REPORT

LED Lamps for use in enclosed external lighting applications

2021

CONNECTED

LIGHT SOLUTIONS

A DIVISION OF **BEACON LIGHTING**

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(1) Introduction

Now that LED technology has become more advanced and accepted in the market place the use of retrofit LED lamps is becoming more attractive to overcome such problems as asset management, reduced power consumption and the difficulty in sourcing high intensity discharge (HID) lamps from overseas suppliers.

In this paper we will explore the use of retrofit LED lamps for use in enclosed external lighting applications, as follows:

- Why retrofit LED lamps
- International Minamata Convention
- Power savings
- Asset management
- Current range of CLS retrofit lamps
- Typical Applications
- Lamp installation
- Operation
- Stock holding
- Conclusion
- Contact

(2) Why Retrofit LED Lamps

The use of HID lamps including mercury vapour, high pressure sodium, metal halide and the like, is becoming less desirable now that LED technology has become more technically advanced and efficient. And also, the cost saving benefits are now well understood and documented.

(3) International Minamata Convention

When taking a “big” picture view of the world and Australia it is important to consider the impact of the International Minamata Convention on mercury where the objective is to protect human health and the environment from mercury and mercury compounds. The Convention seeks the reduction and/or elimination of mercury across a range of products, including external lighting and HID lamps containing mercury.

Due to the on-going world-wide acceptance of the convention, it is getting very hard, and will soon be impossible, to source lamps containing mercury from overseas suppliers. So, it’s not just a case of installing retrofit LED lamps to achieve industry accepted benefits, but more a case of must replace HID lamps containing mercury and soon.

Also, by replacing HID lamps containing mercury with LED lamps this will help Australia meet the requirements of the treaty and provide a safer environment for us all. Given Australia’s commitment to the convention in 2022 the use of retrofit LED lamps will be a game changer.

(4) Power Savings

Significant power savings can be realised by substituting LED lamps for HID lamps.

CSL's LED retrofit lamps operate directly off 240V power with the luminaire HID control gear either removed or isolated. As a result, significant power savings can be achieved in the lighting installation and the network in the immediate short term and of course over the life of the lighting asset.

For example: A typical 80W HID mercury vapour fitting will consume in the order of 100W of total system power. However, the same fitting retrofitted with a 35W LED lamp, and with the control gear taken out of circuit, will have a total system wattage of only 35 watts. So the power savings are obvious, and substantial over time.

(5) Asset Management

LED luminaires are now well established in the external lighting space even though they are generally more expensive than their HID equivalents. But where the end of life of the HID luminaire has not been reached and replacement with an equivalent LED luminaire is seen to be too expensive, then there is an opportunity for a more cost-effective solution whereby we can replace the HID lamp with an LED retrofit lamp to extend the life of the asset.

So by utilising an LED retrofit lamp we can extend the life of the asset and provide cost saving by reducing capital costs.

(6) Current Range of CLS Retrofit LED Lamps

The current range of CLS retrofit lamps are as follows:

- 21W 3000/4000K LED lamp.
- 35W 3000/4000K LED lamp, and
- 80W 4000K LED lamp.

These lamps offer a safe, cost-effective and energy efficient alternative to a range of traditional HID lamps including high pressure sodium and metal halide, for outdoor and industrial applications.

CLS is looking to expand our range of retrofit LED lamps in the near future.

(6.1) 21W LED Retrofit Lamp

Refer Appendix A: 21W LED Data Sheet

The 21W LED retrofit lamp offers a direct replacement solution for 50W Mercury Vapour lamps and equivalent HID Sodium Vapour and Metal Halide lamps.

(6.2) 35W LED Retrofit Lamp

Refer Appendix B: 35W LED Data Sheet

The 35W LED retrofit lamp offers a direct replacement solution for 80W Mercury Vapour lamps and equivalent HID Sodium Vapour and Metal Halide lamps.

(6.3) 80W LED Retrofit Lamp

Refer Appendix C: 80W LED Data Sheet

The 80W LED retrofit lamp offers a direct replacement solution for 250W Mercury Vapour lamps and equivalent HID Sodium Vapour and Metal Halide lamps.

