Line Pattern Lights

LFX3-PT Series Instruction Guide

CE

LED Light for Machine Vision and Industrial Inspection

Thank you for purchasing a CCS product. To ensure proper use of the product, please read this instruction guide before use and keep it for your future reference.

1 Important Information for Equipment Safety - Read Before Use -

This product has been designed with full consideration of safety. However, incorrect usage of the product may result in fire, electric shock, or other serious damages. Please ensure to follow the conditions below.

The following symbols are used in this Instruction Guide to indicate and classify the relative importance of warnings and cautions.

⚠ Warning	Indicates that incorrect usage may result in serious injury or death.	⚠ Caution	Indicates that incorrect usage may result in injury or property damage.

The following symbols in the Instruction Guide indicate and classify the precautions.

PROHIBITED, DISASSEMBLY PROHIBITED, DO NOT TOUCH WITH WET HANDS, DO NOT SUBJECT TO MOISTURE These symbols indicate prohibited actions.	MANDATORY ACTIONS This symbol indicates required actions.

⚠ Warning

Do not disassemble or modify the Light Unit. Doing so may result in fire or electric shock. (DISASSEMBLY PROHIBITED)	LED Light radiation may cause corneal or retinal abnormalities if you look directly at the light. To prevent harmful light exposure, never look directly at the LED Light. (MANDATORY ACTIONS)
Do not touch the Light Unit with wet hands. Doing so may result in electric shock. (DO NOT TOUCH WITH WET HANDS)	This Light Unit generates high temperatures. Do not touch the Light Unit while it is turned on or immediately after it is turned off, or burning may result. Provide cooling with a fan or other ventilation if the Light Unit is to be used in a closed space. (MANDATORY ACTIONS)
Make sure that the Light Unit is free of moisture or any liquid. Exposure to water may result in fire, electric shock. (DO NOT SUBJECT TO MOISTURE)	Connect or disconnect the light cable only after turning off the power source. Failure to do so may result in circuit damage, fire caused by a minute spark, or electric shock. (MANDATORY ACTIONS)
If abnormal condition occurs such as fuming, heat, smell, noise, or so on, stop using the Light Unit immediately, and turn off the power source. A fire or electric shock may result if the Light Unit is kept used. (MANDATORY ACTIONS)	**Using Infrared Light Units (LFX3-nnnIR860-PT)** Make known to all personnel concerned the risk of infrared radiation. Failure to do so may cause incorrect handling. (MANDATORY ACTIONS)

⚠ Caution

Do not use user-made cables. Doing so may cause product failure. Use the CCS extension cable if it is necessary to extend the distance between the Light Unit and the Control Unit. (PROHIBITED)	Use Control Unit that is suitable for the Light Unit ratings. Using an incorrect Control Unit can cause Light Unit failure. (MANDATORY ACTIONS)
Be careful of static electricity. Damage to the LED Light may occur, if a person charged with static electricity touches it. Keep the product away from all items charged with static electricity. (PROHIBITED)	Use a standard Extension Cable that is manufactured by CCS. However, if the cable is too long, the light intensity will decrease due to the DC resistance of the cable. (MANDATORY ACTIONS)
Do not drop the Light Unit or subject it to impact. Doing so may cause the Light Unit to malfunction. (PROHIBITED)	

Do not use the Light Unit in the following situations.

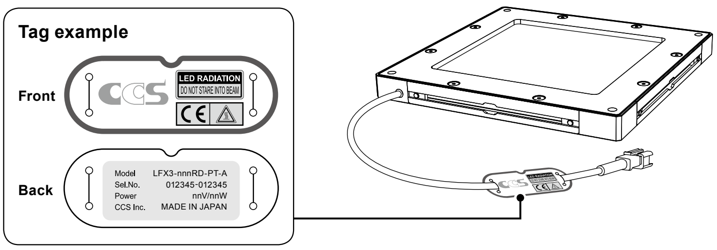
- Under conditions or in an environment not described in this instruction guide.
- In nuclear energy control systems, railroad systems, aviation systems, vehicles, combustion equipment, medical equipment, amusement machines, or safety equipment.
- In applications involving serious risk to life or property, particularly applications demanding a high level of safety.

