

### WARNING

**RISK OF FIRE OR ELECTRIC SHOCK.** LED retrofit kit installation requires knowledge of luminaire electrical systems. Installation should only be performed by a qualified electrician in accordance with the applicable and appropriate electrical codes.

If the lamp exhibits undesirable operation (buzzing, flickering, etc) immediately turn off power, remove lamp from fixture and contact ESL Vision.

**ONE ENDED WIRING WARNING:** To avoid potential fire or shock hazard, do not use this retrofit kit in fixtures employing shunted bi-pin lampholders. (Note: Shunted lamp holders are found only in fluorescent fixtures with Instant-Start ballasts. Instant-start ballasts can be identified by the words “Instant Start” or “I.S.” marked on the ballast. This designation may be in the form of a statement pertaining to the ballast itself, or may be combined with the marking for the lamps with which the ballast is intended to be used, for example F40T12/IS.)

1. Turn off electrical power before starting installation of lamps.
2. Before conducting any installation, maintenance, or removal, disable all power.
3. Do not touch the lamp while it is in service.
4. Intended for indoor use only. Maximum ambient temperature not to exceed 113°F (45°C)
5. Avoid use in sunlight, abnormal heat or moist/condensing environments:
  - Working temperature: -4°–113°F (029°C–45°C)
  - Working humidity: 30%–80%
  - Storage temperature: -40°F–149°F (-40°C–65°C)
  - Storage humidity: 10%–90%
4. Do not connect this lamp to a dimmer.

## Installation Instructions

### Direct Replacement (with existing ballast)

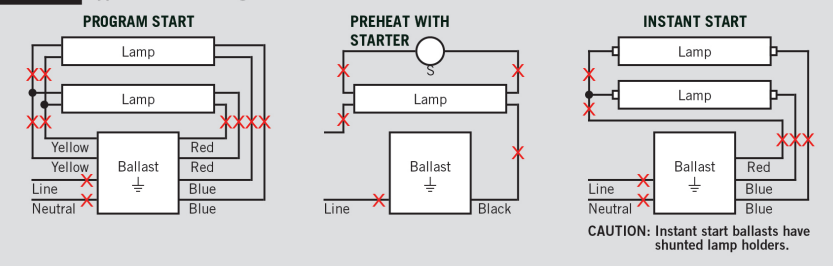
Check ballast compatibility before installation

1. Turn Power Off
2. Remove existing fluorescent lamp(s) from the fixture
3. Install the LED replacement for each fluorescent removed.

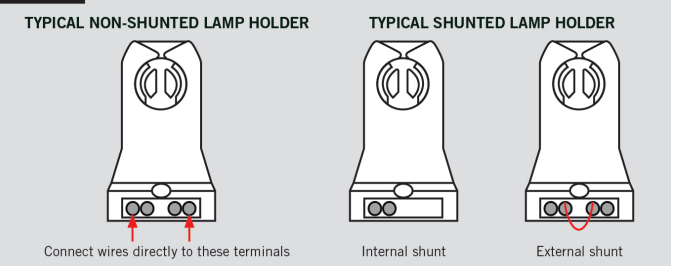
### Bypass Replacement (with ballast removed)

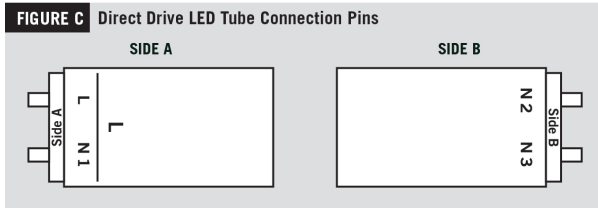
1. Disconnect the power from the fixture
2. Remove existing fluorescent lamp(s) from the fixture
3. Remove lens and wiring compartment, if applicable.
4. Cut all wires connected to ballast (Figure A)
5. Identify the type of lamp holders in the fixture; non-shunted or shunted (Figure B) and follow the instructions for Single or Double ended wiring.

