrs. per start on electronic programmed rapid start

1. Average life for FP54 lamps at 12 hrs. per start on electronic programmed rapid start ballasts is 35,000 hrs.

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Phone: 1-800-263-2852  
Fax: 1-800-667-6772

#### Special Markets

Phone: 1-800-265-2852  
Fax: 1-800-667-6772

## Ordering Guide

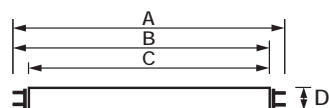
### PENTRON FP28/830

FP	28	/	8	30	/	ECO
Fluorescent	Wattage:		8 = 85 CRI	30 = 3000K		ECOLOGIC®
PENTRON T5	14, 21, 28			35 = 3500K		
	or 35 watts			41 = 4100K		
				65 = 6500K		

### PENTRON HO FP54/830/HO

FP	80	/	8	30	/	HO	/	ECO
Fluorescent	Wattage:		8 = 85 CRI	30 = 3000K		High Output		ECOLOGIC®
PENTRON T5 HO	24, 39, 54			35 = 3500K				
	or 80 watts			41 = 4100K				
				65 = 6500K				

## Dimensions



Ordering Abbreviation	(A) Max. Overall Length mm (in)	(B) Max. Base Face to Opposite Pin mm (in)	(C) Max. Base Face to Base Face mm (in)	(D) Max. Outside Diameter mm (in)
FP14 & FP24/HO	563.2 (22.17)	556.1 (21.89)	549.0 (21.61)	17.0 (0.67)
FP21 & FP39/HO	863.2 (33.89)	856.1 (33.70)	849.0 (33.43)	17.0 (0.67)
FP28 & FP54/HO	1163.2 (45.80)	1156.1 (45.52)	1149.0 (45.24)	17.0 (0.67)
FP35 & FP80/HO	1463.2 (57.61)	1456.1 (57.33)	1449.0 (57.05)	17.0 (0.67)

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## Eco-10 Overview

Eco-10 lighting management electronic dimming ballasts are designed to maximize the benefits of a lighting management system. Eco-10 offers 100% to 10% dimming, and is ideal for use in any space where saving energy is the primary goal of the design.

### Features

- Continuous, flicker-free dimming from 100% to 10%
- Standard 3-wire line-voltage phase-control technology for consistent fixture-to-fixture dimming performance
- Models available for T5 and T5-HO linear, T8 linear and U-bent, and T5 twin-tube lamps
- Programmed rapid start design preheats lamp cathodes before applying full arc voltage
- Lamps turn on to any dimmed level without flashing to full brightness
- Low harmonic distortion throughout the entire dimming range maintains power quality
- Frequency of operation ensures that ballast does not interfere with infrared devices operating between 38 and 42 kHz
- Inrush current limiting circuitry eliminates circuit breaker tripping, switch arcing, and relay failure
- End-of-lamp-life protection circuitry (for T5 and T5-HO linear models) ensures safe operation throughout entire lamp life cycle
- For linear lamps, ballasts maintain consistent light output for different lamp lengths, ensuring uniformity
- Ultra-quiet operation
- Protected from miswires of any input power to control lead
- 100% compatible with all Lutron 3-wire fluorescent controls
- 100% performance tested at factory
- Designed and assembled in the USA
- 5-year limited warranty with Lutron field service commissioning (3-year standard warranty) from date of purchase



**Eco-10, case type C**

1.18”w (30mm) x 1.00”h (25mm) x 18.00”l (457mm)



**Eco-10, case type D**

1.58”w (40mm) x 1.00”h (25mm) x 9.50”l (241mm)



**Eco-10, case type F**

2.38”w (60mm) x 1.50”h (38mm) x 9.50”l (241mm)

<b>Job Name:</b>	<b>Model Numbers:</b>
<b>Job Number:</b>	

## Specifications

### Performance



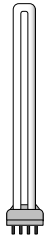
- Dimming Range: 100% to 10% measured relative light output
- Lamp Starting: programmed rapid start
- Minimum Lamp Starting Temperature: 10°C (50°F)
- Ambient Temperature Operating Range: 10°C (50°F) to 60°C (140°F)
- Relative Humidity: maximum 90% non-condensing
- Operating Voltage: 120V or 277V at 60Hz
- Lamp Current Crest Factor: less than 1.7
- Lamp Flicker: none visible
- Light Output Variation: constant  $\pm 2\%$  light output for line voltage variations of  $\pm 10\%$
- Lamp Life: average lamp life meets or exceeds rating of lamp manufacturer
- Ballast Factor: greater than .85 for T8 and T5 twin-tube lamps, equal to 1.0 for T5 lamps
- Power Factor: greater than .95
- Total Harmonic Distortion (THD): less than 20%
- Maximum Inrush Current: 7 amps per ballast at 120V, 3 amps per ballast at 277V
- Sound Rating: Inaudible in a 27dBa ambient
- Maximum Ballast Case Temperature: 75°C (167°F)

### Standards

- UL Listed (evaluated to the requirements of UL935)
- CSA certified (evaluated to the requirements of C22.2 No. 74)
- Class P thermally protected
- Meets ANSI C82.11 High Frequency Ballast Standard
- Meets FCC Part 18 Non-Consumer requirements for EMI/RFI emissions
- Meets ANSI C62.41 Category A surge protection standards up to and including 4kV
- Manufacturing facilities employ ESD reduction practices that comply with the requirements of ANSI/ESD S20.20
- Lutron Quality Systems registered to ISO 9001.2000

<b>Job Name:</b>	<b>Model Numbers:</b>
<b>Job Number:</b>	

Eco-10 Ballast Models


Lamp Type				120 VOLTS		277 VOLTS	
	Lamp Watts (length)	Lamps per ballast	Case Type	Ballast Current (amps)	Eco-10 Model Number	Ballast Current (amps)	Eco-10 Model Number
 5/8" diameter <b>T5 linear</b>	14W (22")	1	C	.17	E 3 T514 C 120 1	.08	E 3 T514 C 277 1
		2	C	.32	E 3 T514 C 120 2	.14	E 3 T514 C 277 2
	21W (34")	1	C	.25	E 3 T521 C 120 1	.11	E 3 T521 C 277 1
		2	C	.43	E 3 T521 C 120 2	.19	E 3 T521 C 277 2
	28W (45.3")	1	C	.30	ECO-T528-120-1	.14	ECO-T528-277-1
		2	C	.55	ECO-T528-120-2	.25	ECO-T528-277-2
 5/8" diameter <b>T5-HO linear high output</b>	24W (21.5")	1	C	.26	ECO-T524-120-1	.13	ECO-T524-277-1
		2	C	.45	ECO-T524-120-2	.20	ECO-T524-277-2
	39W (33.4")	1	C	.38	ECO-T5H39-120-1	.17	ECO-T5H39-277-1
		2	C	.76	ECO-T5H39-120-2	.31	ECO-T5H39-277-2
	54W (45.3")	1	C	.58	ECO-T554-120-1	.25	ECO-T554-277-1
		2	C	1.1	ECO-T554-120-2	.45	ECO-T554-277-2
 5/8" diameter <b>T5 Twin-Tube</b>	36/39W (16")	1	F	.33	ECO-T539-120-1	.14	ECO-T539-277-1
		2	F	.58	ECO-T539-120-2	.25	ECO-T539-277-2
		3	F	.85	ECO-T539-120-3	.35	ECO-T539-277-3
	40W (22")	1	F	.33	ECO-T540-120-1	.14	ECO-T540-277-1
		2	F	.61	ECO-T540-120-2	.25	ECO-T540-277-2
		3	F	.88	ECO-T540-120-3	.38	ECO-T540-277-3
	50W (22")	1	F	.38	ECO-T550-120-1	.17	ECO-T550-277-1
		2	F	.69	ECO-T550-120-2	.32	ECO-T550-277-2



