

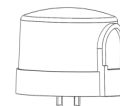
System Parts	 (Approximate)			Windage -Surface (m ²)
	Ø89mm Post	Ø101mm Post	Ø114mm Post	
Post Arm Bracket	7	9	11.5	0.9993
Luminaire	6			
Solar Panel & Mounting Bracket	25			
Solar Controller & Battery Mounting Plates	2.5			N/A
Lithium Iron Phosphate Battery	6.2			

Assembly Component Kits:

- Luminaire x1
- PV Solar Panel x1
- Solar Panel Mounting Bracket x1
- Post Arm Bracket x1
- Solar Controller & Battery Mounting Plates x1
- Lithium Iron Phosphate Battery x1

Photocell Node (Ordered Separately):

LIT-0120 - Nema DC Photocell



Zhaga Motion Sensor (Ordered Separately):

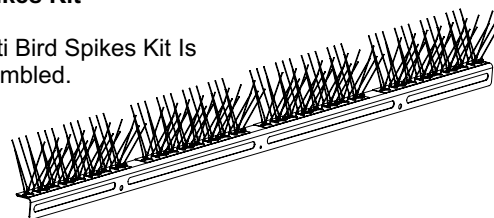
LIT-0141 - DC PIR



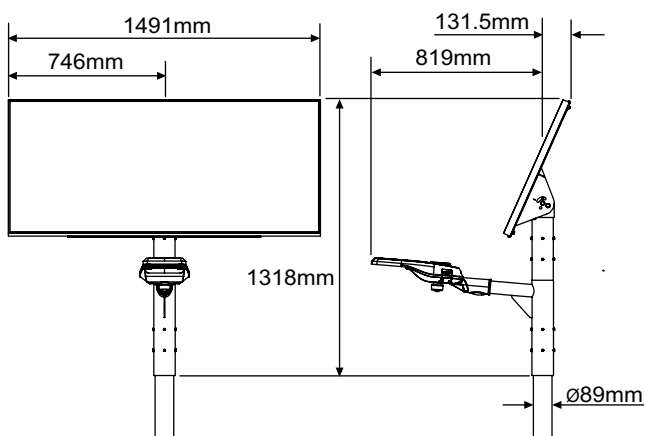
(Motion Sensor Remote Control: LIT-0110)

Anti Bird Spikes Kit

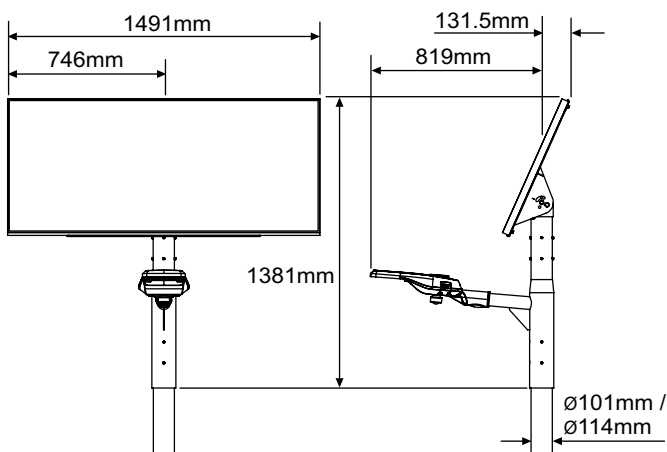
Note: The Anti Bird Spikes Kit Is Not Pre-Assembled.



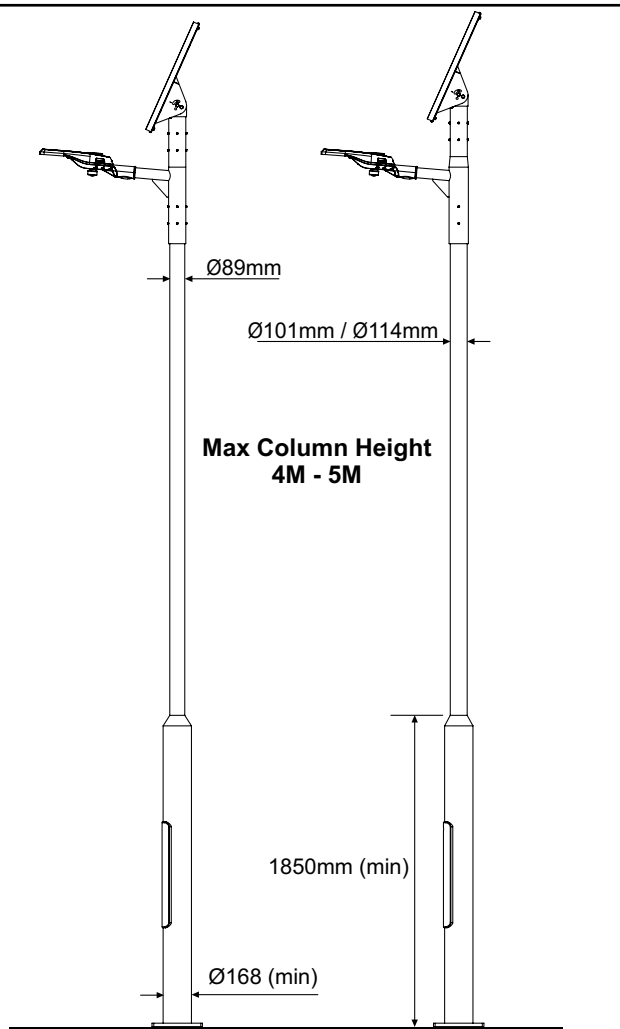
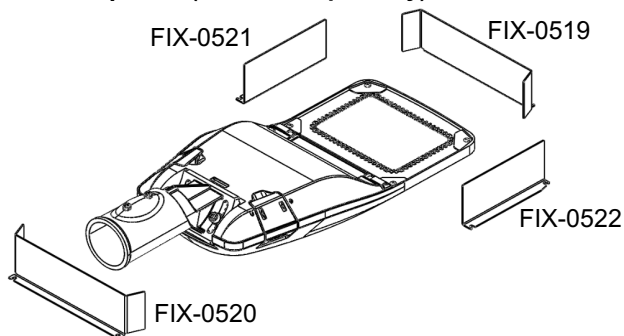
For Ø89mm Column:



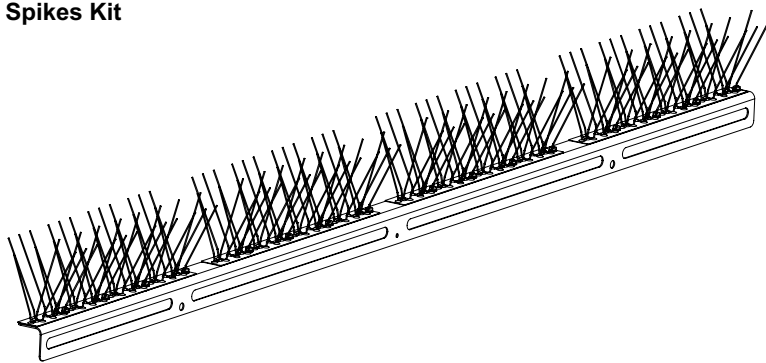
For Ø101mm / Ø114mm Column:



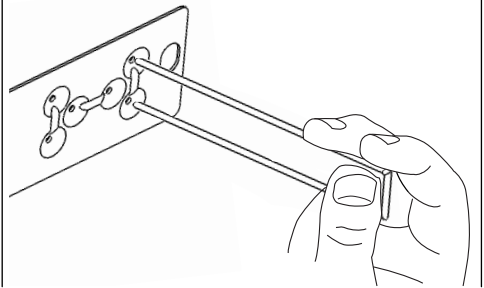
Glare Shield Options (Ordered Separately):