**FIGURE A** Typical Ballast Configurations



**FIGURE B** Lamp Holder Types

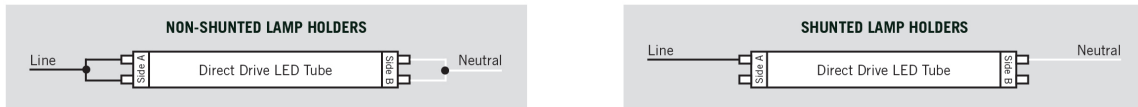




### Double Ended Line Voltage Wiring

#### Single Lamp

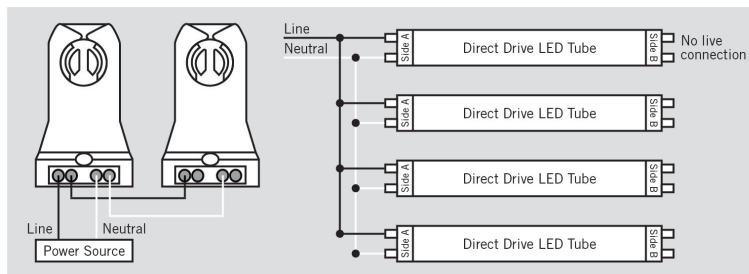
1. Follow the steps for “Bypass Replacement (with ballast removed)”
2. Cut all existing connections to ballast and remove ballast (Figure A)
3. Connect line voltage AC to both pins on Side A of the lamp (marked L and N1) on the endcap as shown below; on Side B, connect line neutral AC wire to pins marked N2 and N3 on the endcap as shown below (Figure C)



4. Complete all electrical connections with appropriate connectors/wire nuts as needed, per all local and national electrical codes. Note: there should not be any exposed wires from sockets left unconnected.
5. Replace wiring compartment cover.
6. Ensure that installed lamp is wired to line and neutral in the lamp holder and that lamp is facing proper direction for illumination
7. Install lens or diffuser, if applicable.
8. Apply power to fixture and check for illumination

#### Double Lamp

1. Follow the steps for “Bypass Replacement (with ballast removed)”
2. Cut all existing connections to ballast and remove ballast (Figure A)
3. Connect the terminals of the first lamp to the matching terminals of the second lamp with line and neutral wires. Continue daisy-chain connection for each additional lamp as shown below.



4. Complete all electrical connections with appropriate connectors/wire nuts as needed, per all local and national electrical codes. Note: there should not be any exposed wires from sockets left unconnected.
5. Replace wiring compartment cover.
6. Ensure that installed lamp is wired to line and neutral in the lamp holder and that lamp is facing proper direction for illumination.
7. Install lens or diffuser, if applicable.
8. Apply power to fixture and check for illumination.

### Single Ended Line Voltage Wiring

#### Single Lamp

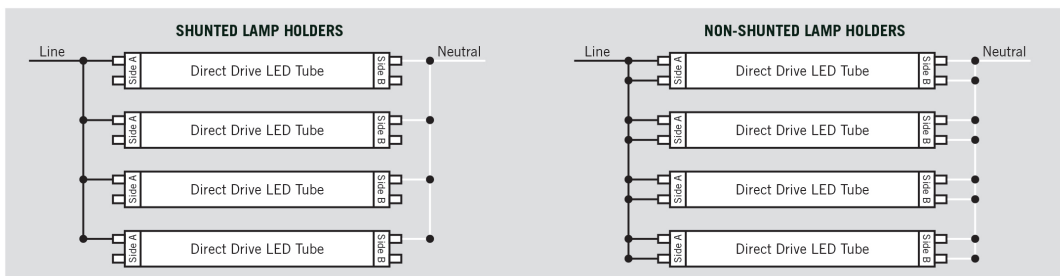
1. Follow the steps for “Bypass Replacement (with ballast removed)”
2. Cut all existing connections to ballast and remove ballast (Figure A)  
Note: Single-ended wiring requires non-shunted lamp holders (Figure B)
3. On Side A of lamp holder, connect line voltage AC wire to pin marked L and connect line neutral AC wire to pin marked N1 on the endcap as shown below (see Figure C, on page 3, for direct drive LED tube connection pins). Do not connect AC wires to Side B.