(7) Typical Applications

CLS has supplied retrofit LED lamps for use in a number of different applications. Some typical applications were:

(7.1) Heritage Lighting

Refer Appendix D: Bathurst Heritage photos 1-3

The heritage listed HID luminaires situated in Bathurst's central civic and business areas were installed between 1872 – 1924 and are truly unique and add a distinctive historical character to the town centre as well as in the town park. Considering the significance and age of these luminaires, it was always going to be challenging to find a like-for-like LED replacement. This is where our LED retrofit lamps fitted in perfectly.

In this project the existing 80W and 125 Mercury Vapour and 70W High Pressure Sodium HID lamps were replaced by 35W and 80W retrofit LED lamps.

The customer is very happy with the resulting light levels and being able to maintain the heritage look of the town lighting.

(7.2) Security Lighting

Refer Appendix E: End User Security photos 1-3

In this commercial/warehouse building the external 70W Metal Halide security lighting HID lamps have been replaced by our 35W LED retrofit lamps.

The customer is very happy with the resulting lighting levels and being able to save money by reducing their power consumption and not having to replace the security fittings.

(7.3) Decorative Lighting

Refer Appendix F: EQL Nostalgia/Avenue photos 1-2

Energy Queensland (EQL) after rigorous field trials and assessment has accepted on contract our 21W and 35W LED retrofit lamps as direct replacements for their 50W and 80W (respectively) HID lamps in their Nostalgia/Avenue decorative fittings throughout their Queensland network.

EQL is very happy with being able to save money by reducing their network power consumption and not having to replace lighting assets before their end-of-life with much more expensive new LED fittings. Also EQL recognise that they have a commitment/responsibility to the Minamata Convention and by replacing HID lamps with retrofit LED lamps this helps reduce the mercury content in their lighting network.

(7.4) Pathway Lighting

Refer Appendix G: End User Pathway photos 1-2

In this commercial/warehouse building the external 70W Metal Halide pathway lighting HID lamps have been replaced by our 35W LED retrofit lamps.

The customer is very happy with the resulting lighting levels and power savings and that they could maintain/keep the same fitting throughout the site.

(8) Lamp Installation

Refer Appendix H: Retrofit LED lamp installation guide

To prepare the lighting fitting for the installation of the LED lamp by a qualified electrician, first we must remove the existing HID lamp and then rewire the fitting's 240V power supply directly to the wires leading to the lamp holder. The bypassed control gear can then be either removed from the fitting or safely electrically isolated from the mains supply.

As per the installation instructions supplied with each lamp it is recommended that a 500mA fuse be installed on the load feed before the lamp holder and that a 4KV surge protector be added to the circuit before the lamp to protect the lamp in the event of high transient voltage in extreme conditions.

Each LED lamp is supplied with a label stating that "the luminaire has been modified and can no longer be operated with a HID lamp" and this should be placed on a visible part of the luminaire to warn that the luminaire has been modified.

(9) Operation

The LED retrofit lamp is for use in enclosed external lighting applications and not suitable for hazardous areas and/or explosive atmospheres.

The LED retrofit lamps come with a built-in fan technology that pushes heat out of the LEDs to keep them operating at optimum temperatures and extends the life of the lamp.

As previously noted by installing a more energy efficient LED lamp and with the removal of the HID lamp and associated control gear significant power saving will be made.

(10) Stock Holdings

CLS maintains an extensive range of LED retrofit lamps in our Beacon Warehouse in Parkinson, Qld.

(11) Conclusion

In summary:

- LED lighting technology has become more technically advanced and efficient.
- Lighting Owners need to consider the impact of the International Minamata Convention on mercury. Australia is currently experiencing difficulty in sourcing HID lamps containing mercury from overseas and soon will not be able get them at all. So, the use of LED retrofit lamps will be a game changer.
- Significant power savings can be realised by substituting LED lamps for HID lamps.
- By substituting an LED retrofit lamp for a HID lamp, we can extend the life of the asset and provide cost saving by reducing capital costs.
- The current CLS retrofit LED lamp range is 21W, 35W and 80W lamps. This range will be extended.
- Typical LED retrofit lamp applications can be found in heritage lighting, security lighting, pathway lighting, post top lighting and decorative lighting.
- The LED retrofit lamps are for use in general enclosed external lighting applications and not suitable for hazardous areas and/or explosive atmospheres.
- Retrofit LED lamps provide cost saving benefits in terms of both fitting capital cost and power consumption.
- Retrofit LED lamps are a proven safe and effective alternative to HID lamps.