Please install the Light Unit to locations with following conditions. Incorrect installation location may cause Light Unit failure.

- In a flat and stable location with minimal vibration.
- Well-ventilated places with minimal dust.
- Places that are not subject to sudden temperature changes.
- Places free from any water, oil, liquid, chemical, or steam.
- Places free from corrosive or combustible gas.
- Places away from water faucets, boilers, humidifiers, air conditioners, heaters, or stoves.

2 Confirming Product Information

The following tag is attached to the cable on the LED Light. The color of the label indicates the luminescence color of the Light Unit. The back of the tag there is a name label that gives the model number, power consumption, and serial number. Be sure to check the contents before using the Light Unit and handle the label with care. If the label is missing or damaged and the contents cannot be checked, please contact CCS Inc.



3 Features

The LFX3-PT-series Light Units are used for detecting gentle bumps on reflective surfaces. The light from the light-guiding diffusion plate with a printed line pattern is projected onto the inspection object surface to highlight bumps as curved lines.
There are two types of Light Units with different line pitches of the line pattern.

LFX3-PT-A series Light Units
The line pitch of the line pattern is 1 mm.

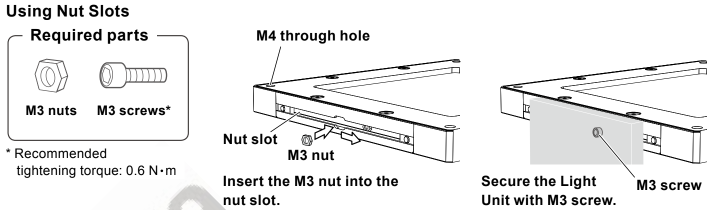
LFX3-PT-B series Light Units
The line pitch of the line pattern is 2 mm.

4 Installation

This Light Unit has two faces. Install the Light Unit so that it faces in the correct direction.

- Camera side: The emitting surface appears transparent when the Light Unit is turned OFF. This side must face the camera.
- Light projection side: The emitting surface appears translucent white when the Light Unit is turned OFF. This side must face the inspection object. When the Light Unit is turned ON, light will be projected from this side.

Use the M4 through holes at the four corners of the square face. Additionally, you can use the nut slots on the lateral side of the Light Unit.



Determine the length of the screws considering the dimensions of the M4 through holes and nut slots. For information on the dimensions of each part, refer to *8. Dimensions*.

5 Operating Instructions

MANDATORY ACTIONS: Make sure that the Control Unit for the LED Lights is turned OFF.

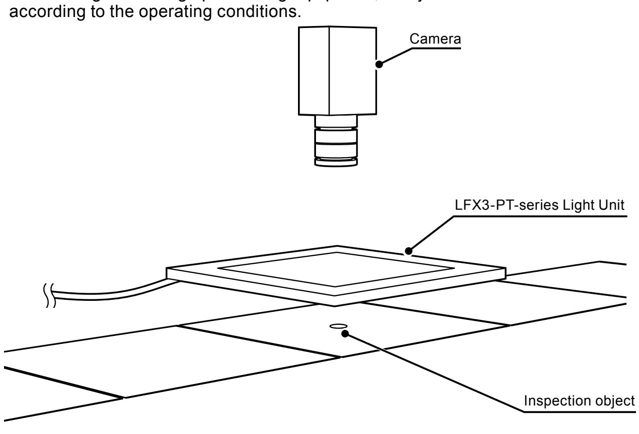
❶ Connect the light cable of the Light Unit to the Control Unit.
Connect to the Control Unit equipped with **SMP-03V-BC** Connectors for power output. Insert the plug all the way into the connector.

For information on applicable Control Units and cables, refer to the product catalogs or the CCS website.

⚠ Caution — **Using Infrared Light Units (LFX3-nnnIR860-PT)**
Do not expose human eyes to infrared radiation. Also, make known to all personnel concerned the risk of infrared radiation.

❷ Turn ON the Control Unit to turn ON the Light Unit.
Read the *Instruction Guide* of the Control Unit before use.

❸ Adjust light range, light angle, and radiant quantity to optimize images.
When using color image processing equipment, readjust the white balance of the camera according to the operating conditions.