4. Complete all electrical connections with appropriate connectors/wire nuts as needed, per all local and national electrical codes. Note: there should not be any exposed wires from sockets left unconnected.
5. Replace wiring compartment cover.
6. Ensure that installed lamp is wired to line and neutral in the lamp holder and that lamp is facing proper direction for illumination
7. Install lens or diffuser, if applicable.
8. Apply power to fixture and check for illumination

#### Double Lamp

1. Follow the steps for “Bypass Replacement (with ballast removed)”
2. Cut all existing connections to ballast and remove ballast (Figure A)  
Note: Single-ended wiring requires non-shunted lamp holders (Figure B)
3. Connect the terminals of the first lamp to the matching terminals of the second lamp with line and neutral wires. Continue daisy-chain connection for each additional lamp as shown below. Note: Do not connect any wires to Side B of lamp holder.



4. Complete all electrical connections with appropriate connectors/wire nuts as needed, per all local and national electrical codes. Note: there should not be any exposed wires from sockets left unconnected.
5. Replace wiring compartment cover.
6. Ensure that installed lamp is wired to line and neutral in the lamp holder and that lamp is facing proper direction for illumination.
7. Install lens or diffuser, if applicable.
8. Apply power to fixture and check for illumination.

### Standard Voltage Compatibility

BRAND	PART NUMBER	START METHOD	# OF LAMPS	1 LAMP LOAD INPUT VOLTAGE		2 LAMP LOAD INPUT VOLTAGE		3 LAMP LOAD INPUT VOLTAGE		4 LAMP LOAD INPUT VOLTAGE	
				120V	277V	120V	277V	120V	277V	120V	277V
Arcata	ACT2P32ISUNV	IS	2	✓	✓	✓	✓	-	-	-	-
	ACT4P32ISUNV	IS	4	-	-	-	-	✓	✓	✓	✓
	ICN-1P32-N	IS	1	✓	✓	-	-	-	-	-	-
	ICN-2P32-N	IS	2	x	x	✓	✓	-	-	-	-
	ICN-3P32-N	IS	3	-	-	✓	✓	✓	✓	-	-
	ICN-4P32-N	IS	4	-	-	✓	✓	✓	✓	-	-
	ICN-2P32-SC	IS	2	✓	✓	✓	✓	-	-	-	-
	ICN-4P32-SC	IS	4	-	-	-	-	x	✓	x	✓
	IOP-2P32-HL-N	IS	2	x	x	x	x	-	-	-	-
	IOP-4P32-HL-SC	IS	4	-	-	-	-	x	x	x	x