<b>Job Name:</b>	<b>Model Numbers:</b>
<b>Job Number:</b>	



Eco-10 Ballast Models continued ...

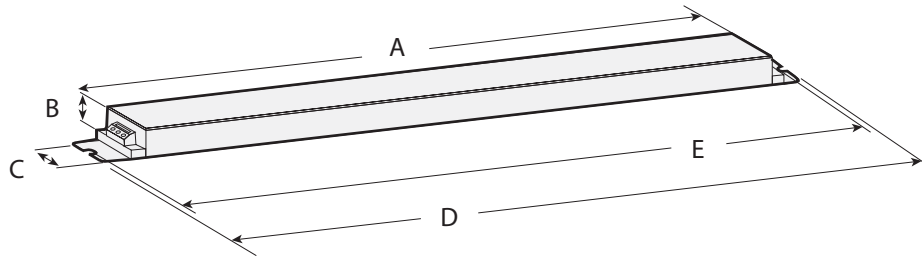
Lamp Type				120 VOLTS		277 VOLTS	
	Lamp Watts (length)	Lamps per ballast	Case Type	Ballast Current (amps)	Eco-10 Model Number	Ballast Current (amps)	Eco-10 Model Number
<b>T8 linear and U-bent</b>   1" diameter	17W (24")	1	F	.19	ECO-T817-120-1	.08	ECO-T817-277-1
		2	F	.31	ECO-T817-120-2	.15	ECO-T817-277-2
		3	F	.43	ECO-T817-120-3	.20	ECO-T817-277-3
	25W (36")	1	F	.24	ECO-T825-120-1	.12	ECO-T825-277-1
		2	F	.43	ECO-T825-120-2	.19	ECO-T825-277-2
	32W (48")	1	C	--	--	.14	E 3 T832 C 277 1
		1	D	.34	ECO-T832-120-1-L	.14	ECO-T832-277-1-L
		1	D	.34	ECO-T832-120-1-T	.14	ECO-T832-277-1-T
		1	F	--	--	.15	ECO-T832-277-1
		2	C	--	--	.23	E 3 T832 C 277 2
2		D	.53	ECO-T832-120-2-L	.23	ECO-T832-277-2-L	
2		D	.53	ECO-T832-120-2-T	.23	ECO-T832-277-2-T	
2		F	--	--	.22	ECO-T832-277-2	
3	F	.82	ECO-T832-120-3	.35	ECO-T832-277-3		



<b>Job Name:</b>	<b>Model Numbers:</b>
<b>Job Number:</b>	

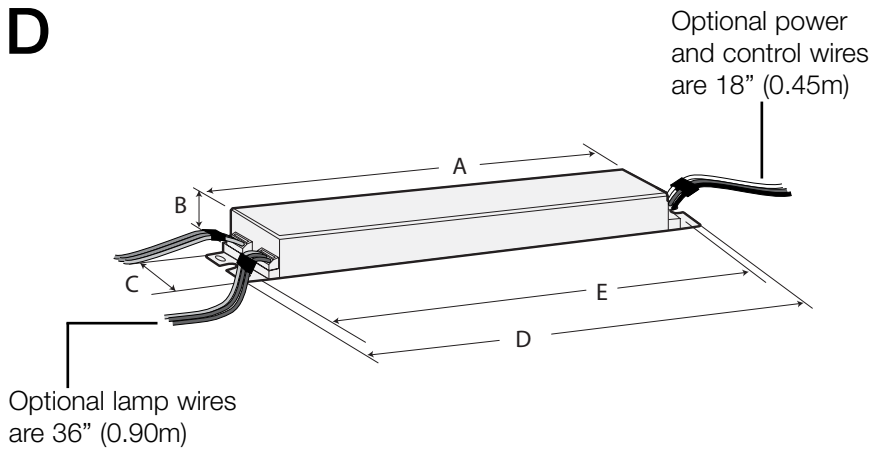
Eco-10 Case Dimensions

C



A	16.12"	(409 mm)
B	1.00"	(25 mm)
C	1.18"	(30 mm)
D	18.00"	(457 mm)
E	17.70"	(450 mm)
		(mounting centers)

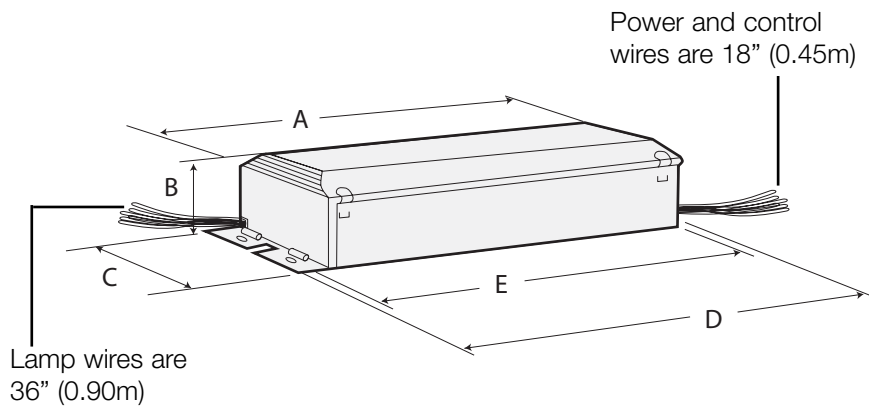
D



A	7.13"	(181 mm)
B	1.00"	(25 mm)
C	1.58"	(40 mm)
D	9.50"	(241 mm)
E	8.91"	(226 mm)
		(slot mounting centers)

If using four hole mount, mounting centers are 9.00" (229 mm) x 1.06" (27 mm).