Anti Bird Spikes Kit

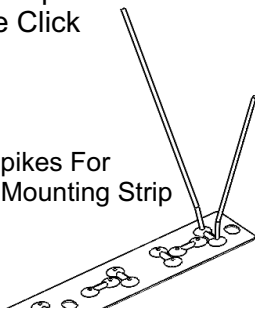


1 Compress Spike To A-line With Holes In Mounting Strip

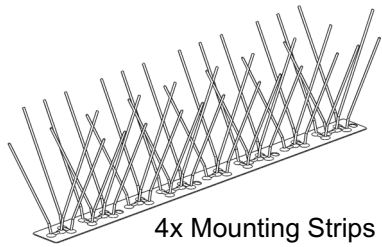


2 Push Spike Ends Through The Mounting Strip Until You Hear An Audible Click

20x Spikes For Each Mounting Strip

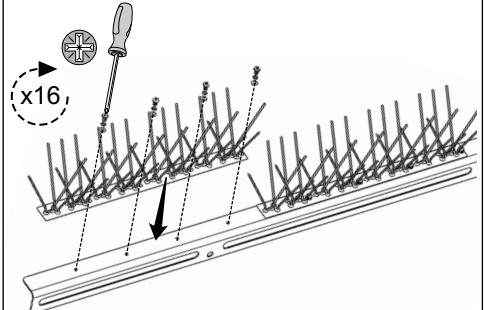


3 Repeat Steps To Fully Populate Each Mounting Strips

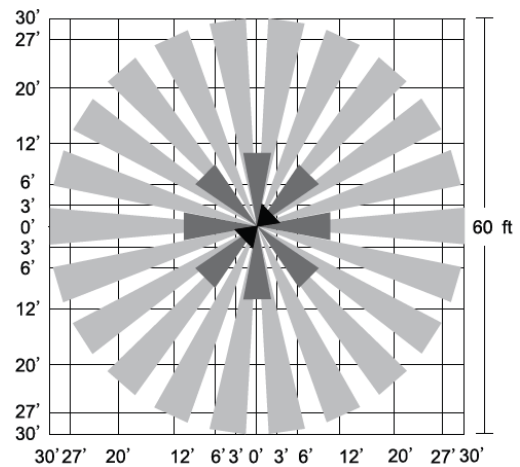
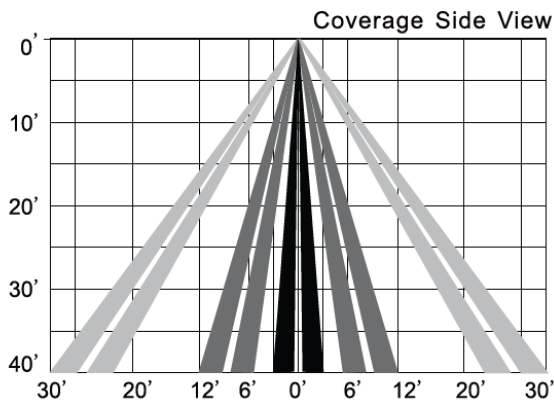


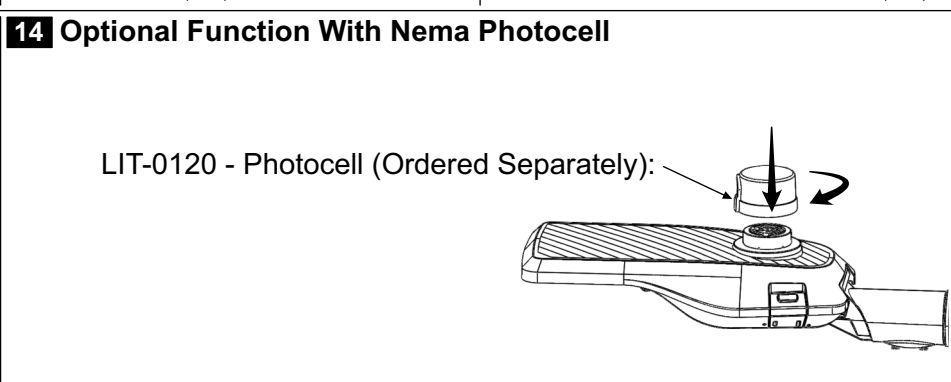
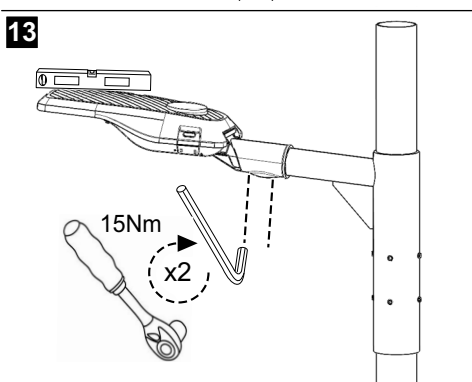
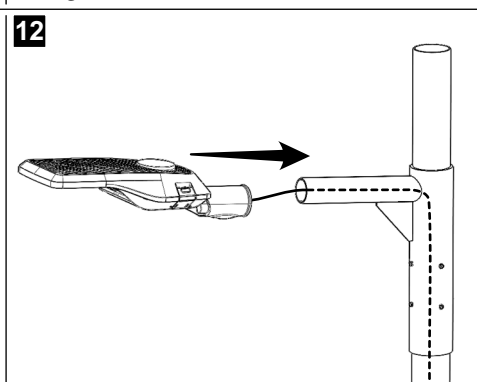
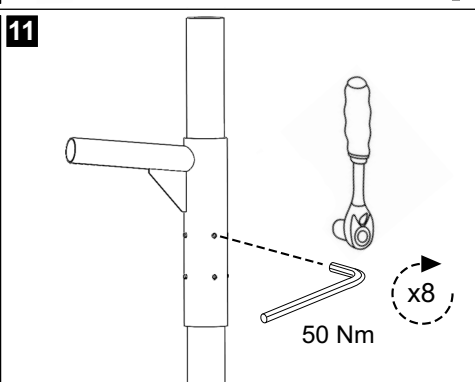
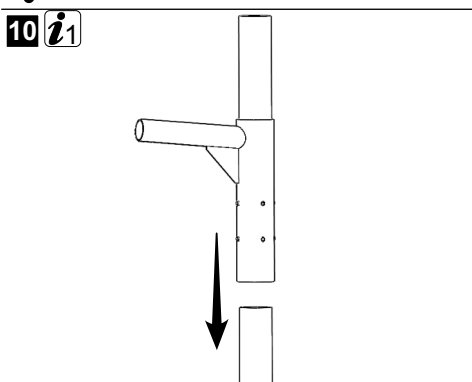
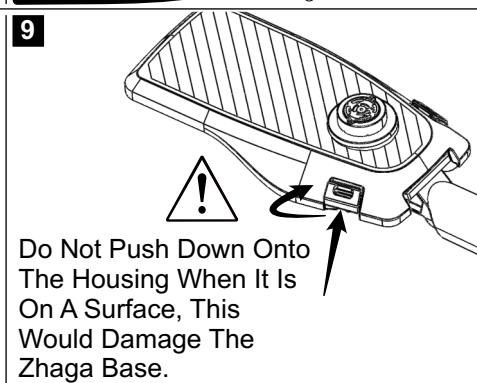
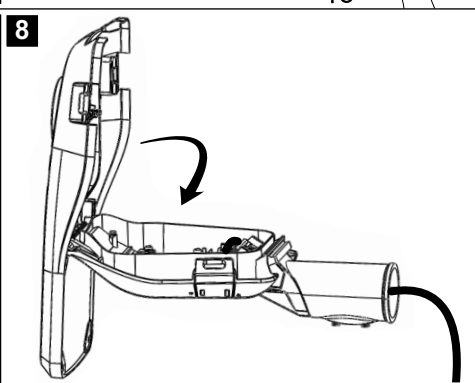
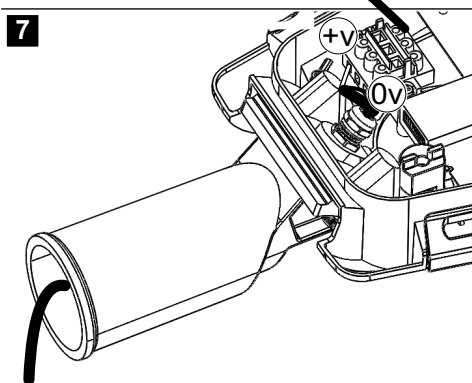
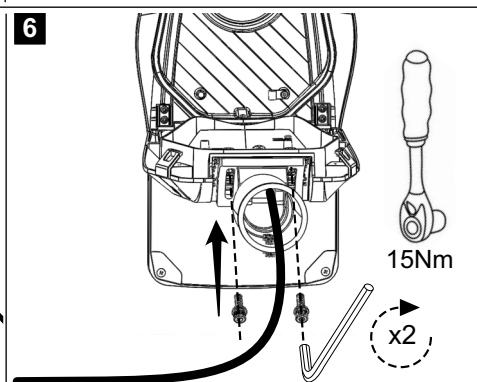
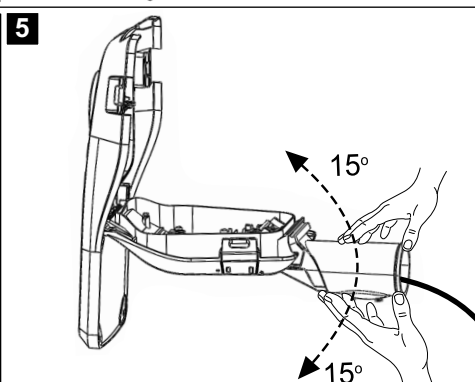
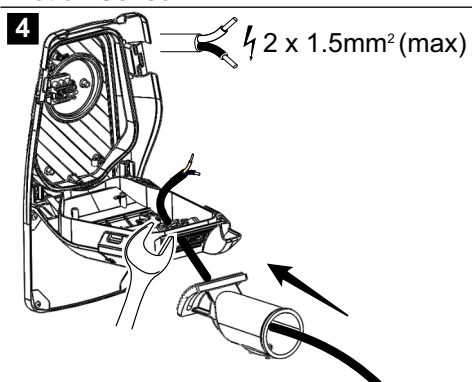
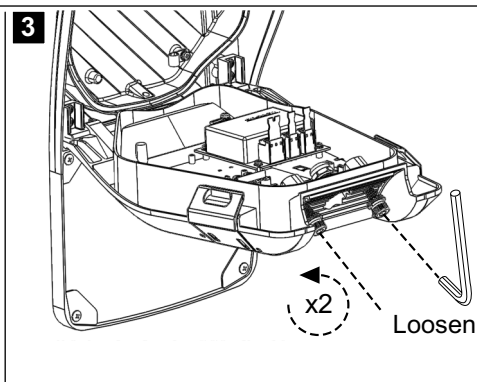
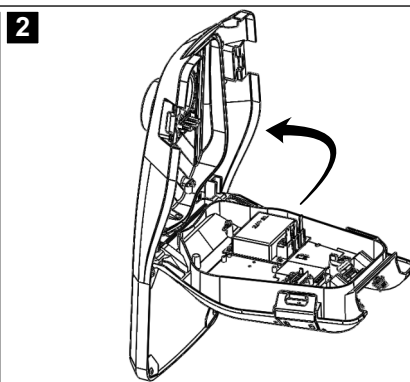
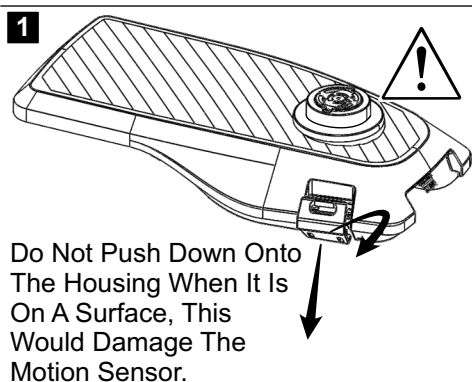
4x Mounting Strips For Each Anti Bird Spikes Kit