Advance	IOPA-1P32-N	IS	1	✓	✓	-	-	-	-	-	-
	IOPA-2P32-N	IS	2	x	x	✓	✓	-	-	-	-
	IOPA-3P32-N	IS	3	-	-	x	x	✓	✓	-	-
	IOPA-4P32-N	IS	4	-	-	-	-	✓	✓	✓	✓
	IOPA-1P32-LW-N	IS	1	x	x	-	-	-	-	-	-
	IOPA-2P32-LW-N	IS	2	x	x	✓	✓	-	-	-	-
	IOPA-4P32-LW-N	IS	4	-	-	-	-	✓	✓	✓	✓
	REL-2P32-SC	IS	2	✓	✓	✓	✓	-	-	-	-
	REZ-2S32-SC	IS	2	-	-	✓	-	-	-	-	-
	VE232MVHIPHE	IS	2	x	x	x	x	-	-	-	-
ESPEN	VE232MVHIPLE	IS	2	✓	✓	✓	✓	-	-	-	-
	VE432MVHIP	IS	4	-	-	-	-	✓	✓	✓	✓
	VE432MVHIPE	IS	4	-	-	-	-	✓	✓	✓	✓
	NPY-120-232-LT8	PS	2	x	-	x	-	-	-	-	-
Fulham	NPY-120-432-T8B	IS	4	-	-	-	-	✓	-	✓	-
	NPY-120-432-T8-IS	IS	4	-	-	-	-	✓	-	✓	-
	WHCG3-120-T8-IS	IS	3	-	-	✓	-	✓	-	-	-
	WH2-120-L	IS	1	✓	-	-	-	-	-	-	-
	WH5-120-L	IS	4	-	-	-	-	x	-	x	-
Fusion	FB232MVE	IS	2	✓	✓	✓	✓	-	-	-	-
	FB232MVE-N	IS	2	✓	✓	✓	✓	-	-	-	-
	FB232MVE-HE	IS	2	✓	✓	✓	✓	-	-	-	-
	FB232MVE-LHE	IS	2	✓	-	✓	-	-	-	-	-
	FB232MVE-PPS-HE	PS	2	✓	✓	✓	✓	-	-	-	-
	FB332MVE	IS	3	-	-	✓	✓	✓	✓	-	-
	FB432MVE	IS	4	-	-	-	-	✓	✓	✓	✓
	FB432MVE-HE	IS	4	-	-	-	-	✓	✓	✓	✓
	FB432MVE-N	IS	4	-	-	-	-	✓	✓	✓	✓
	FB432MVE-PPS-HE	PS	4	-	-	-	-	✓	✓	✓	✓
GE	GE132MAX-L/ULTRA	IS	1	✓	✓	-	-	-	-	-	-
	GE132MAXP-L/ULTRA	IS	1	✓	✓	-	-	-	-	-	-
	GE132MAX-N/ULTRA	IS	1	✓	✓	-	-	-	-	-	-
	GE132MAXP-N/ULTRA	IS	1	✓	✓	-	-	-	-	-	-
	GE132MAXP-H/ULTRA	IS	1	x	x	-	-	-	-	-	-
	GE132MAX-G-N	IS	1	✓	✓	-	-	-	-	-	-
	GE232MAX-L/ULTRA	IS	2	✓	✓	✓	✓	-	-	-	-
	GE232MAXP-L/ULTRA	IS	2	✓	✓	✓	✓	-	-	-	-
	GE232MAX-N/ULTRA	IS	2	✓	✓	✓	✓	-	-	-	-
	GE232MAXP-N/ULTRA	IS	2	✓	✓	✓	✓	-	-	-	-
	GE232MAXP-H/ULTRA	IS	2	x	x	x	x	-	-	-	-
	GE232MAX-G-L	IS	2	✓	✓	✓	✓	-	-	-	-
	GE232MAX-G-N	IS	2	✓	✓	✓	✓	-	-	-	-
	GE232MAX-G-H	IS	2	x	x	x	x	-	-	-	-
	GE232MV-H	IS	2	x	x	x	x	-	-	-	-
GE 232-120-PS-N	PS	2	✓	-	✓	-	-	-	-	-	
GE232-MVPS-L	PS	2	✓	x	✓	x	-	-	-	-	
GE232-MVPS-H	PS	2	x	x	x	x	-	-	-	-	
LEDET8/DR/2L/H	IS	2	x	x	✓	✓	-	-	-	-	
LEDET8/DR/2L/H-G2	IS	2	✓	x	✓	✓	-	-	-	-	
GE232MVPS-N-V03	PS	2	✓	✓	✓	✓	-	-	-	-	
GE332MAX-L/ULTRA	IS	3	-	-	✓	✓	✓	✓	-	-	
GE332MAXP-L/ULTRA	IS	3	-	-	✓	✓	✓	✓	-	-	
GE332MAXP-N/ULTRA	IS	3	-	-	✓	✓	✓	✓	-	-	
GE332MAX-H/ULTRA	IS	3	-	-	x	x	x	x	-	-	
GE332MAXP-H/ULTRA	IS	3	-	-	x	x	x	x	-	-	
GE332MAX-G-L	IS	3	-	-	✓	✓	✓	✓	-	-	