F



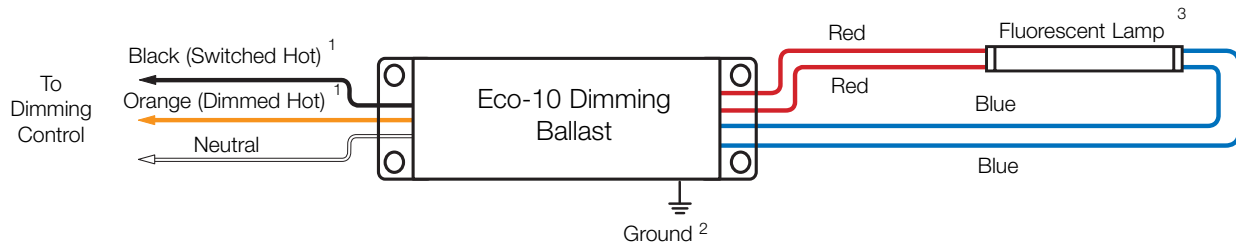
A	8.30"	(211 mm)
B	1.50"	(38 mm)
C	2.38"	(60 mm)
D	9.50"	(241 mm)
E	8.91"	(226 mm)
		(slot mounting centers)

If using four hole mount, mounting centers are 9.21" (234 mm) x 1.70" (43 mm).

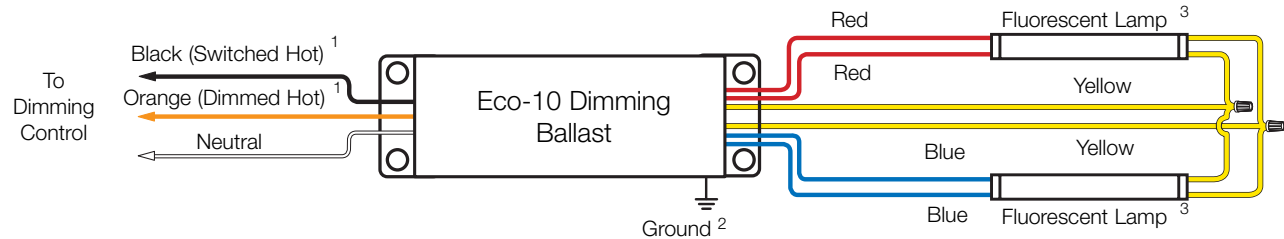
<b>Job Name:</b>	<b>Model Numbers:</b>
<b>Job Number:</b>	

## Eco-10 Wiring Diagrams

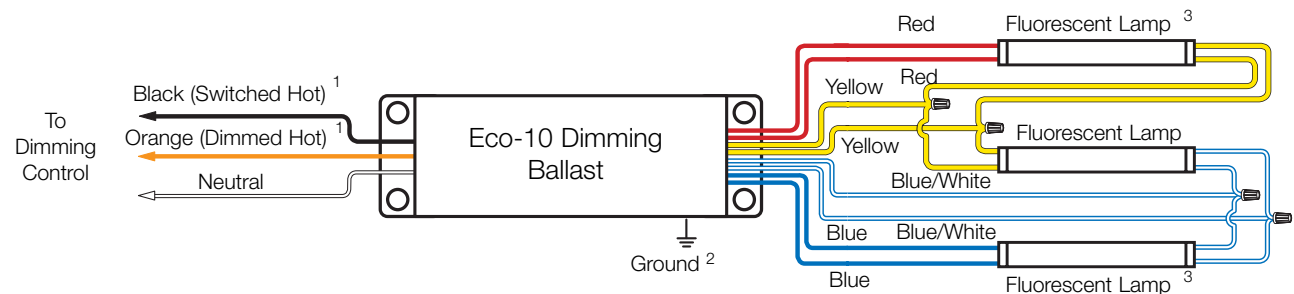
### One T5 or T8 lamp



### Two T5 or T8 lamps



### Three T8 lamps



<sup>1</sup> Dimming control wire colors do not necessarily match ballast wire colors (e.g. control 'dimmed hot' may be yellow, and ballast 'dimmed hot' may be orange. Wire colors shown are for Lutron ballasts and controls only.

<sup>2</sup> Ballast and lighting fixture must be effectively grounded.

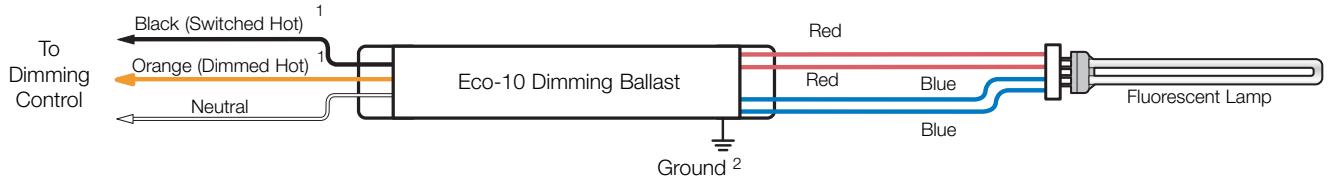
<sup>3</sup> Includes 6" T8 U-bent lamps

Note: For T5 and T8 lamps, maximum lamp-to-ballast wire length is 7 feet (2m).

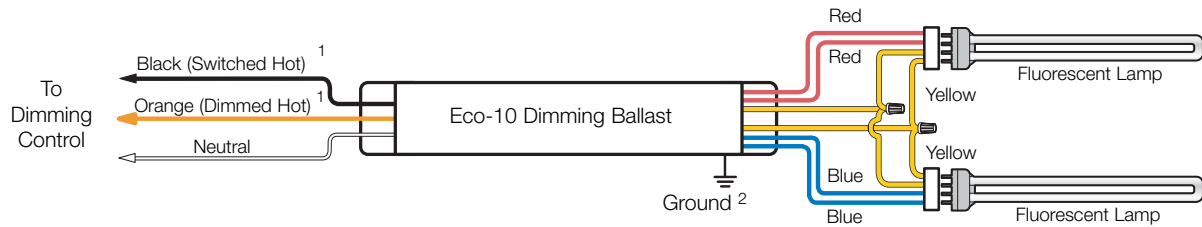
<b>Job Name:</b>	<b>Model Numbers:</b>
<b>Job Number:</b>	

## Eco-10 Wiring Diagrams continued

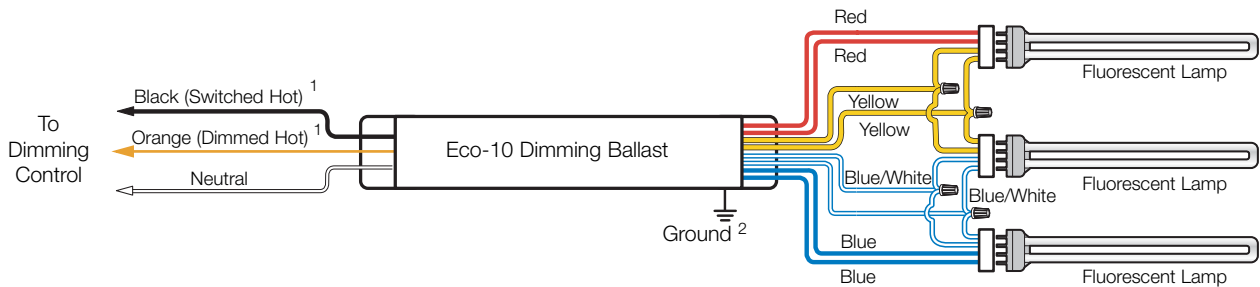
### One T5 twin-tube lamp



### Two T5 twin-tube lamps



### Three T5 twin-tube lamps



<sup>1</sup> Dimming control wire colors do not necessarily match ballast wire colors (e.g. control 'dimmed hot' may be yellow, and ballast 'dimmed hot' may be orange). Wire colors shown are for Lutron ballasts and controls only.