4 Screw Each Mounting Strips To L Bracket



LIT-0141 - DC PIR Sensor Information (In ft)

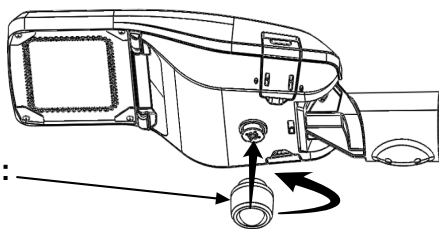




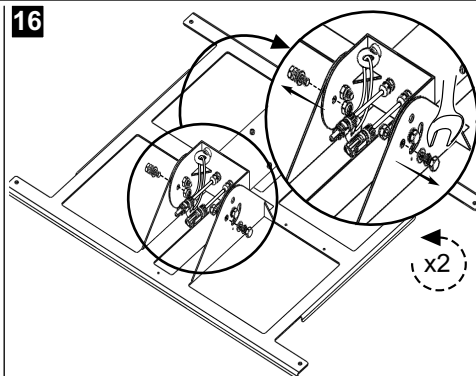
15 Optional Function With Motion Sensor

Motion Sensor (Ordered Separately):
LIT-0141 - DC PIR

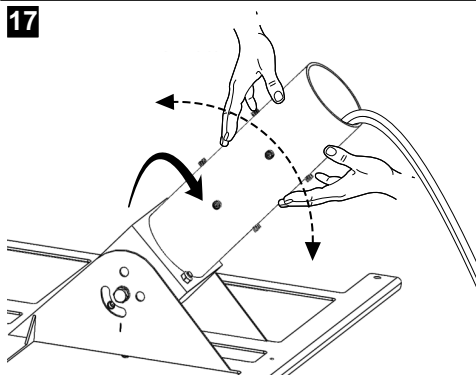
If Motion Sensor Settings Outside Of The Factory Pre-sets Is Required, The Use Of A LIT-0110 Remote Control Will Be Necessary (Ordered Separately)



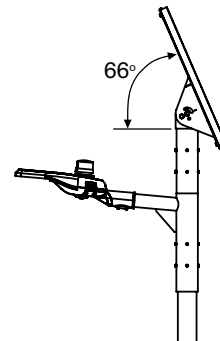
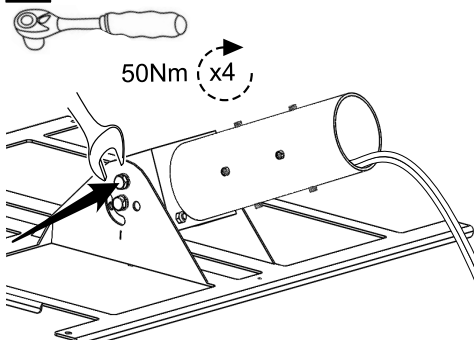
16



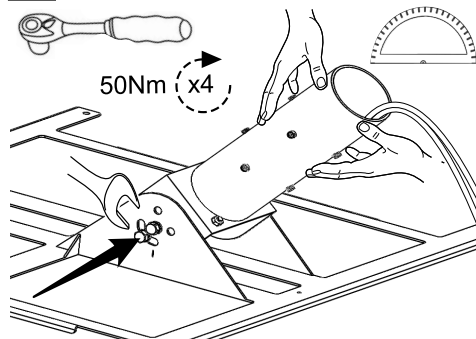
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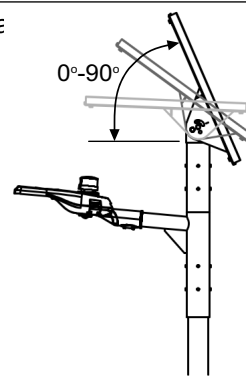
18a Only For United Kingdom - Per Set Angle Of 66° From The Horizontal