– Imaging example –

⚠ Caution — **Using Infrared Light Units (LFX3-nnnIR860-PT)**
If you look at the LEDs in the Light Unit, it may appear that some of the LEDs are lit and some of them are not lit. This is because some of the LEDs radiate visible light. The LEDs that appear to be not lit radiate infrared light. Do not look at the radiated light directly with your naked eyes.
To check for unlit LEDs, use a camera to look at the LEDs indirectly. You can also look at the LEDs through the LCD monitor on a normal digital camera or cellphone.

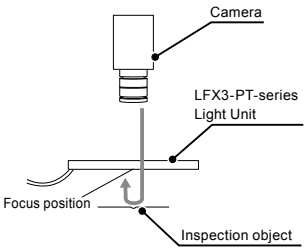
5 Operating Instructions (Continued)

To Obtain the Optimal Image

Install the LFX3-PT-series Light Unit so that it projects the line pattern onto the inspection object surface. Normally, match the camera focus not to the inspection object but to the line pattern of the Light Unit.
If the captured image has interference fringes, adjust the settings as follows:

- Open the camera aperture.
- Increase the distance between the Light Unit and the inspection object.

Note: The most appropriate position of the Light Unit and the best imaging conditions, such as the distance between the camera and inspection object, focus position, F-number, and so on, may vary with the type of the inspection. Use the above description as only a guide for adjustment.



When the ambient light is reflected from the surface of the Light Unit or the surface of the inspection object, the captured image may be affected.

Methods for preventing the effects of ambient light

- Prevent ambient light from entering with a hood or the like.
- If using red light, equip a Sharp-cut Filter to the lens.
- Increase the camera's shutter speed. (Increase the Light Unit intensity somewhat.)

Dirt or dust on the surface of the Light Unit may affect the captured image.

Dirt and dust removal methods

- Handle the Light Unit with care. Make sure no dirt, dust, or fingerprints get on the Light Unit.
- Remove dirt and dust by blowing air rather than by hand.
- Use a soft, finely woven cloth to wipe away any marks such as fingerprints.
- Use diluted neutral detergent to remove any heavy dirt.
  Do not use chemicals such as alcohol for the light-guiding diffusion plate after you disassemble the Light Unit. Otherwise, the line pattern printed on the surface may be damaged.

6 Control Units

When connecting a Control Unit to the Light Unit, use following CCS Control Units for the LED Lights. Select a Control Unit to match the application and purpose. When making the selection, confirm that the total power consumption of the connected Light Units will be within the Control Unit output power specifications. In addition, independent control is enabled by selecting a Control Unit with the number of channels corresponding to the number of input connectors for the Light Units that are used. Read the *Instruction Guide* of the Control Unit before use.

Digital Control Unit (Pulse Duty Control)
The Digital Control Unit is able to control radiant quantity with a PWM light control system.

Analog Control Unit (Constant Voltage Control)
The Analog Control Unit providing step-less intensity control through variable voltage control.

Overdrive Control Unit
The Overdrive Control Unit enables LED Lights to be used with strobes. By overdriving* the voltage, a current several times higher than normal current will flow. Therefore, it enables the Light Units to emit few times brighter than using the ON/OFF control function.
(All Light Units that are described on this document are applicable for the operation with overdrive.)
* Overdrive: A state in which voltage raises instantly in excess of the rated voltage.

Please contact CCS about a new product and other Control Units.