<sup>2</sup> Ballast and lighting fixture must be effectively grounded.

Note: For T5 twin-tube lamps, maximum lamp-to-ballast wire length is 3 feet (1m).

<p><b>Job Name:</b></p>	<p><b>Model Numbers:</b></p>
<p><b>Job Number:</b></p>	



**ATTENTION ELECTRICIANS AND CONTRACTORS**

**Ballast/Socket Leads**

Lead lengths from ballast to socket must not exceed 7' (2m) for T5 and T8 lamps, and 3' (1m) for T5 twin-tube lamps.

**Lamp Sockets**

Quality lamp sockets are required to ensure positive lamp-pin to socket contact. T5 linear lamps require rotary locking sockets. T8 lamps require knife-edge sockets. U-bent lamps require locking sockets and proper lamp support to hold lamp pins in full contact with the socket. T5 twin-tube lamps require sockets that lock into the lamp base and provide proper lamp support to hold lamp pins in full contact with socket.

**Lamp Mounting for T5 Twin-Tube and T8**

Many fluorescent lamp sockets are available with mounting slots to vary the height of the lamp away from the grounded metal surface. Use these slots to get the outside edge of the lamp to be 1/2" ± 1/4" away from the grounded metal surface.

Having a fluorescent lamp too close to the grounded metal will make the minimum intensity too low and will reduce lamp life. Having a fluorescent lamp too far away from the grounded metal will make the lamp flicker or not turn on at all.

**Lamp Mounting for T5**

Keep lamp at least 3/8" ± 1/8" away from the grounded metal surface. Having a lamp too close to the grounded metal will not reduce lamp life but may cause a visible difference in brightness along the length of the lamp.

**Wiring and Grounding**

All wiring from the dimming control to the Eco-10 ballasts is line voltage wiring and may be run together in the same conduit.

Ballast and lighting fixture must be effectively grounded. Ballasts must be installed per national and local electrical codes.

**Ballast Operating Temperature**

Ballast case temperature must not exceed 75°C at any point on ballast.

**Number of Ballasts Per Control**

To calculate the maximum number of ballasts allowed per control, divide control's current capacity by individual ballast current. Certain controls allow a specific maximum number of ballasts.



**ATTENTION FACILITIES MANAGERS**

**PERFORMANCE**

**Lamps Must Be Seasoned**

New fluorescent lamps must be operated for 100 hours at full output ("seasoned") to render lamp impurities inert, so as to achieve proper dimming performance and average rated lamp life.

**SERVICE**

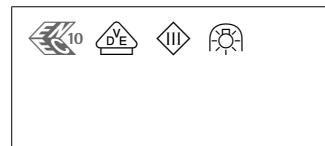
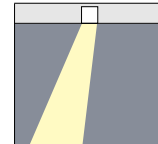
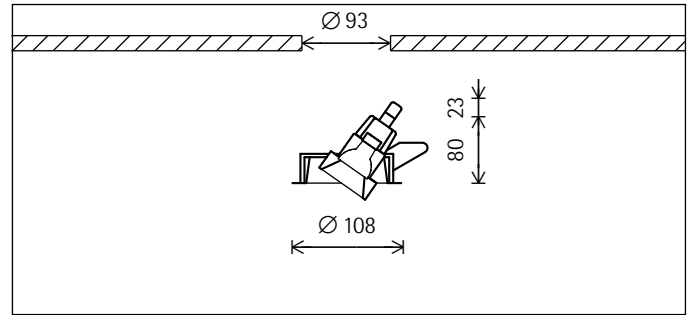
**Replacement Parts**

Use replacement parts with exact Lutron model numbers. Consult Lutron if there are questions.

**Further Information**

For further information, please visit <http://www.lutron.com/ballasts> or contact our 24-hour Technical Support Center at 1-800-523-9466.

<b>Job Name:</b>	<b>Model Numbers:</b>
<b>Job Number:</b>	

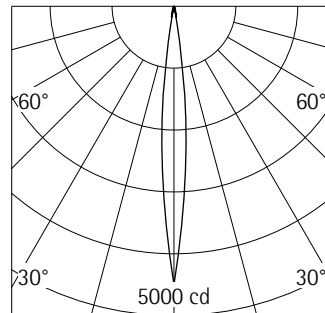


**88100.000**

QR-CBC35 20W 12V GU4 10°  
 QR-CBC35 20W 12V GU4 38°

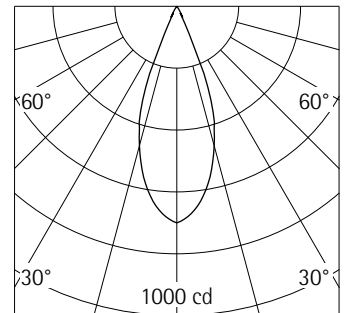
**Product description**

Luminaire: cast aluminium, black powder-coated. Heat sink: black.  
 Mounting ring: plastic, white (RAL9002), with multigroove baffle, cast aluminium, black powder-coated. Fixing springs for ceiling thickness max. 25mm. Cardanic suspension of the luminaire in the mounting ring. 0°-40° tilt. Pivots are to be locked.  
 Cable, L 500mm.  
 Anti-dazzle ring as lamp retainer: plastic, black.  
 Transformer according to EN 61558 or EN 61347 to be ordered separately.  
 Weight: 0.25 kg