18b International Countries (Outside United Kingdom) - Angle 0° - 90° From The Horizontal

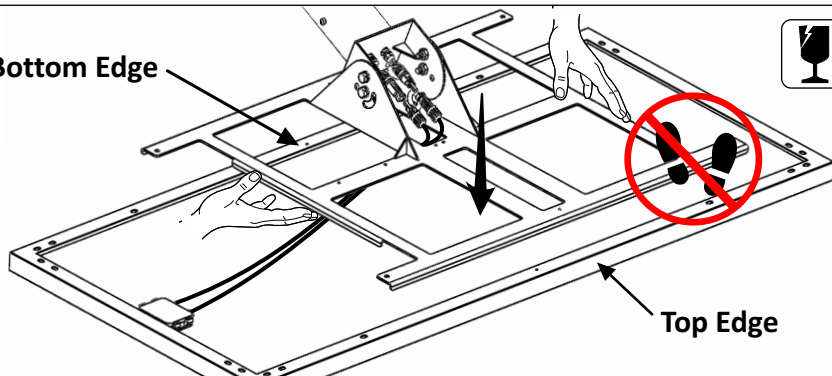


The Optimal Angle of Tilt Will Require Re Calculation. Calculating The Optimal Solar Panel Angle Is To Add 15 Degrees To The Latitude Of The Site Location.



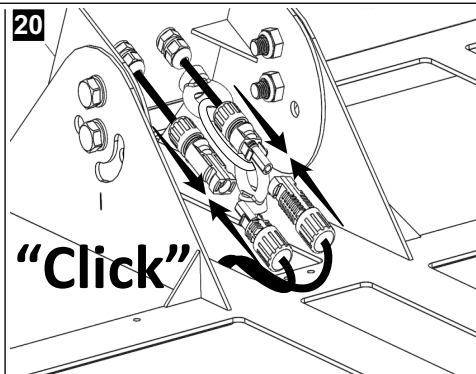
19

Bottom Edge



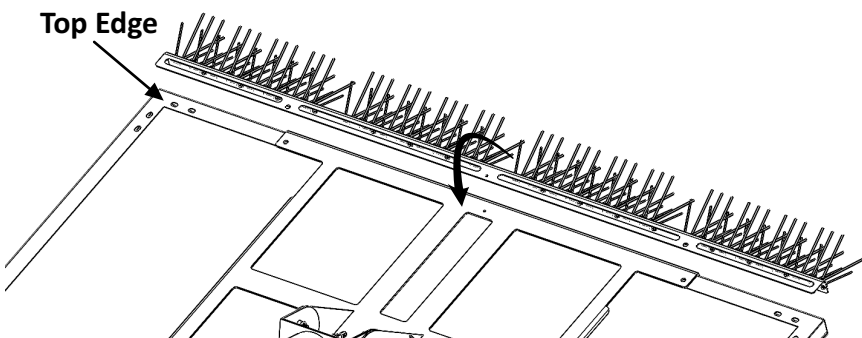
Top Edge

20

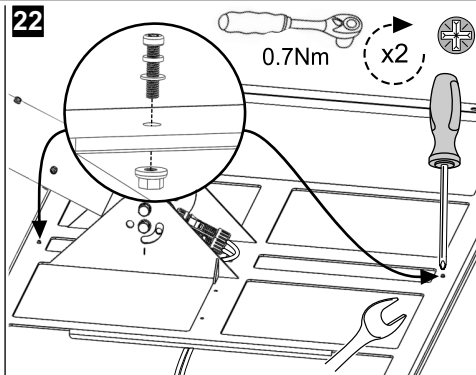


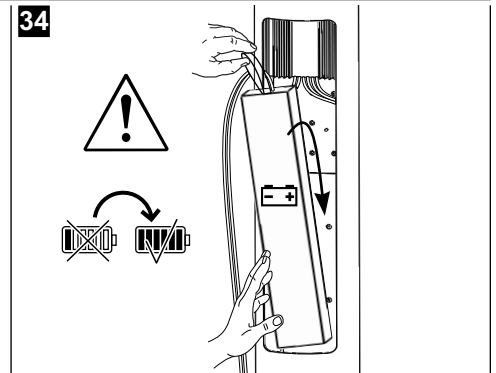
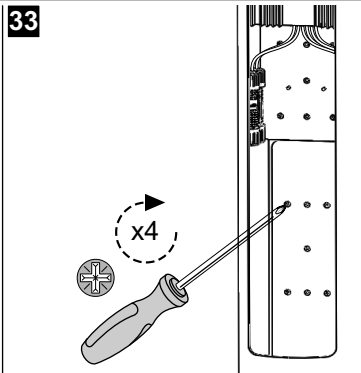
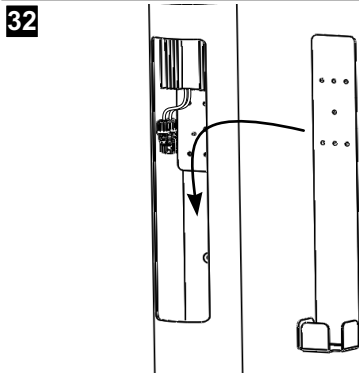
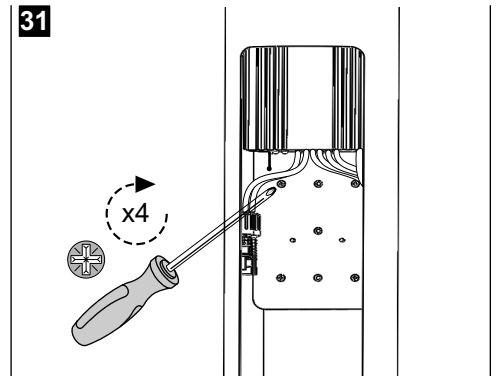
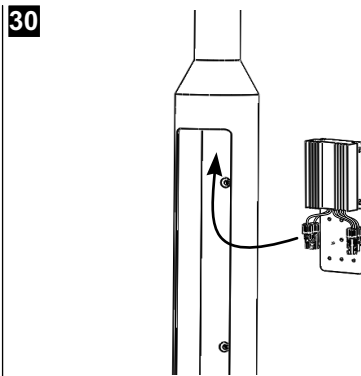
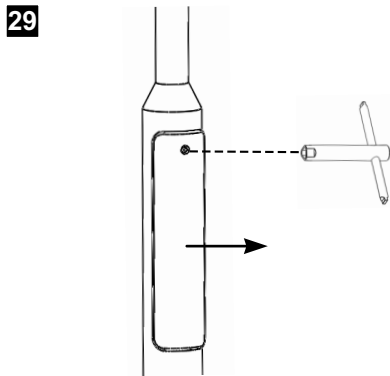
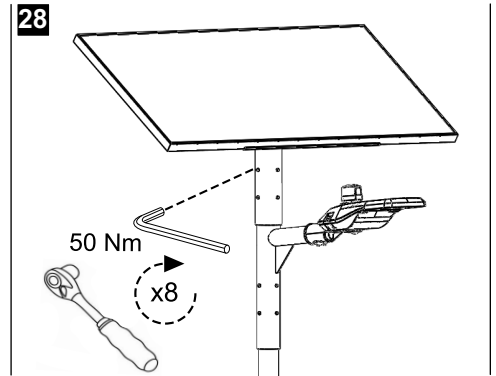
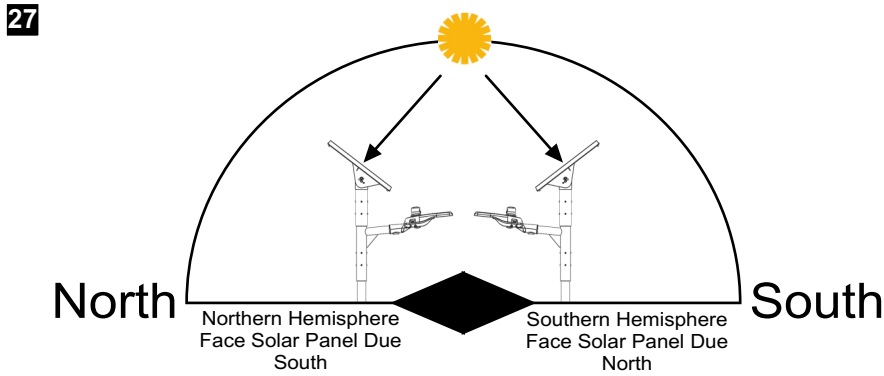
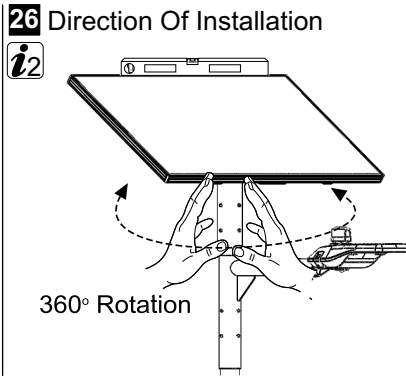
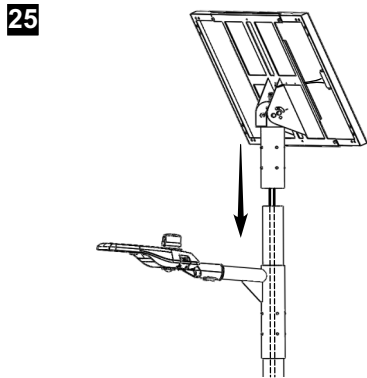
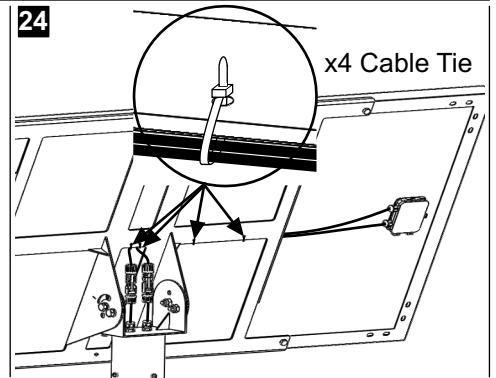
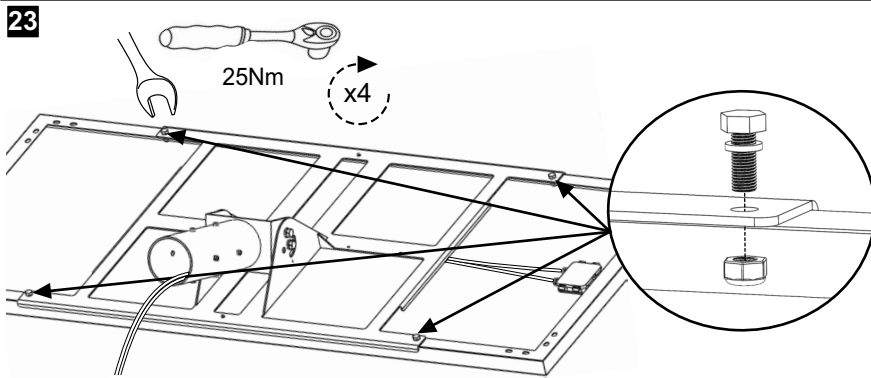
21 Anti Bird Spikes Kit