### Standard Voltage Compatibility

BRAND	PART NUMBER	START METHOD	# OF LAMPS	1 LAMP LOAD INPUT VOLTAGE		2 LAMP LOAD INPUT VOLTAGE		3 LAMP LOAD INPUT VOLTAGE		4 LAMP LOAD INPUT VOLTAGE	
				120V	277V	120V	277V	120V	277V	120V	277V
GE	GE332MAX-G-N	IS	3	-	-	✓	✓	✓	✓	-	-
	GE332MAX-G-H	IS	3	-	-	x	x	x	x	-	-
	GE332MV-H	IS	3	-	-	x	x	x	x	-	-
	GE332MAX90-V60	IS	3	-	-	x	x	x	x	-	-
	GE332MV-N-DIY	IS	3	-	-	✓	✓	✓	✓	-	-
	GE332MVPS-N-V03	PS	3	-	-	✓	✓	✓	✓	-	-
	GE432MAX-L/ULTRA	IS	4	-	-	-	-	x	x	✓	✓
	GE432MAXP-L/ULTRA	IS	4	-	-	-	-	✓	✓	✓	✓
	GE432MAX-N/ULTRA	IS	4	-	-	-	-	✓	✓	✓	✓
	GE432MAXP-N/ULTRA	IS	4	-	-	-	-	✓	✓	✓	✓
	GE432MAX-H/ULTRA	IS	4	-	-	-	-	x	x	x	x
	GE432MAXP-H/ULTRA	IS	4	-	-	-	-	x	x	x	x
	GE432MAX-G-L	IS	4	-	-	-	-	✓	✓	✓	✓
	GE432MAX-G-N	IS	4	-	-	-	-	✓	✓	✓	✓
	GE432MAX-G-H	IS	4	-	-	-	-	x	x	x	x
	GE432MV-N	IS	4	-	-	-	-	✓	✓	✓	✓
	GE432MV-H	IS	4	-	-	-	-	x	x	x	x
	LEDET8/DR/4L/H	IS	4	-	-	-	-	✓	✓	✓	✓
	LEDET8/DR/4L/H-G2	IS	4	-	-	-	-	✓	✓	✓	✓
	GE432-120-N	IS	4	-	-	-	-	✓	-	✓	-
	GE432MAX-H-42T	IS	4	-	-	-	-	x	x	x	x
	GE432MV-N-DIY	IS	4	-	-	-	-	✓	✓	✓	✓
	GE432MVPS-N-V03	PS	4	-	-	-	-	✓	✓	✓	✓
	Greenhill	GH4P32ISUNV	IS	4	-	-	-	-	✓	✓	✓
Halco	EP332IS/MV/MC	IS	3	-	-	✓	✓	✓	✓	-	-
	EP432IS/L/MV/HE	IS	4	-	-	-	-	✓	✓	✓	✓
Howard	EP432IS/MV/MC	IS	4	-	-	-	-	✓	✓	✓	✓
	EP4/32IS/MV/MC/HE	IS	4	-	-	-	-	✓	x	✓	✓
Huafeng	ENI-T8-32-P2SC-N	IS	2	✓	✓	✓	✓	-	-	-	-
	ENI-T8-32-P4MC-N	IS	4	-	-	-	-	x	✓	x	✓
Keystone	KTEB-132-UV-IS-L-P	IS	1	✓	✓	-	-	-	-	-	-