7 Main Specifications

Common Specifications

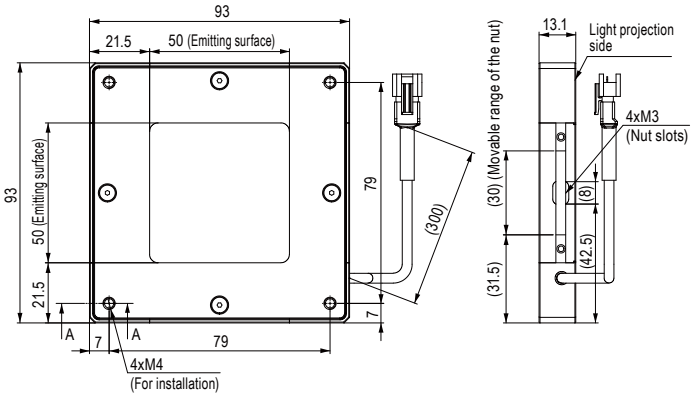
Input voltage	24 VDC
Peak wavelength/Correlated color temperature (typ.)	Red: 632 nm, White: 6800 K, Blue: 469 nm, IR: 857 nm
Connector	SMR-03V-B
Polarity, signal	1: (+), 2: NC, 3: (–)
Cable length	300 mm
Cooling method	Natural air-cooling
Operating environment (indoors only)	Temperature: 0 to 40°C, Humidity: 20 to 85%RH (with no condensation)
Storage Environment	Temperature: -20 to 60°C, Humidity: 20 to 85%RH (with no condensation)
CE Marking	Safety standard: Conforms to EN 62471
Environmental regulations	RoHS compliant
Case material	Aluminum alloy, Resin (protective plate, light-guiding diffusion plate)
Accessories	Instruction guide

Specifications by Model

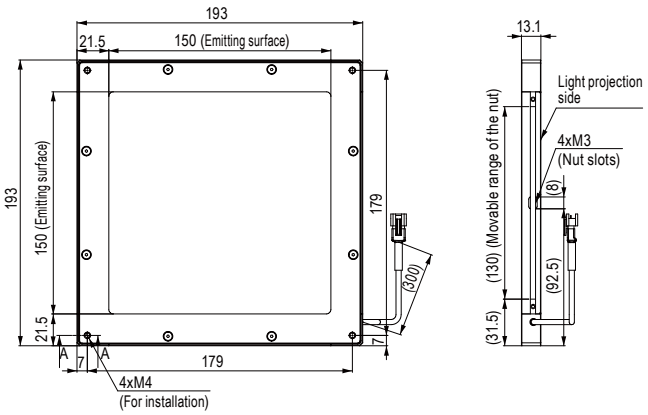
Model name	Line pitch	LED color	Power consumption (max.)	Weight (max.)
LFX3-50RD-PT-A	1 mm	Red	13 W	230 g
LFX3-50SW-PT-A		White	12 W	
LFX3-50BL-PT-A		Blue	6.1 W	
LFX3-50IR860-PT-A		Infrared	6.6 W	
LFX3-75RD-PT-A		Red	13 W	320 g
LFX3-75SW-PT-A		White	18 W	
LFX3-75BL-PT-A		Blue	9.1 W	
LFX3-75IR860-PT-A		Infrared	14 W	
LFX3-100RD-PT-A		Red	19 W	400 g
LFX3-100SW-PT-A		White	23 W	
LFX3-100BL-PT-A		Blue	13 W	
LFX3-100IR860-PT-A		Infrared	14 W	
LFX3-150RD-PT-A		Red	25 W	620 g
LFX3-150SW-PT-A		White	35 W	
LFX3-150BL-PT-A		Blue	19 W	
LFX3-150IR860-PT-A		Infrared	20 W	
LFX3-200RD-PT-A		Red	37 W	910 g
LFX3-200SW-PT-A		White	46 W	
LFX3-200BL-PT-A		Blue	25 W	
LFX3-200IR860-PT-A		Infrared	27 W	
LFX3-50RD-PT-B	2 mm	Red	13 W	230 g
LFX3-50SW-PT-B		White	12 W	
LFX3-50BL-PT-B		Blue	6.1 W	
LFX3-50IR860-PT-B		Infrared	6.6 W	
LFX3-75RD-PT-B		Red	13 W	320 g
LFX3-75SW-PT-B		White	18 W	
LFX3-75BL-PT-B		Blue	9.1 W	
LFX3-75IR860-PT-B		Infrared	14 W	
LFX3-100RD-PT-B		Red	19 W	400 g
LFX3-100SW-PT-B		White	23 W	
LFX3-100BL-PT-B		Blue	13 W	
LFX3-100IR860-PT-B		Infrared	14 W	
LFX3-150RD-PT-B		Red	25 W	620 g
LFX3-150SW-PT-B		White	35 W	
LFX3-150BL-PT-B		Blue	19 W	
LFX3-150IR860-PT-B		Infrared	20 W	
LFX3-200RD-PT-B		Red	37 W	910 g
LFX3-200SW-PT-B		White	46 W	
LFX3-200BL-PT-B		Blue	25 W	
LFX3-200IR860-PT-B		Infrared	27 W	