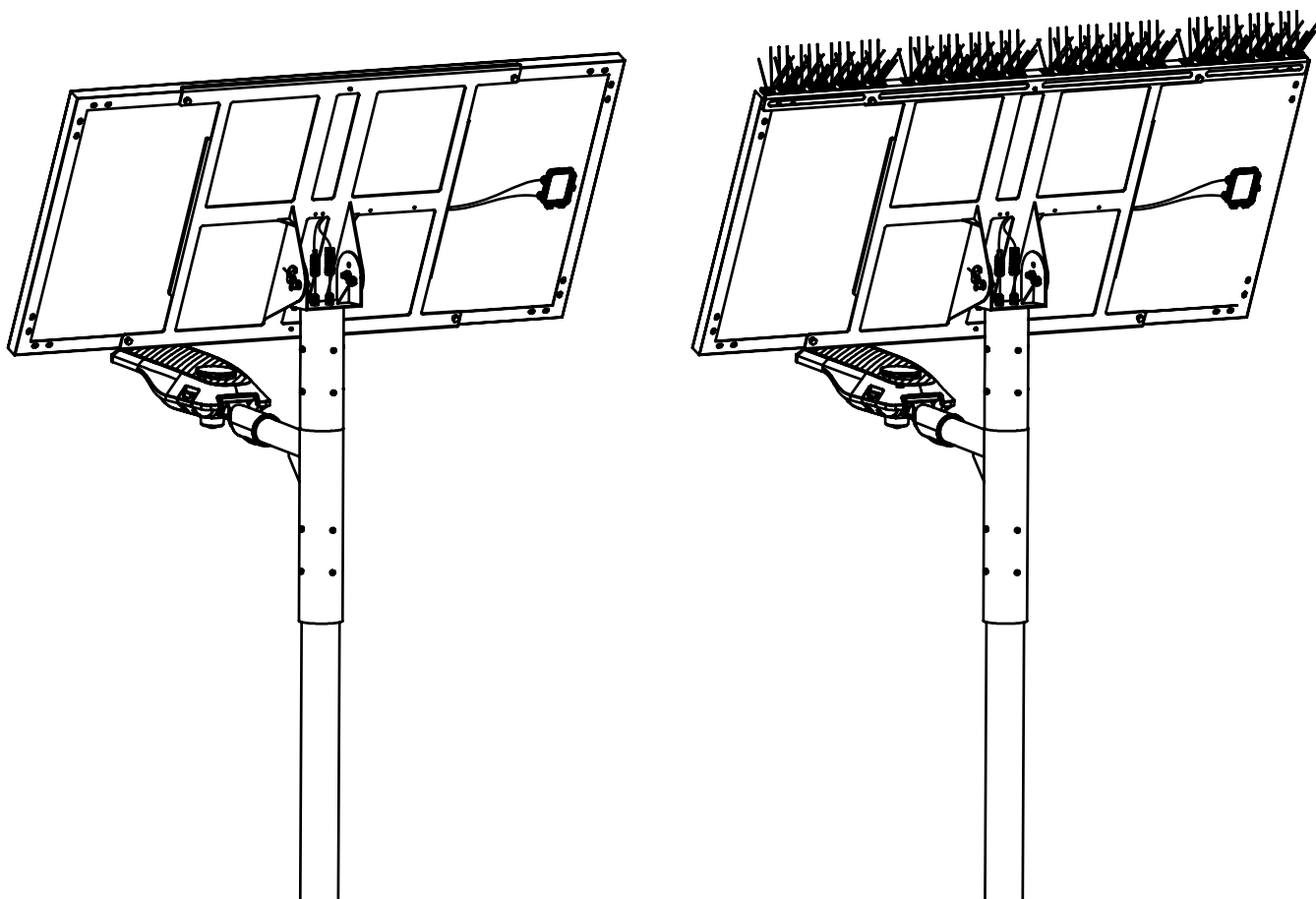
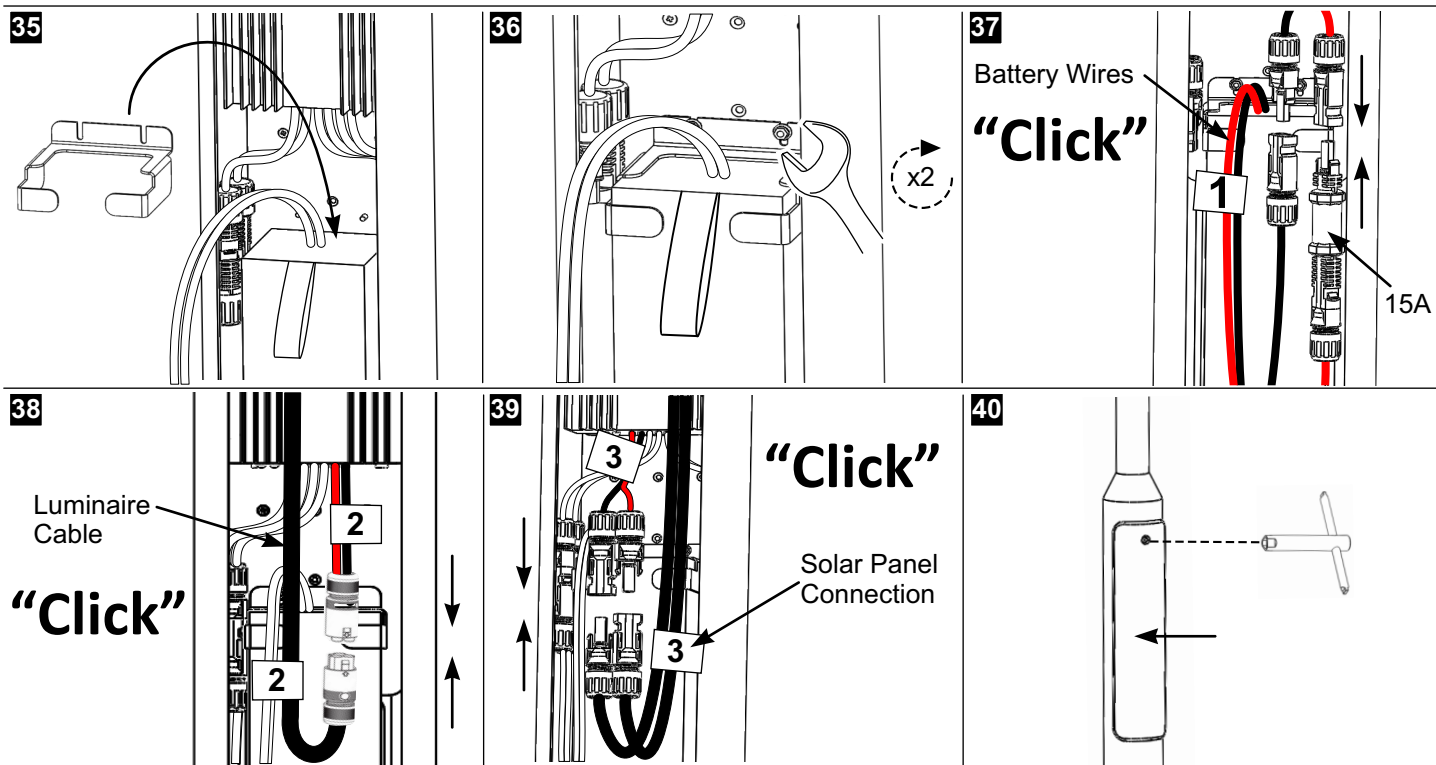
Top Edge