	KTEB-132-UV-PS-N-P	IS	1	✓	✓	-	-	-	-	-	-
	KTEB-232-UV-IS-L-P	IS	2	✓	✓	✓	✓	-	-	-	-
	KTEB-232-UV-IS-N-P	IS	2	✓	✓	✓	✓	-	-	-	-
	KTEB-232-UV-IS-H-P	IS	2	x	x	x	x	-	-	-	-
	KTEB-232-UV-PS-VDIM	PS	2	-	-	x	✓	-	-	-	-
	KTEB-232-UV-PS-H-P	PS	2	x	x	x	x	-	-	-	-
	KTEB-332-UV-IS-L-P	IS	3	-	-	✓	✓	✓	✓	-	-
	KTEB-332-UV-IS-N-P	IS	3	-	-	✓	✓	✓	✓	-	-
	KTEB-332-UV-IS-H-P	IS	3	-	-	x	x	x	x	-	-
	KTEB-332-UV-PS-L-P	PS	3	-	-	✓	✓	✓	✓	-	-
	KTEB-332-UV-PS-N-P	PS	3	-	-	✓	✓	✓	✓	-	-
	KTEB-332-UV-PS-H-P	PS	3	-	-	x	x	x	x	-	-
	KTEB-432-UV-IS-L-P	IS	4	-	-	-	-	✓	✓	✓	✓
	KTEB-432-UV-IS-N-P	IS	4	-	-	-	-	✓	✓	✓	✓
	KTEB-432-UV-IS-H-P	IS	4	-	-	-	-	x	x	x	x
KTEB-432-UV-PS-L-P	PS	4	-	-	-	-	✓	✓	✓	✓	
KTEB-432-UV-PS-N-P	PS	4	-	-	-	-	✓	✓	✓	✓	
Osram	QHE 1X32T8/UNV ISN-SC	IS	1	✓	✓	-	-	-	-	-	-
	QTP 1X32T8/UNV ISN-SC	IS	1	✓	✓	-	-	-	-	-	-
	QHE 2X32T8/UNV ISL-SC	IS	2	✓	✓	✓	✓	-	-	-	-
	QTP 2X32T8/UNV ISL-SC	IS	2	✓	✓	✓	✓	-	-	-	-
	QHE 2X32T8/UNV ISN-SC	IS	2	✓	✓	✓	✓	-	-	-	-
	QTP 2X32T8/UNV ISN-SC	IS	2	✓	✓	✓	✓	-	-	-	-
Pacific	QTP 4x32T8/UNV ISN-SC	IS	4	-	-	-	-	✓	✓	✓	✓
	EB-332IS-U	IS	3	-	-	✓	✓	✓	✓	-	-
PQL	EB-432IS-U	IS	4	-	-	-	-	✓	✓	✓	✓
	70201	IS	2	✓	✓	✓	✓	-	-	-	-
Premium	70204	IS	4	-	-	-	-	✓	✓	✓	✓
	BB-T8/UVH-2x32	IS	2	✓	✓	✓	✓	-	-	-	-
Robertson	BB-T8/UVH-3x32	IS	3	-	-	-	-	✓	✓	-	-
	RSW240T12120	PS	2	✓	-	✓	-	-	-	-	-
Standard	E232PI120L	IS	2	✓	-	✓	-	-	-	-	-
	E432T8IS120/H	IS	4	-	-	-	-	x	-	x	-
	E432T8IS120/N/AS/BULK	IS	4	-	-	-	-	✓	-	✓	-