QR-CBC35 20W 12V GU4 10°

h(m)	E(lx)	D(m)
1	4500	0.17
2	1125	0.35
3	500	0.52
4	281	0.70
5	180	0.87



QR-CBC35 20W 12V GU4 38°

h(m)	E(lx)	D(m)
1	700	0.71
2	175	1.42
3	78	2.12
4	44	2.83
5	28	3.54

## Planning data

cleaning (a) ambient conditions	1				2				3			
	P	C	N	D	P	C	N	D	P	C	N	D
LMF	0.98	0.94	0.90	0.86	0.95	0.91	0.86	0.81	0.94	0.90	0.84	0.79
RSMF	0.99	0.98	0.96	0.95	0.97	0.96	0.95	0.94	0.97	0.96	0.95	0.94

hours of operation (h)	1000	2000
LLMF	0.98	0.95
LSF	1	1

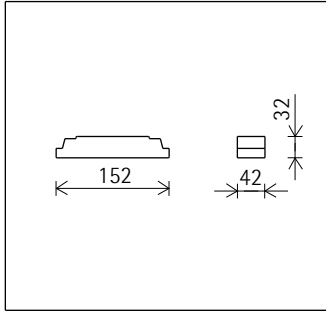
MF LMFxRSMFxLLMFxLSF

- MF Maintainance Factor
- LMF Luminaire Maintenance Factor
- RSMF Room Surface Maintenance Factor
- LLMF Lamp Lumens Maintenance Factor
- LSF Lamp Survival Factor
- P pure
- C clean
- N normal
- D dirty

## Accessories



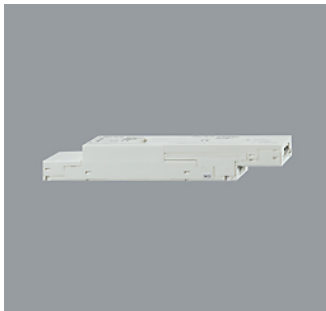
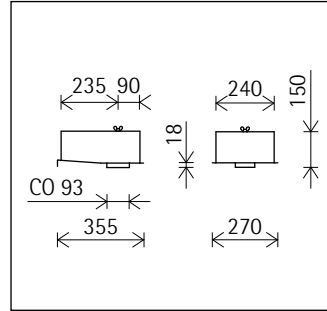
**83831.000**  
 Electronic transformer EN 61347 230/12V, 50Hz/60Hz. 20-105W at max. 50°C ambient temperature. Secondary voltage 11.8V. Installation in ceiling voids, show-cases, furniture. Plastic housing. Primary and secondary cable clamps and terminal blocks. Short-circuit protection: electronic cut-out, reconnection once short-circuit is cleared. Overload and overheat protection: automatic load-sensing. Use dimmers for electronic transformers (trailing edge). For interference suppression to VDE 0875, part 2, secondary cable length max. 2m. For ceiling aperture  $\varnothing$  58mm, recessed depth 110mm MM sign. ENEC10 sign, VDE sign. Protection class II. SELV sign. L 152mm, B 42mm, H 32mm. Weight 0.19kg.



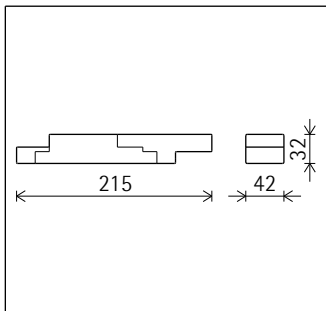
SELV  $\nabla$   $\nabla$   $\nabla$   $\nabla$   
 1150  
 $t_a$  50° C



**83579.000**  
 Concrete housing  
 Metal, powder-coated.  
 L 355mm, W 270mm.  
 Recessed depth 150mm.  
 Ceiling aperture  $\varnothing$  93mm.



**83833.000**  
 Electronic transformer EN 61347 230/12V, 50Hz. 20-105W at max. 50°C ambient temperature, controllable 1V-10V. Secondary voltage 11.7V. Installation in ceiling voids, show-cases, furniture. Plastic housing. Primary and secondary cable clamps and terminal blocks. Short-circuit protection: electronic cut-out, reconnection once short-circuit is cleared. Overload and overheat protection: automatic load-sensing. For interference suppression to VDE 0875, part 2, secondary cable length max. 2m. For ceiling aperture  $\varnothing$  58mm, recessed depth 180mm Protection class II. L 215mm, B 42mm, H 32mm. Weight 0.20kg.  $t_a$  50° C



**83956.000**  
 Plaster ring  
 Metal, white.  
 Height 20mm.



**83980.000**  
 Cover ring  
 Metal, white. For covering the gap where ceiling cut-outs are too big. Inner and outer diameter to be specified when placing order.



**83819.000**  
 Overvoltage protection device  
 For max. 10 electronic transformers.  
 L 45mm, B 25mm, H 22mm.  
 2x1.5mm<sup>2</sup>, L 80mm.  
 Weight 0.05kg.  
 Only in conjunction with:  
 83831.000  
 83833.000



# TRU-AIM® MR11

## Low Voltage Halogen Lamps



- Axial filament design
- Semi-hard dichroic reflector
- 3000-hour average rated lamp life
- Halogen capsule with innovative UV-Stop technology. Meets the most stringent UV protection thresholds (NIOSH)
- GU4 base for safe mechanical grip and easier replacement

ECOLOGIC® is a comprehensive program of OSRAM SYLVANIA focused on addressing environmental issues at all stages of lamp life.



**SYLVANIA TRU-AIM MR11 lamps offer innovative design and precision manufacturing for applications in which color consistency throughout rated life is not a major concern.**

These popular and versatile low voltage directional halogen lamps feature a dichroic reflector and provide a high quality, cost effective lighting alternative – the perfect source for display cabinets and other applications requiring extremely bright light from an extremely compact source.

### Product Availability

Product	Beam Spread
TRU-Aim MR11 20Watt	Spot 10° Flood 35°
Covered 35Watt	Flood 35° Spot 10° Flood 40°
Covered	Spot 10°

### Application Information

#### Applications

High end retail  
Showcase  
Highlighting heat sensitive merchandise  
Art and sculptures  
Accent lighting  
Decorative room lighting  
Ambient lighting

#### Application Notes

1. Compact directional lamp provides bright light from small fixtures
2. Dichroic coating makes these lamps ideal for heat-sensitive merchandising
3. UV-Stop capsule reduces fading on UV-sensitive merchandising and art

#### Fixtures

Track  
Strips for case lighting

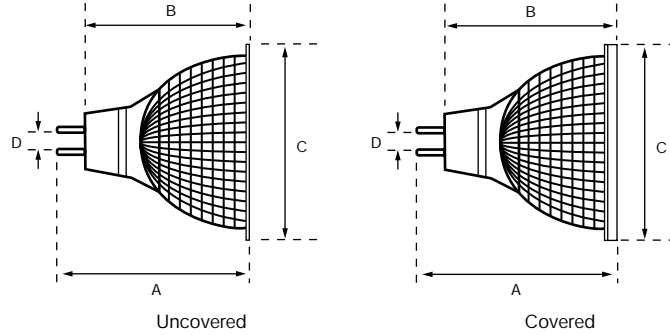
**Sample Specification**

TRU-AIM MR11  
 Lamp(s) shall be (a) 12V TRU-AIM MR11 halogen lamp(s) with a UV-stop capsule, an axial filament and a dichroic reflector coating. Lamp(s) shall be \_\_\_watts (20, 35) with a \_\_\_beam spread (SP, FL) or as noted on drawings/schedules.