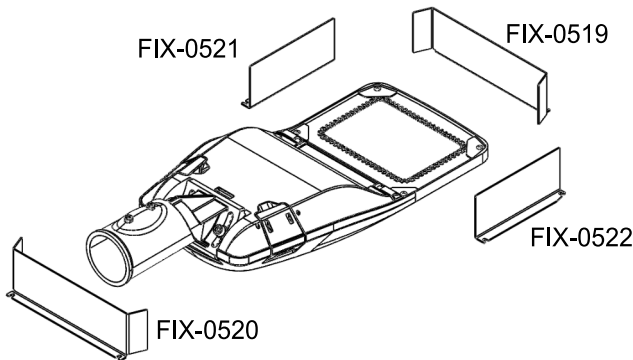
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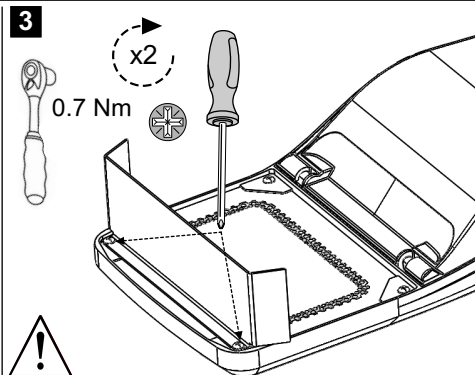
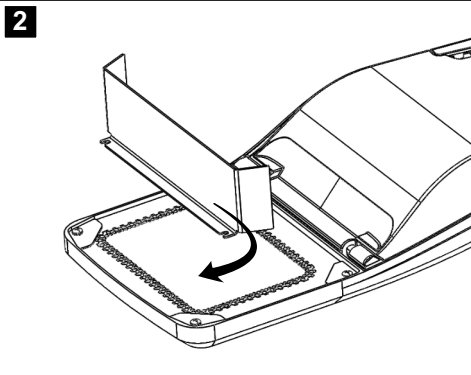
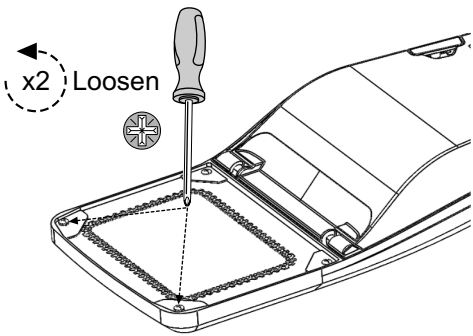




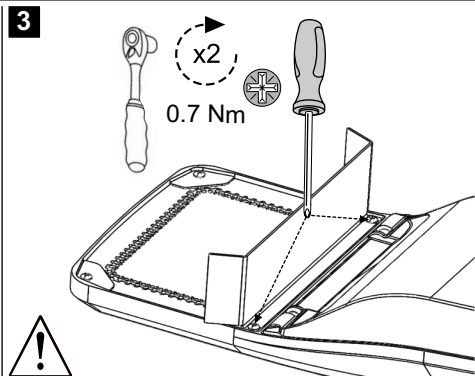
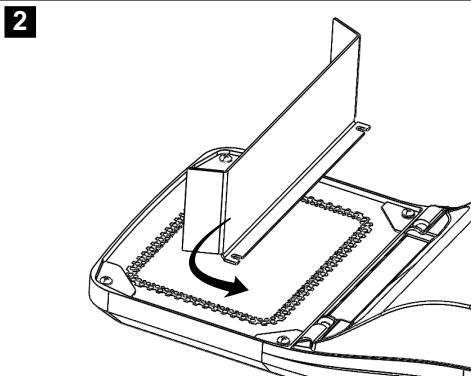
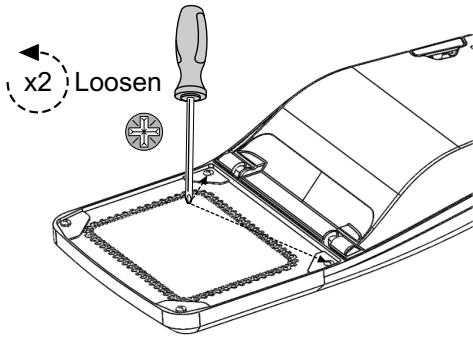
Glare Shield Options.