8 Dimensions (mm)

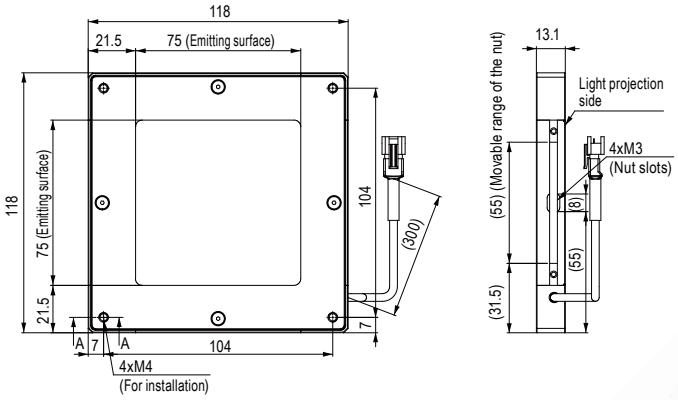
LFX3-50-PT-A/-B



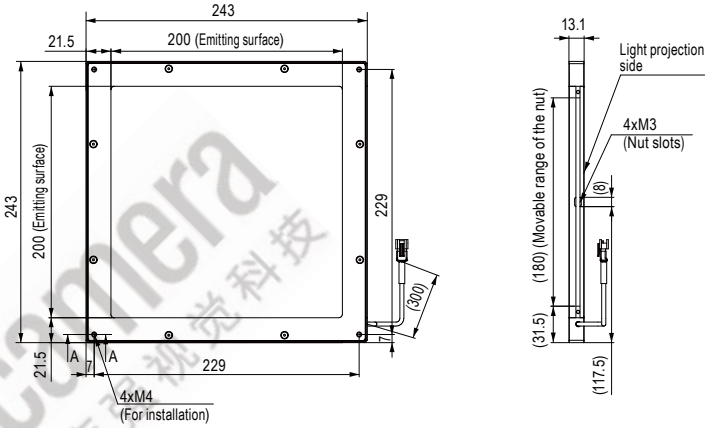
LFX3-150-PT-A/-B



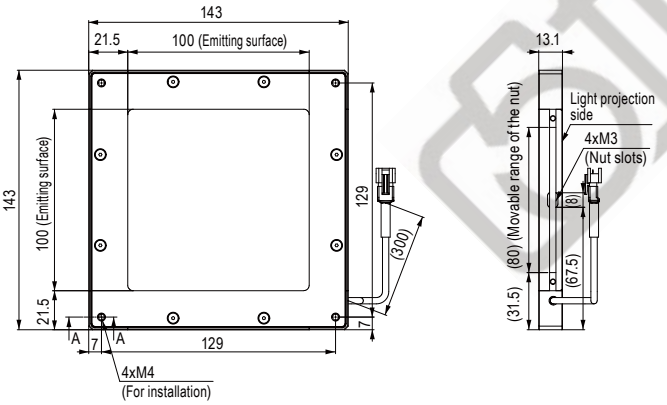
LFX3-75-PT-A/-B



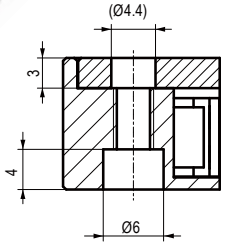
LFX3-200-PT-A/-B



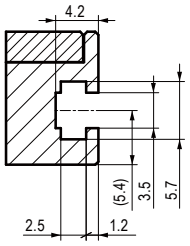
LFX3-100-PT-A/-B



Detail Diagram for the A-A Surface



Detail Diagram for the M3 Nut Slot



9 Environmental Regulation

EU RoHS Directive

The RoHS Directive is short for the "restriction of use of certain hazardous substances in electrical and electronic equipment." As a directive, it restricts the use of specific hazardous substances for new electrical and electronic equipment marketed in the EU on or after July 1, 2006, and restricts the use of six substances, which are (1) lead, (2) mercury, (3) cadmium, (4) hexavalent chromium, (5) polybrominated biphenyl (PBB), and (6) polybrominated diphenyl ether (PBDE).