**Lamp Comparison**

Item Number	Ordering Abbreviation	Watts	Beam Spread (degree)	CBCP (cd)	Color Temp. (K)	Average Rated Life (hours)
55119	20MR11/FL/35/C	20	35	700	3000	3000
	Brand X 20MRC11/FL30	20	30	600	2925	3000
	Brand Y Q20MR11/NFL30	20	30	600	2900	3500

**Dimensions**



	MOL (A)	Max. Length w/o Pins (B)	Max. Diameter (C)	Max. Pin Spacing (D)
TRU-AIM MR11	1.45"	1.15"	1.38"	0.16"
TRU-AIM MR11 Covered	1.60"	1.30"	1.38"	0.16"

**Ordering and Specification Information**

Item Number	Ordering Abbreviation	Watts	Volts	Beam Angle	CBCP (cd)	Average Rated Life (hrs.)	Base
55109	20MR11/SP/10 FTB	20	12	10	5500	3000	GU4
55107	20MR11/FL/35 FTD	20	12	35	700	3000	GU4
55119	20MR11/FL/35/C FTD	20	12	35	700	3000	GU4
55113	35MR11/SP/10 FTE	35	12	10	8500	3000	GU4
55122	35MR11/SP/10/C FTE	35	12	10	8500	3000	GU4
55111	35MR11/FL/40 FTH	35	12	40	1500	3000	GU4

OSRAM SYLVANIA  
 National Customer Support Center  
 18725 N. Union Street  
 Westfield, IN 46074  
**Industrial & Commercial**  
 Phone: 1-800-255-5042  
 Fax: 1-800-255-5043  
**National Accounts**  
 Phone: 1-800-562-4671  
 Fax: 1-800-562-4674  
**Special Markets**  
 Phone: 1-800-762-7191  
 Fax: 1-800-762-7192

In Canada  
 OSRAM SYLVANIA LTD.  
 Headquarters  
 2001 Drew Road  
 Mississauga, ON L5S 1S4  
**Industrial & Commercial**  
 Phone: 1-800-263-2852  
 Fax: 1-800-667-6772  
**Special Markets**  
 Phone: 1-800-265-2852  
 Fax: 1-800-667-6772

**Ordering Guide**

20	MR	11	/	SP	/	10	/	C
Wattage	Multifaceted Reflector	Diameter 11 = 11/8"		Beam Spread SP = Spot FL = Flood		Beam Angle 10° 35° 40°		C = Covered Lens _ = Uncovered

### Description

#### Incandescent Controls NT-Series

These controls are for use with incandescent and quartz lamps only, 120VAC, 60Hz. Do not connect to receptacles, fluorescent fixtures, motor-operated appliances, or transformer-supplied appliances.

#### Magnetic Low-Voltage Controls NTLV-Series

These controls are for use with low-voltage incandescent and quartz lamps only. Do not connect to receptacles, fluorescent fixtures, or motor-operated appliances. Use with core and coil (magnetic) low-voltage transformers. Do not use to control a solid-state electronic low-voltage transformer. Call the **Lutron Hotline** for more information. Ask for Application Note 19: "Guide to Dimming Low-Voltage Lighting."

Operation of a dimmed low-voltage circuit with all lamps removed or inoperative may result in current flow in excess of normal levels. To avoid possible transformer failure, Lutron strongly recommends the following:

- a. Do not operate dimmed low-voltage circuits without operative lamps in place.
- b. Replace burned-out bulbs immediately.
- c. Use transformers that incorporate thermal protection or fuse transformer primary windings in order to prevent transformer failure caused by excess current.

#### Electronic Low-Voltage Controls NTELV-Series

These controls must not be used to control magnetic transformer-supplied low-voltage lighting. Use Lutron Magnetic Low-Voltage controls with magnetic transformer-supplied lighting fixtures. Some fixture manufacturers do not recommend dimming their solid-state transformers. To determine if a fixture may be dimmed, consult Lutron or the fixture manufacturer. These controls are overload-protected. If more than the rated wattage is applied, power to the circuit will shut off until the control cools. If this happens, remove excess load from the circuit.

#### Fan-Speed Controls NTFS-Series

These controls are for use only with fan or blower units that are operated by shaded-pole or permanently-split capacitor motors. Use with other types of motors may damage equipment and void warranty. Use with fans marked "Suitable for use with solid-state fan-speed controls only." Set multi-speed fans to their highest setting before installing controls.

#### Quiet Fan-Speed Controls NTFSQ-Series

These controls are for use with a single ceiling paddle fan only, rated at 1.5A maximum. (The current rating of your fan motor may be determined from the motor nameplate, packaging, or by contacting the manufacturer.) Do not wire into a circuit with a GFCI breaker or receptacle. Set multi-speed fans to their highest setting before installing controls. Do not use these controls for light fixtures. Not recommended for

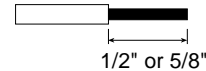
use with Hunter Original<sup>®</sup> Series fan. Contact Lutron's Customer Service department for suitable controls.

#### Fluorescent Controls NTF-Series

These controls are for use with Lutron's FDB or ECO Series Electronic Fluorescent Dimming Ballasts only. Refer to FDB or ECO Series specification sheets for maximum capacity. Do not use with other ballasts.

### Important Notes

1. Install in accordance with national and local electrical codes.
2. These controls are designed to operate in ambient temperatures from 0°C to 40°C (32°F to 104°F).
3. Wire connectors provided are suitable for copper wire only. Use to join one 10, 12, 14, 16, or 18 gauge wire with one or two 12 or 14 gauge wires.  
*Ces connecteurs conviennent seulement au fil de cuivre.*



Strip insulation from all wires:

- 1/2" for 10, 12, and 14 gauge.
  - 5/8" for 16 and 18 gauge.
4. Check for short circuits in new installations before wiring controls. With power OFF, use appropriate switch and connect to lamp and voltage line. Turn power ON. If breaker trips, a short is present. Correct wiring and check circuit again. Install control only when short is no longer present.
  5. Multiphase applications: Use a separate neutral for each phase containing a control circuit. For more information, call the **Lutron Hotline** and ask for Application Note 17, "Common Neutral Interaction."
  6. To ensure proper dimming performance and full lamp life, fluorescent lamps must be operated at full intensity for 100 hours prior to dimming.

### Installation

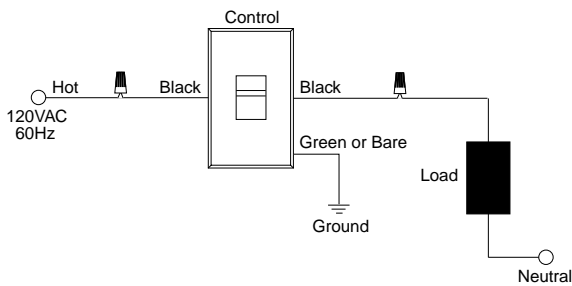
If more than one control is to be installed in the same wallbox, review the Multigang Installation section (back page) before beginning. Lutron multigang faceplates are available for ganging multiple units.