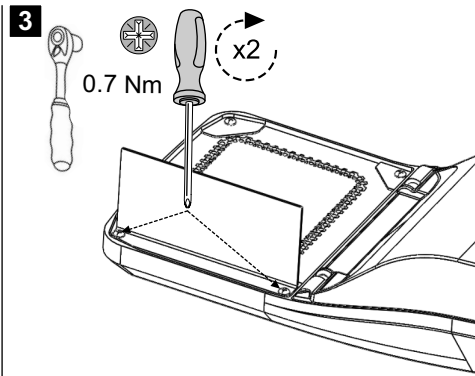
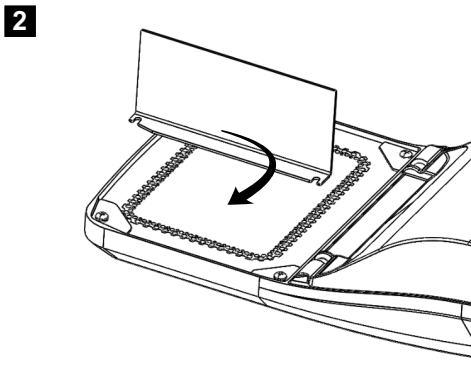
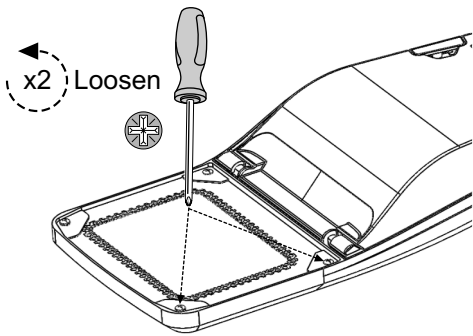
1 FIX-0519 - Front Glare Shield



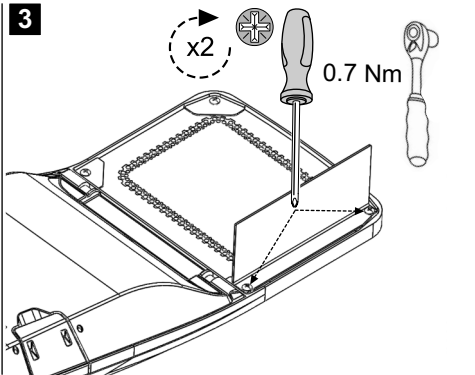
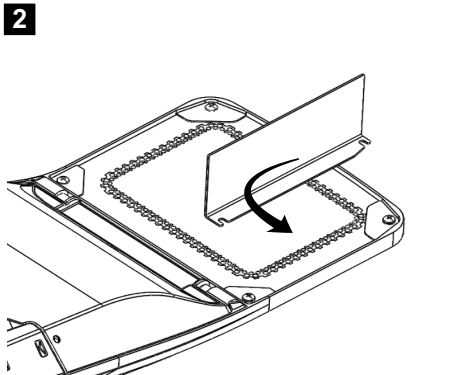
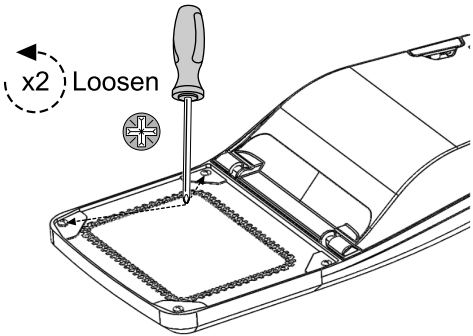
1 FIX-0520 - Rear Glare Shield



1 FIX-0521 - Left Glare Shield



1 FIX-0522 - Right Glare Shield



If The Column To Be Used Is A Root Mount Variant The Following Mounting Specifications Apply.

Gemma Lighting Column Option:

See 'UK Wind Zone Guide' page for more details.

4m Column:

- 4TC-RM-89-HD-SOLAR
- 4TC-RM-101-HD-SOLAR
- 4TC-RM-114-HD-SOLAR

5m Column:

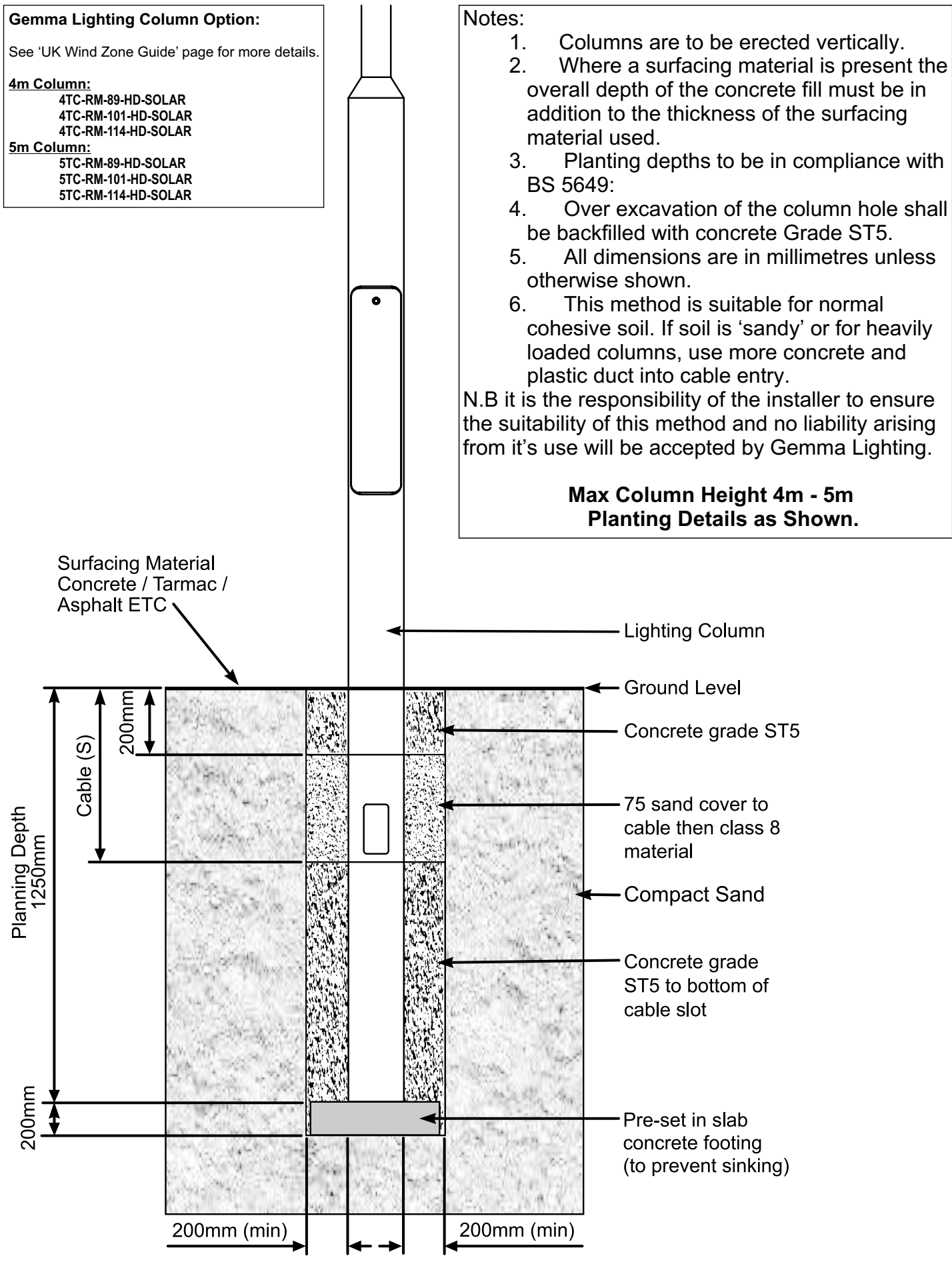
- 5TC-RM-89-HD-SOLAR
- 5TC-RM-101-HD-SOLAR
- 5TC-RM-114-HD-SOLAR

Notes:

- Columns are to be erected vertically.
- Where a surfacing material is present the overall depth of the concrete fill must be in addition to the thickness of the surfacing material used.
- Planting depths to be in compliance with BS 5649:
- Over excavation of the column hole shall be backfilled with concrete Grade ST5.
- All dimensions are in millimetres unless otherwise shown.
- This method is suitable for normal cohesive soil. If soil is 'sandy' or for heavily loaded columns, use more concrete and plastic duct into cable entry.