The bottom line is……LED lamps offer a safe, cost-effective and energy efficient alternative to a range of traditional HID lamps for outdoor and industrial applications.

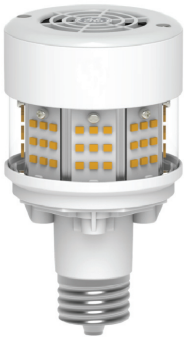
(12) Contact

If you have any enquiries regarding LED retrofit lamps our Connected Light Solutions team is here to assist you.

You can get in touch with us via our website at:
connectedlightsolutions.com.au or on **1300 497 221.**

Appendix A: 21W LED Data Sheet:

LED 21W HID Lamp



21W

The 21W LED HID lamp from GE offers a safe, cost effective and energy efficient alternative to HID Mercury lamps for outdoor and industrial applications.

Direct replacement solution for both 50W and 80W Mercury Vapour (MV) and 125W HID lamps.

RANGE SUMMARY	
S93150912	LED 21W HID LAMP, 3000K 3000LM 50,000HRS 120-277V CRI ≥7 0 - LED21ED17/730/E27
S93150913	LED 21W HID LAMP, 4000K 3000LM 50,000HRS 120-277V CRI ≥7 0 - LED21ED17/740/E27

SPECIFICATIONS

BASIC PRODUCT INFO	
Product Type	Lamp
Brand	GE
Dimmable Y/N	N

TECHNICAL DATA	
Voltage	120 - 277
Wattage (Max)	21
Socket Type	ES
Beam Angle	280
Brightness/Lumens	3000
Light Apperance	4000K, 3000K
Efficacy (LM/W)	143
CRI	>70
Average Rated Life	50,000 hours

MEASUREMENTS	
PRODUCT DIMENSIONS	
Unit Size (cm)	H13.8 x W6.4
Weight (g)	0.27
PACKAGING DIMENSIONS	
Retail Pack Size	TBA
Weight	0.43
Retail Barcode (EAN)	TBA
Quantity	1
Inner Pack Size (cm)	TBA
Weight	2.82
Inner Barcode (GTIN)	TBA
Quantity	6
Outer Pack Size	TBA
Weight (kg)	12
Outer Barcode (GTIN)	TBA
Quantity	24

Note: It is advisable to connect this lamp within an enclosure with a degree of ingress protection of at least IP54 or higher.

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Appendix B: 35W LED Data Sheet:

GE LED 35W HID Lamp

The 35W LED HID lamp from GE offers a safe, cost effective and energy efficient alternative to HID Mercury lamps for outdoor and industrial applications. Direct replacement solution for both 80W Mercury Vapour (MV) and 125W HID lamps.

RANGE SUMMARY	
13203L	GE LED 35W HID LAMP E27 4000K 4,800LM 50,000HRS 220-240V CRI ≥71

SPECIFICATIONS

BASIC PRODUCT INFO	
SKU	13203L
Product Type	Lamp
Brand	GE
Dimmable Y/N	N

TECHNICAL DATA	
Voltage	220 - 240
Wattage (Max)	35W (Max 38.5)
Socket Type	E27
Beam Angle	280
Brightness/Lumens	4800
Light Apperance	4000K Cool White
Efficacy (LM/W)	137
CRI	>71
Average Rated Life	50,000 hours

Note: It is advisable to connect this lamp within an enclosure with a degree of ingress protection of at least IP54 or higher.

MEASUREMENTS	
PRODUCT DIMENSIONS	
Unit Size (cm)	H 16.9 x W 7.6
Weight (g)	0.35
PACKAGING DIMENSIONS	
Retail Pack Size	84 x 84 x 193
Weight	0.43
Retail Barcode (EAN)	9333509132035
Quantity	1
Inner Pack Size (cm)	L 29.2 x W 19.2 x D 21.0
Weight	2.82
Inner Barcode (GTIN)	29333509132039
Quantity	6
Outer Pack Size	L 40.5 x W 30.6 x D 45.0
Weight (kg)	12
Outer Barcode (GTIN)	39333509132036
Quantity	24

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Appendix C: 80W LED Data Sheet:

GE LED 80W HID Lamp

The 80W LED HID lamp from GE offers a safe, cost effective and energy efficient alternative to HID Mercury lamps for outdoor and industrial applications. Direct replacement solution for up to 150W HPS, 100W and 150W CMH, 175W and 250W QMH and 250W and 400W MV lamps.