1. Turn power OFF at fusebox or circuit breaker.  
**WARNING:** Wiring with power on may result in personal injury. Damage to this product caused by wiring with power on voids warranty.
2. Remove faceplate and faceplate adapter from control to prevent damage and to access mounting holes. Pull from top of faceplate to remove. Unscrew faceplate adapter. Set aside.
3. Wire Control per appropriate wiring diagram (see next page) using wire connectors provided.  
**Note:** Color names refer to the wire colors on the control.

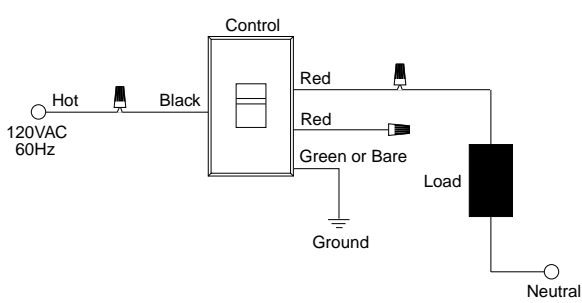
# Wiring Diagrams

Model Number	Wiring Diagram
NT-600, NT-1000, NT-1500, NT-2000, NTFTU-5A	1
NT-603P, NT-1003P, NT-1503P	2
Single-Pole	3
3-Way	3
4-Way	4
NTLV-600, NTLV-1000, NTLV-1500	1
NTLV-603P, NTLV-1003P, NTLV-1503P	2
Single-Pole	2
3-Way	3
4-Way	4
NTELV-300, NTELV-600	7
NTFS-6E, NTFS-12E	5
NTFSQ	1
NTF-10, NTF-10-277	6

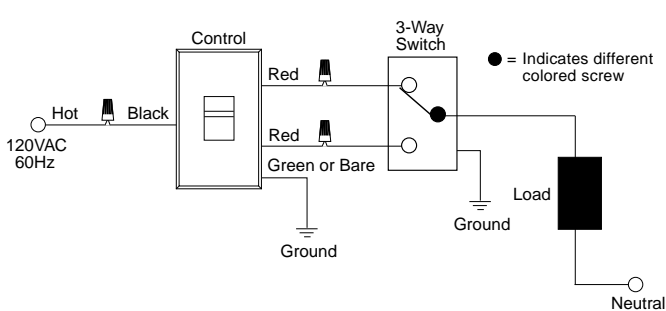
### Wiring Diagram 1



### Wiring Diagram 2

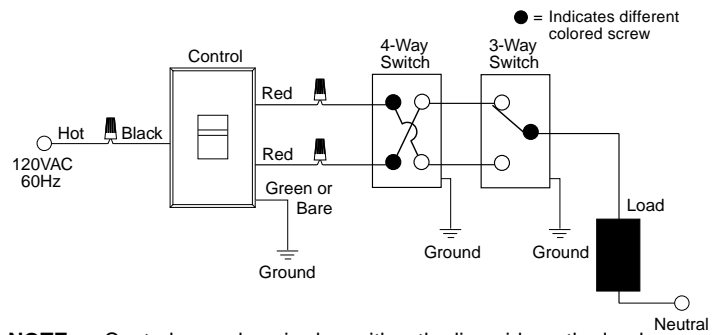


### Wiring Diagram 3



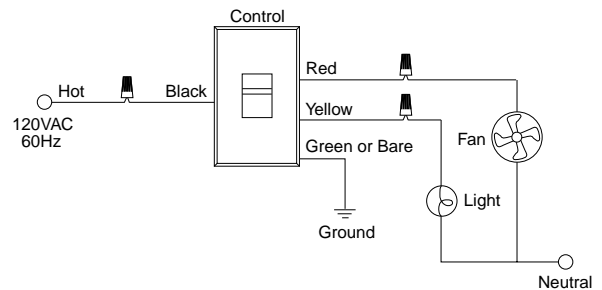
**NOTE:** Controls may be wired on either the line side or the load side of the switch.

# Wiring Diagram 4

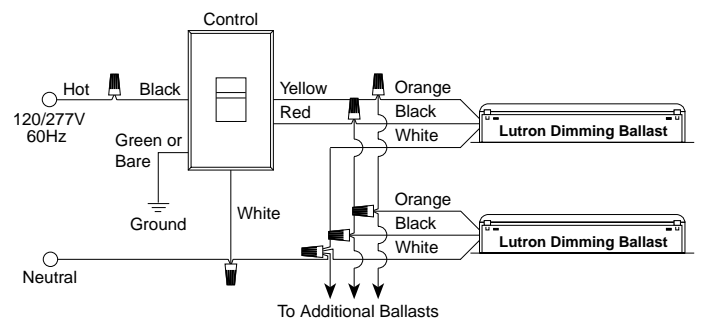


**NOTE:** Controls may be wired on either the line side or the load side of the switch.

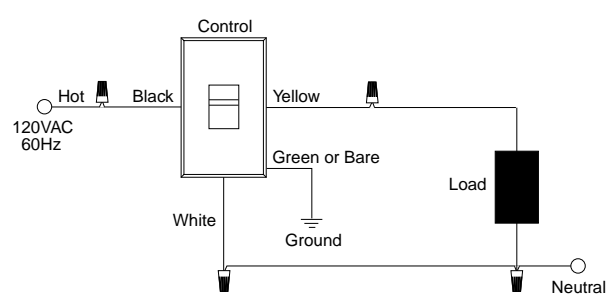
# Wiring Diagram 5



# Wiring Diagram 6

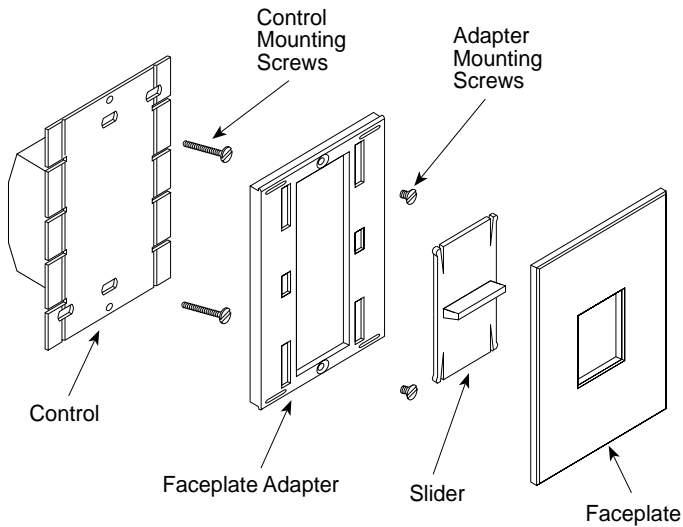


# Wiring Diagram 7



## Mounting Instructions

1. Push wires into wallbox, allowing room for control to be inserted. Do not pinch wires between wallbox and control.
2. Mount control to wallbox using screws provided. Controls must be mounted vertically. See stamp on control for correct positioning.
3. Mount adapter plate with mounting screws provided (see below).