*Standards for "RoHS Directive-Compliant Products"

Lead	Mercury	Cadmium	Hexavalent chromium	PBB	PBDE
1000ppm max.	1000ppm max.	100ppm max.	1000ppm max.	1000ppm max.	1000ppm max.

(Items that are exempted in the RoHS Directive are excluded from these standards.)

China RoHS Directive

China RoHS Directive is formally known as "Management Methods for Restricting Hazardous Substances Used in Electric and Electronic Products", which was implemented on July 1, 2016 in China. Same as EU RoHS Directive, this regulation restricts the usage of six substances such as lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyl (PBB), and polybrominated diphenyl ether (PBDE). This regulation requires electronic information products which are manufactured or imported, and sold in China, to clearly disclose contents of the 6 restricted substances listed below.

Names and contents of hazardous substances

Usage Deadline for Environmental Protection	Product name	Names and contents of hazardous substances					
		Lead (Pb)	Mercury (Hg)	Cadmium (Cd)	Hexavalent chromium (Cr(VI))	PBB	PBDE
10	LED Lights	×	○	×	○	○	○

(This table is made in compliance with SJ/T11364 regulations.)
○: Indicates that this toxic or hazardous substances contained in all the homogeneous materials for this part, according to GB/T26572 is within the limit requirement.
×: Indicates that this toxic or hazardous substance contained in all the homogeneous materials for this part, according to GB/T26572, is over the limit requirement.
*Lead and cadmium are excluded in EU RoHS.

Usage deadline for environmental protection
The number used in this logo is based on "Management Methods for Restricting Hazardous Substances Used in Electric and Electronic Products" and related regulations from People's Republic of China. It shows the product usage duration in years for environmental protection. After finishing a product usage, the product needs to be re-used or discarded appropriately following local law and regulations, complying with safety and usage caution.

产品中有害物质的名称及含量

环保使用期限	产品	有害物质的名称及含量					
		铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
10	LED 照明	×	○	×	○	○	○

（本表格依据 SJ/T11364 的规定编制。）
○：表示该有毒有害物质在该部件所有均质材料中的含量均在 GB/T26572 标准规定的限量要求以下。
×：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 GB/T26572 标准规定的限量要求。
（注）铅和镉中的“×”，因欧洲 RoHS 没限定，故用“○”表示。

环保使用期限
此标志的数字是根据中华人民共和国电器电子产品有害物质限制使用管理办法以及有关标准等，表示该产品的环保使用期限的年数。遵守产品的安全和使用上的注意，在产品使用后采取适当的方法根据各地法律，规定，回收再利用或进行废弃处理。

Warranty Information

EXCEPT FOR THE EXPRESS WARRANTIES STATED IN THIS DOCUMENT, CCS MAKES NO ADDITIONAL WARRANTIES, EXPRESS, IMPLIED, OR STATUTORY, AS TO ANY MATTER WHATSOEVER. IN PARTICULAR, ANY AND ALL WARRANTIES OF MERCHANTABILITY OR FITNESS FOR PARTICULAR PURPOSE ARE EXPRESSLY EXCLUDED.
EXCEPT AS EXPRESSLY SET FORTH HEREIN, CCS MAKES NO WARRANTIES WITH RESPECT TO THE PRODUCTS.

WARRANTY PERIOD: TWO YEARS (ONE YEAR FOR RADIANT QUANTITY), STARTING FROM CCS Inc. SHIPPING DATE.

CCS Inc. WILL REPAIR OR REPLACE THE PRODUCT FREE OF CHARGE IF IT SHOULD FAIL TO FUNCTION OR IF THE RADIANT QUANTITY OF THE PRODUCT SHOULD DROP TO 50% OR LESS OF ITS INITIAL RADIANT QUANTITY WITHIN THE SPECIFIED WARRANTY PERIOD. IF EITHER OF THESE CONDITIONS OCCURS, PLEASE TAKE THE PRODUCT TO YOUR CCS SALES REPRESENTATIVE.