RANGE SUMMARY	
S93105826	GE LED 80W LAMP E40 4000K 12000LM 50,000HRS 120-277V CRI ≥7 0

SPECIFICATIONS

BASIC PRODUCT INFO	
SKU	S93105826
Product Type	Lamp
Brand	GE
Dimmable Y/N	N

TECHNICAL DATA	
Voltage	120 - 277
Wattage (Max)	80
Socket Type	E40
Beam Angle	360
Brightness/Lumens	12000
Light Apperance	4000K Cool White
Efficacy (LM/W)	150
CRI	>70
Average Rated Life	50,000 hours

Note: It is advisable to connect this lamp within an enclosure with a degree of ingress protection of at least IP54 or higher.

MEASUREMENTS	
PRODUCT DIMENSIONS	
Unit Size (cm)	H 20.3 x W 9.2
Weight (g)	730
PACKAGING DIMENSIONS	
Retail Pack Size	10 x 10 x 23.8
Weight	0.80
Retail Barcode (EAN)	5994100014959
Quantity	1
Inner Pack Size (cm)	32.8 x 21.9 x 26.8
Weight	4.8
Inner Barcode (GTIN)	5994100014959
Quantity	6
Outer Pack Size	N/A
Weight (kg)	N/A
Outer Barcode (GTIN)	N/A
Quantity	N/A

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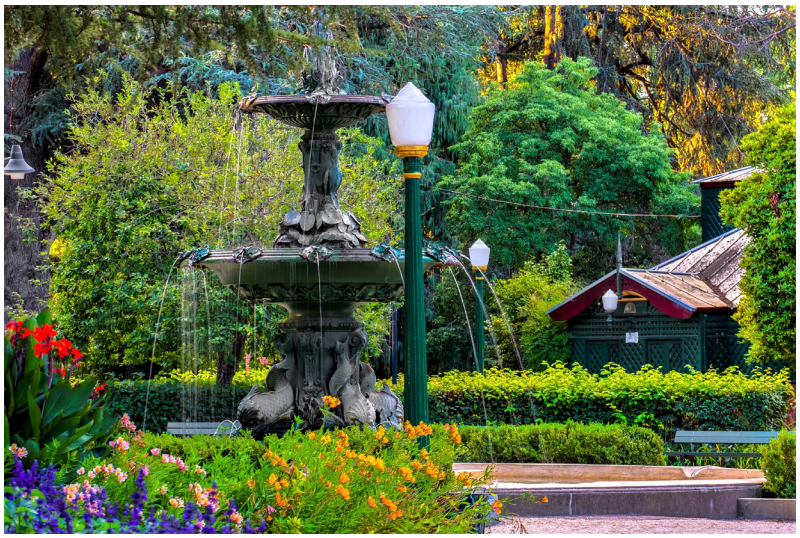
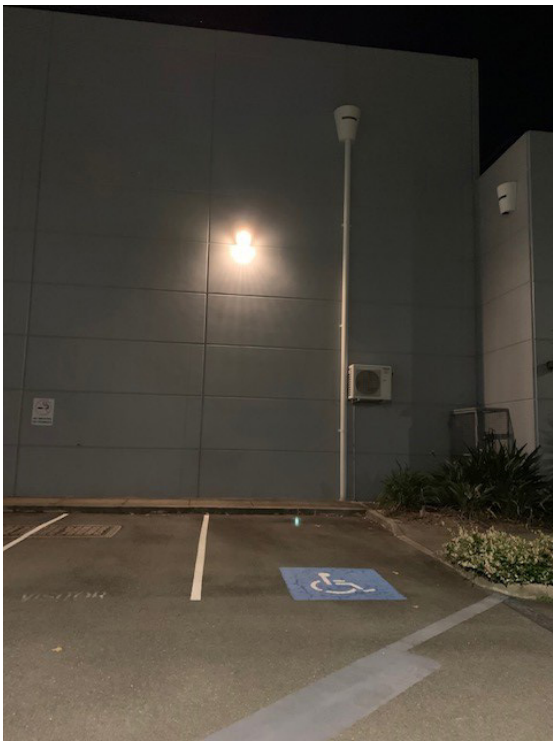
Appendix D: Bathurst Heritage Photos:



Appendix E: End User Security Photos:



Appendix F: EQL Nostalgia/Avenue Photo:

Appendix G: End User Pathway Photo:

Appendix H: Retrofit LED Lamp Installation Guide:

TUNGSRAM

Installation Guide

LED HID Passive cooling lamps

LED HID passive cooling lamps are suitable to replace traditional HID lamps with the same standard E27 or E40 caps.