### Standard Voltage Compatibility

BRAND	PART NUMBER	START METHOD	# OF LAMPS	1 LAMP LOAD INPUT VOLTAGE		2 LAMP LOAD INPUT VOLTAGE		3 LAMP LOAD INPUT VOLTAGE		4 LAMP LOAD INPUT VOLTAGE	
				120V	277V	120V	277V	120V	277V	120V	277V
Sunpark	SL15T	PS	2	x	-	✓	-	-	-	-	-
	B232PUSV3PLA	PS	2	x	x	x	x	-	-	-	-
	B232SR120S30	PS	2	-	-	x	-	-	-	-	-
Universal	B232IUNVHE-A	IS	2	✓	✓	✓	✓	-	-	-	-
	B232IUNVEL-N	IS	2	-	-	-	-	✓	✓	✓	✓
	B232IUNVHP-N	IS	2	-	-	-	-	✓	✓	✓	✓
	B432IUNVHE-A	IS	2	-	-	-	-	✓	✓	✓	✓
	B432IUNVEL-A	IS	4	-	-	-	-	✓	✓	✓	✓
	B432IUNVHP-A	IS	4	-	-	-	-	✓	✓	✓	✓

### High Voltage Compatibility

BRAND	PART NUMBER	START METHOD	# OF LAMPS	1 LAMP LOAD INPUT VOLTAGE		2 LAMP LOAD INPUT VOLTAGE		3 LAMP LOAD INPUT VOLTAGE		4 LAMP LOAD INPUT VOLTAGE	
				347V	480V	347V	480V	347V	480V	347V	480V
Arcata	ACT2P32IS347	IS	2	✓	✓	✓	✓	-	-	-	-
	ACT4P32IS347	IS	4	-	-	-	-	✓	✓	✓	✓
Advance	GOPA-2P32-LW-SC	IS	2	✓	-	✓	-	-	-	-	-
	GOPA-4P32-LW-SC	IS	4	-	-	-	-	✓	-	✓	-
	GOPA-2P32-SC	IS	2	✓	-	✓	-	-	-	-	-
	GOPA-4P32-SC	IS	4	-	-	-	-	✓	-	✓	-
Fusion	FB232347E-HE	IS	2	✓	-	✓	-	-	-	-	-
	FB232347E-L	IS	2	✓	-	✓	-	-	-	-	-
	FB232347E-N	IS	2	✓	-	✓	-	-	-	-	-
	FB232347E-PPS-HE	PS	2	✓	-	✓	-	-	-	-	-
	FB432347E-HE	IS	4	-	-	-	-	✓	-	✓	-
	FB432347E-L	IS	4	-	-	-	-	✓	-	✓	-
	FB432347E-N	IS	4	-	-	-	-	✓	-	✓	-
GE	FB432347E-PPS-HE	PS	4	-	-	-	-	✓	-	✓	-
	GE232MAX347-H	IS	2	x	-	x	-	-	-	-	-
	GE232PS347-N	PS	2	✓	-	✓	-	-	-	-	-
	GE332MAX347-H	IS	3	-	-	x	-	x	-	-	-
	GE432MAX347-H	IS	4	-	-	-	-	x	-	x	-
Keystone	GE432PS347-N	PS	4	-	-	-	-	✓	-	✓	-
	KTEB-232-3-IS-N-P	IS	2	✓	-	✓	-	-	-	-	-
Osram	KTEB-432-3-IS-N-P	IS	4	-	-	-	-	✓	-	✓	-
	QHE 2x32 T8/347 ISL-SC	IS	2	✓	-	✓	-	-	-	-	-
Standard	QHE 2x32 T8/347 ISN-SC	IS	2	✓	-	✓	-	-	-	-	-
	E232T8IS347/H/90C	IS	2	x	-	x	-	-	-	-	-
	E232T8IS347/L/BULK	IS	2	✓	-	✓	-	-	-	-	-
	E232T8IS347/N/BULK	IS	2	x	-	✓	-	-	-	-	-
	E432PI347G01	IS	4	-	-	-	-	✓	-	✓	-
	E432T8IS347/L/BULK	IS	4	-	-	-	-	✓	-	✓	-
	E432T8IS347/N	IS	4	-	-	-	-	✓	-	✓	-
	E432T8IS347/N/BULK	IS	4	-	-	-	-	✓	-	✓	-
Universal	E432T8IS347/H/90C	IS	4	-	-	-	-	x	-	x	-
	B232I347HE-A	IS	2	✓	-	✓	-	-	-	-	-
	B432I347HE-A	IS	4	-	-	-	-	✓	-	✓	-

### Emergency Ballast Compatibility

BRAND	PART NUMBER	COMPATIBLE
Keystone	KT-EMRG-500	✓
	KT-EMRG-1300-T5	✓
	KT-EMRG-1400-SL	x
Philips	Dobine B50	✓
	Dobine ELI-S-20	✓
	Dobine LP600	✓
LOTA	I-320	✓
	ISL-540	✓