4. Snap on slider and faceplate.

## Operation

### Slide-to-Off Controls

Raise slider to increase light intensity. Lower slider to decrease light intensity and turn off.

### Preset Controls

Push button in center of slider to turn lights on to preset level (set by slider) and to turn lights off. Raise slider to increase light intensity. Lower slider to decrease light intensity.

### 3-Way and 4-Way Controls

When switching power from remote location, lights will turn on to level set on control (by slider), or turn off. Raise slider to increase light intensity. Lower slider to decrease light intensity and turn off.

### Fluorescent Controls

Controls are factory calibrated and do not require low-end light adjustment. If lamps flicker or drop out at the minimum dimming level there may be an installation error. Continued use of the system in this mode will cause premature lamp failure. If this is occurring, call the **Lutron Technical Assistance Hotline** at: 1-800-523-9466.

To ensure proper dimming performance and full lamp life, fluorescent lamps must be operated at full intensity for 100 hours prior to dimming.

## Multigang Installation

Multiple controls can be installed in a common gangable wallbox or a series of interconnected wallboxes for a clean, consolidated appearance. Lutron multigang faceplates are available to complete the installation. Refer to instruction sheet supplied with multigang faceplates for installation.

For new installations, controls can be ganged without removing side sections, but, to reduce the size of the multigang installation or to fit existing wallboxes, inner side sections must be removed. Because side sections are designed to dissipate heat, removing them requires derating the capacity of the control.

**Note:** When ganging any combination of small and large controls, place all small controls on one end of the gang and all large controls on the other. Use the chart below to determine the size and rating of each control.

### Control Size and Rating Chart

Model	Control Size	No Sides Removed	1 Side Removed	2 Sides Removed
NT-600	S	600W	500W	400W
NT-1000	S	1000W	900W	700W
NT-1500	L	1500W	1250W	1000W
NT-2000*	L	1950W	—	—
NTLV-600	S	600VA	500VA	300VA
NTLV-1000	S	1000VA	900VA	700VA
NTLV-1500	L	1500VA	1200VA	1000VA
NT-603P	S	600W	500W	400W
NT-1003P	S	1000W	900W	700W
NT-1503P	L	1500W	1250W	1000W
NTLV-603P	S	600VA	500VA	300VA
NTLV-1003P	S	1000VA	900VA	700VA
NTLV-1503P	L	1500VA	1250VA	1000VA
NTELV-300	S	300W	300W	250W
NTELV-600	S	600W	500W	400W
NTFS-6E	S	6A	4.2A	2.5A
NTFS-12E	L	12A	10A	8.3A
NTFSQ	S	1.5A	1.5A	1.5A
NTF-10	S	16A	16A	16A
NTF-10-277	S	8A	8A	8A
NTFTU-5A	S	5A	4A	3.3A
NT-1PS	S	20A	20A	20A
NT-3PS	S	20A	20A	20A
NT-4PS	S	20A	20A	20A

\*NT-2000 cannot have side sections removed.

The Wallbox Requirement Charts on this sheet do not apply for the NT-2000. See the NT-2000 instruction sheet for the appropriate requirements.

## Worldwide Technical and Sales Assistance

If you have questions concerning the installation or operation of these products, call the **Lutron Technical Assistance Hotline**. Please provide exact model number when calling.

(800) 523-9466 (U.S.A., Canada, and the Caribbean)

Other Countries call (610) 282-3800

Fax (610) 282-3090

Visit our Web site at [www.lutron.com](http://www.lutron.com)

## Side Sections Removed

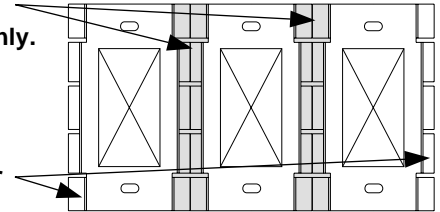
(Derating Required)

### Wallbox Requirement Chart

		Number of Small Controls						
		0	1	2	3	4	5	6
Number of Large Controls	0	0	1	2	3	4	5	6
	1	1	3	4	5	6	7	8
	2	3	5	6	7	8	9	10
	3	5	7	8	9	10	11	12
4	7	9	10	11	12	13	14	

Remove inner side sections from controls. Using pliers, bend side sections up and down until they break off.

Remove inner side sections (shaded) only.



Do not remove outer side sections.

## No Side Sections Removed

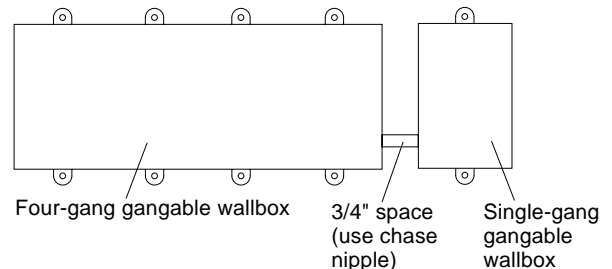
(Derating Not Required)

### Wallbox Requirement Chart

		Number of Small Controls				
		0	1	2	3	4
Number of Large Controls	0	0	1	1+1	4	4+1
	1	1	3	5	6	8
	2	4	6	7	8	10
	3	6	8	10	11	13
4	9	11	12	14	15	

**Note:** When ganging an even number of small controls with side sections intact, use gangable 3"x2" wallboxes. Space an additional wallbox 3/4" apart from the other wallboxes. A 3/4" chase nipple is recommended as a spacer between wallboxes.

**Example:** Wallbox arrangement required for ganging 4 small controls with no side sections removed:



## Warranty

Lutron will, at its option, repair or replace any unit that is defective in materials or manufacture within one year after purchase. For warranty service, return unit to place of purchase or mail to LUTRON at 7200 Suter Road, Coopersburg, PA 18036-1299, postage prepaid.

This warranty is in lieu of all other warranties, express or implied, and the implied warranty of merchantability is limited to one year from purchase. This warranty does not cover the cost of installation, removal, or reinstallation, or damage resulting from misuse, abuse, or damage resulting from improper wiring or installation.

This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. Some states do not allow the exclusion or limitation of incidental or consequential damages or limitations on how long an implied warranty may last, so the above limitations may not apply to you.

Lutron Electronics Co., Inc.

7200 Suter Road

Coopersburg, PA 18036-1299 U.S.A.

Made and printed in U.S.A. 8/99 P/N 030-408 Rev. C