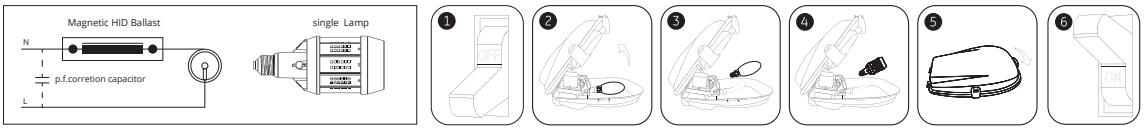
BEFORE YOU BEGIN

To install the LED HID lamp, please read the entire installation guide completely and carefully.
Ensure that package includes: installation guide, warning label to be attached to luminaire, LED HID Lamp

WARNING RISK OF FIRE OR ELECTRIC SHOCK. LED HID Lamp installation must be done by a qualified electrician only and all safety instructions must be followed to avoid a risk of injury or property damage. Disconnect power before installation of the product. Do not disassemble this product and replace any LED or other internal components. When the light source reaches its en of life, the whole lamp shall be replaced.

Note 1: Caution label with the following warning shall be placed onto the fixture in a location readily visible to the user during and after direct wire, new luminaire and bypass installation. "Caution Risk of injury Damage: This luminaire has been modified and can no longer operate a traditional high intensity discharge lamp. Only use the LED HID lamp or contact manufacturer for more information."
Note 2: Visually check the base and socket before & after installation, assure base and socket in good condition, and no damage on its enclose and metal conductor before & after screwing in.
Note 3: Screw in the lamp with adequate torque. Inadequate torque may result in arcing inside base, while excessive torque will damage base.
Torque shall not exceed 3 Nm. **Note 4:** Don't block the airflow inlet and outlet openings on the lamp after screwing in the lamp. **Note 5:** Don't touch the transparent optical cover during the installation and maintenance. **Note 6:** For LED HID lamps of 54W and above: Their weight is significantly higher than the traditional HID lamp they are intended to replace. Therefore, in order to avoid accidental fall of the lamp, please use the tether provided in the packaging to secure the lamp to the fixture.

Retrofit / Magnetic HID Ballast system



Note 1: If the ballast in fixture is not correct magnetic HID ballast, that will damage the LED HID lamp when plug in.
Note 2: Existing power factor compensation capacitor worsens the power factor, but may remain within the circuit.

Direct wire, New Luminaire and Bypass Ballast

1) Switch off electricity
2) Remove existing traditional HID lamp and dispose properly based on local regulations
3) Establish direct wiring from mains to lamp holder as per figure 2 or bypass the ballast by cutting all wires that connect to ballast and cutting wire away from lamp holder as show in figure 3. and rewire power source directly to wires leading to lamp holder.
   Note: Should anyone re-wire the luminaire, the technical and safety requirements of the converted luminaire are the sole responsibility of the party doing the conversion and shall comply with the local applicable safety and regulatory laws (i.e. LVD) and standards (i.e. IEC 60598).
   Note: An 250 V 5A slow melting fuse is suggested to add on L line before lamp holder. See electronics component distributor for proper fuse.
   Note: A 4KV CE certified surge protector is suggested to be added in the circuit before the lamp. Without surge protector, the lamp may be damaged by transient voltage in extreme conditions.
4) Install LED HID Lamp carefully
5) Place warning label in LED HID Lamp package to warn the users that the luminaire is modified only for LED HID lamp and using traditional HID lamp may cause damage
6) Switch on electricity and check for proper operation

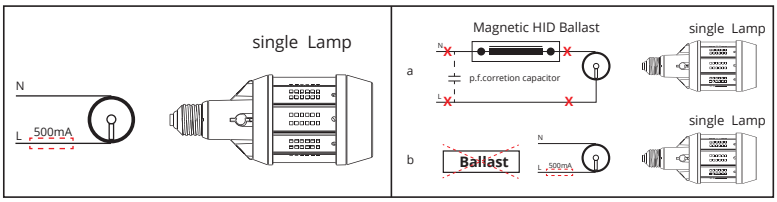


Figure 2. New Luminaire without ballast

Figure 3. Bypass Ballast

This lamp is designed for general lighting service (excluding for example explosive atmospheres).
This lamp may not be suitable for use in all applications where a traditional HID lamp has been used.
The temperature range of this lamp is more restricted. In cases of doubt regarding the suitability of the application the manufacturer of this lamp should be consulted.