WARRANTY TERMS

1 CCS Inc. WILL REPAIR OR REPLACE THE PRODUCT FREE OF CHARGE IF IT SHOULD FAIL TO FUNCTION UNDER USE ON OUR SPECIFIED CONDITION IN ACCORDANCE WITH THE INSTRUCTION GUIDE AND OTHER WRITTEN CAUTIONS DURING THE INDICATED WARRANTY PERIOD OF TWO YEARS.

2 CCS Inc. WILL REPAIR OR REPLACE THE PRODUCT FREE OF CHARGE IF ITS RADIANT QUANTITY SHOULD DROP TO 50% OR LESS OF ITS INITIAL RADIANT QUANTITY UNDER USE ON OUR SPECIFIED CONDITION IN ACCORDANCE WITH THE INSTRUCTION GUIDE AND OTHER WRITTEN CAUTIONS DURING THE INDICATED WARRANTY PERIOD OF ONE YEAR.

3 CCS Inc. WILL CHARGE A REPAIR FEE UNDER THE FOLLOWING CONDITIONS:
1) IF THE PRODUCT HAS BEEN SUBJECTED TO MISUSE, UNAUTHORIZED REPAIRS, OR MODIFICATION FROM ITS ORIGINAL DESIGN.
2) IF THE PRODUCT HAS BEEN DAMAGED FROM IMPACTS DUE TO INAPPROPRIATE HANDLING.
3) IF DAMAGE TO THE PRODUCT RESULTS FROM EXTERNAL CAUSES INCLUDING ACCIDENTS, FIRE, POLLUTION, RIOTS, COMMUNICATION FAILURES, EARTHQUAKES, THUNDERSTORMS, WIND AND FLOOD DAMAGE, OR ANY OTHER ACT OF PROVIDENCE, OR FROM ANY EXTRAORDINARY CONDITIONS SUCH AS ELECTRICAL SURGES, WATER LEAKAGE, CONDENSATION, OR THE USE OF CHEMICALS.
4) IF THE DAMAGE RESULTS FROM CONNECTION TO ANY POWER SUPPLY OR TO ANY EQUIPMENT WHICH CCS Inc. DOES NOT MANUFACTURE OR DOES NOT SPECIFY FOR USE.

4 CCS ASSUMES NO LIABILITY FOR ANY PURCHASER'S SECONDARY DAMAGE (DAMAGE OF EQUIPMENT, LOSS OF OPPORTUNITIES, LOSS OF PROFITS, ETC.) OR ANY OTHER DAMAGE RESULTING FROM A FAILURE OF OUR PRODUCT.

THIS WARRANTY INFORMATION PROVIDES THE SCOPE OF CCS'S PRODUCT WARRANTY WITHIN THE SPECIFIED PERIOD, AND DOES NOT INDICATE OR IMPLY ANY FURTHER GUARANTEE BEYOND THE WARRANTY TERMS.

CONTACT CCS FOR INQUIRIES OR INFORMATION ON REPAIRS TO THE PRODUCT AFTER THE EXPIRATION OF THE WARRANTY.

NOTE: THE RADIANT QUANTITY REFERS TO THE WATTAGE OF PHYSICAL ENERGY RADIATED FROM AN LED. IT REFERS TO THE RADIATION LUMINOSITY OF THE LED MEASURED UNDER CONDITIONS SPECIFIED BY CCS OR THE RADIATION ILLUMINATION OF THE LED UNDER SPECIFIED IRRADIATION CONDITIONS. CCS SPECIFIES THE RADIANT QUANTITY FOR EACH LED LIGHT BECAUSE THE MEASUREMENT AND IRRADIATION CONDITIONS VARY FROM THE FORM, THE APPLICATION AND THE IRRADIATION WAVELENGTH.

- Contents of this Instruction Guide may be changed without prior notice.
- Illustrations used in this Instruction Guide may differ from actual products.
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- Instruction Guide and Dimensional Diagrams in PDF or CAD can be downloaded from the CCS website. http://www.ccs-grp.com

Ask any product queries to the following address or to your nearest CCS representative.

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Use our website to find your nearest CCS representative. http://www.ccs-grp.com/mvad

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