Lamp suitable for 50 Hz or 60 Hz operation

Dimming not allowed

Lamp not suitable for emergency operation

Lamp to be used in dry conditions or in a luminaire that provides protection

Processing of electric and electronic equipment at the end of their service life. This symbol indicates that the product must not be processed with household waste. It must be brought to an electric and electronic waste collection point for recycling and disposal. Please contact your municipality, local waste disposal centre or the store where the product was purchased.

Please retain this Installation Guide for further reference. Tungsram Group disclaims liability for any damage caused by not following the instructions in this Installation Guide.
LEAFLET / LED HID / TU - September 2019 - 99007422

Appendix H: Retrofit LED Lamp Installation Guide:

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Installation Guide

GB/IE/MT	The English version of the installation instruction and safety information can be found at the following location:
DE	Die deutsche Version der Installationsanleitung und Sicherheitsinformationen finden Sie in folgendem Verzeichnis:
FR/LU	La version française des instructions d'installation et informations de sécurité est disponible à l'adresse suivante:
IT	La versione italiana del manuale di installazione e sicurezza può essere reperita nella seguente sezione:
ES	La versión española de las instrucciones de instalación y la información sobre seguridad puede encontrarse en la siguiente ubicación:
PT	A versão em Português das instruções de instalação e das informações de segurança pode ser encontrada na seguinte localização:
RO	Versiunea în limba română a instrucţiunilor de instalare şi a informaţiilor de siguranţă pot fi găsite la:
PL	Polską wersję instrukcji instalacji oraz informacje dotyczące bezpieczeństwa można znaleźć w następującej lokalizacji:
CZ	Návod k montáži a bezpečnostní informace v češtině najdete zde:
SK	Slovenskú verziu montážnej príručky a bezpečnostných inštrukcií nájdete na nasledujúcej lokalite:
HR	Hrvatska verzija priručnika za ugradnju i sigurnosnih informacija nalazi se na sljedećoj lokaciji:
RS	Verziju uputstva za instalaciju i informacija o bezbednosti na srpskom jeziku možete pronaći na sledećoj lokaciji:
SI	Slovenska različica navodil za namestitev in varnostnih navodil se nahaja na naslednji strani:
HU	A telepítési útmutató és a biztonsági információk magyar nyelvű változata az alábbi címen található:
NL/BE	De Nederlandse versie van de installatie-instructies en veiligheidsinformatie kan op de volgende locatie worden gevonden:
DK	Den danske version af installationsvejledningen og sikkerhedsoplysninger kan findes på følgende placering:
FI	Asennusohjeiden ja turvallisuustietojen suomenkielinen versio löytyy seuraavasta paikasta:
NO	Den norske versjonen av installasjonsinstruksjonene og sikkerhetsinformasjonen finnes under:
SE	Ni hittar den svenska versionen av installationsanvisningarna och säkerhetsinformationen på följande plats:
EE	Eestikeelse paigaldusjuhendi ja ohutusnõuded leiate aadressilt:
LV	Uzstādīšanas instrukciju un drošības informāciju latviešu valodā var atrast šeit:
LT	Lietuvišką diegimo instrukcijos ir saugos informacijos versiją galima rasti šioje vietoje:
GR/CY	Μπορείτε να βρείτε την ελληνική εκδοχή των οδηγιών εγκατάστασης και των πληροφοριών ασφάλειας στην εξής τοποθεσία:
RU	Русскую версию инструкции по установке и технике безопасности можно найти здесь:
UA	Українська версія інструкції зі встановлення та інформація щодо безпеки знаходяться за такою адресою:
BG	Българската версия на инструкциите за инсталация и информация за безопасност могат да бъдат намерени на следния адрес:
ARAB	يمكن إيجاد النسخة العربية من إرشادات التثبيت ومعلومات الأمان على الموقع التالي:
TR	Montaj talimatı ve güvenlik bilgilerinin Türkçe sürümü, aşağıdaki konumda bulunabilir:

The English version of the installation instruction and safety information can be found at the following location:

tungsram.com/installations