N.B it is the responsibility of the installer to ensure the suitability of this method and no liability arising from it's use will be accepted by Gemma Lighting.

**Max Column Height 4m - 5m
Planting Details as Shown.**





- ARM - Armagh
ANG - Anglesey
BED - Bedfordshire
BUC - Buckinghamshire
CAM - Cambridgeshire
CDF - Cardiff
CLE - Cleveland
DER - Darlington
DER - Derbyshire
DLO - Derry / Londonderry
FAL - Falkirk

FER - Fermanagh
FLT - Flintshire
GLO - Greater London
GMA - Greater Manchester
GWY - Gwynedd
H&W - Hereford & Worcester
HAM - Hampshire
HER - Hertfordshire
HLP - Hartlepool
INV - Inverclyde
LEI - Leicestershire

MER - Merseyside
MID - Middlesbrough
MGL - Mid Glamorgan
NLC - North Lincolnshire
NOR - Northamptonshire
NOT - Nottinghamshire
NWS - North West Somerset
PLY - Plymouth
RCT - Rhondda Cynon Taff
REN - Renfrewshire
SHR - Shropshire

SOT - Stockton on Tees
STA - Staffordshire
SYO - South Yorkshire
TAW - Telford and Wrekin
T&W - Tyne & Wear
VOG - Vale of Glamorgan
WAR - Warwickshire
WGL - West Glamorgan
WRE - Wrexham
WMI - West Midlands
WYO - West Yorkshire

Wind Loading Categories:

The rationalised wind loading factor, R_{wf} , are all stated at 10m above ground level, and for a mean return period of 25 years.

Note: The information given in this specification is for guidance only. Coastal sites, sites above 250m, or sites subject to funnelling will require special consideration. If in doubt please seek professional advice.

Terrain Category II - 8m and above.
Terrain Category III - less than 8m.

Terrain Cat. I: Seaside. At the edge of a lake with a length exposed to the wind of at least 5km. Flat even land without obstacles.

Terrain Cat. II: Fenced off cultivated land, some small agricultural buildings, houses of trees.

Terrain Cat. III: Industrial or sub-urban zones and forest.

Terrain Cat. VI: Urban perimeters with at least 15% of the surface built on, and/or on which the average heights of buildings exceed 15m.

Wind Region Colour Key:

- Extra Heavy

Medium
- Heavy

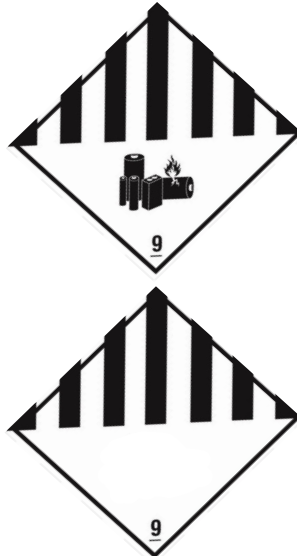
Light

4m Column			
Wind Region	Terrain Category	Column	
		Diameter	Order Code
Light	II	89mm	4TC-RM-89-HD-SOLAR
	III		
Medium	II		
	III		
Heavy	II	101mm	4TC-RM-101-HD-SOLAR
	III		
Extra Heavy	II		
	III		
Extra Heavy	II	114mm	4TC-RM-114-HD-SOLAR
	III		

5m Column			
Wind Region	Terrain Category	Column	
		Diameter	Order Code
Light	II	89mm	5TC-RM-89-HD-SOLAR
	III		
Medium	II		
	III		
Heavy	II	101mm	5TC-RM-101-HD-SOLAR
	III		
Extra Heavy	II		
	III		
Extra Heavy	II	114mm	5TC-RM-114-HD-SOLAR
	III		



Lithium Phosphate (LiFePO₄) Battery Manual



1. In Advance Of Using The Supplied LifePO₄ Battery:

Read these instructions in full and keep them safe for future reference.

- Work using the lithium battery should only be carried out by qualified personnel.
- Make note of and do not remove the warning labels placed upon the battery.
- Check the supplied battery for any external damage before use, do not use if damage is present.
- Upon receipt, the charge status of the battery will be 30% - 50%.
- Upon receipt check the charge status of the battery and (if required) fully charge before putting the battery into service.

Note: Only a LifePO₄ battery charger can be used, any other charger type may cause irreparable damage to the battery, the Maximum permissible charge rate should not exceed 15A.

2. Warnings:

The lithium (LiFePO₄) battery pack is a non-repairable component, upon receipt any obvious damage or an initial failure should be reported to Gemma Lighting after-sales department.

- The battery optimal operational temperature range is between 0°C – 45°C, outside of this range the expected performance will be affected.
- The battery must be kept away from water and or any other type of liquid.
- The battery must be kept away from any extreme heat source, open flame, flammable material, or explosive gas or liquid.
- Keep away from sharp metallic surfaces that can puncture the battery resulting in a short circuit.
- If any of the following battery conditions is observed, disconnect the battery immediately and contact the Gemma Lighting after-sale department.
 - i. Strange smell.
 - ii. Abnormally hot.
 - iii. Deformed housing.
 - iv. Leaking.

In the event of a fire, only a type D, foam, or CO₂ type fire extinguisher should be used.

- Whilst handling / working with the lithium battery protective PPE (safety glasses and protective clothing) must be worn.
- Any dismantling of the battery is not permitted, a high risk of the battery overheating and or catching fire / exploding is possible resulting in injury.
- Keep out of reach of children.

3. Storage:

The battery should be stored under clean and dry conditions @ 0°C – 40°C.

- Do not store the battery in an environment where the temperature is likely to be exceed 40°C for an extended time, detrimental effect of incorrect storage may result in the battery having a shortened lifespan. for the best performance / lifespan ratio the optimal storage temperature should be @25°C.
- The ideal state of charge of the lithium battery when stored for any extended period is @100% however with time and variations in the storage environment the battery can self-discharge so periodic checks should be made. It is possible to store the battery for an extended amount of time, but **the state of charge should not be allowed to fall below 30% before recharging takes place. Failure to do this may cause irreversible damage to the battery.**
- The battery should be stored were there no risk of damage from it being dropped from height, the impact can cause possible internal damage to the battery leading to potential personal harm.
- Do not use or store the battery in a location where there is a strong electrostatic and or magnetic field, as this may result in damage to the internal battery safety protection devise.
- If the battery is to be stored outside of the original packing insulate the conductors / terminals to prevent accidental short circuits.

4. Installation and operation:

Make sure the lithium battery's positive and negative electrode are connected correctly to the solar controller / charger as shown in the GemSun installation instructions.

- Only a fully charged battery should be put into service.
- The battery is protected with an in-line fuse on the live conductor and should be checked before use.
- Do not connect the battery in series or parallel with any other battery if not specifically indicated to do so in the data sheet / installation instructions.

4.1 Charging:

Only a LiFePO4 battery charger can be used which matches the specific battery parameters. The proper continuous charging current is from 0.2CA to 0.5CA. for best performance, charge as follows: 0.2CA Constant Current to 14.6V, then Constant Voltage of 14.6V, until the current drops to 0.02CA. Rest 30min before use.

- Please refer to the battery data sheet for more information about charging.
- Charging of the battery should only take place where the environment is between 0°C to 45°C. (optimum temperature = 25°C for overall performance/lifespan ratio). Note: Due to battery internal protection the battery will not charge at temperatures below 0°C,

4.2 Discharging:

LiFePO4 batteries can be discharged up to 100% of their capacity. However, to optimize the performance / life of your LiFePO4 battery, (and to avoid the BMS disconnecting the battery), the discharge limit is controlled to a limiting discharge level of 50%.

- Discharge of the battery is possible at the operational environment temperature range of -10°C to 50°C. (Optimum = 25°C for best performance / lifespan ratio).

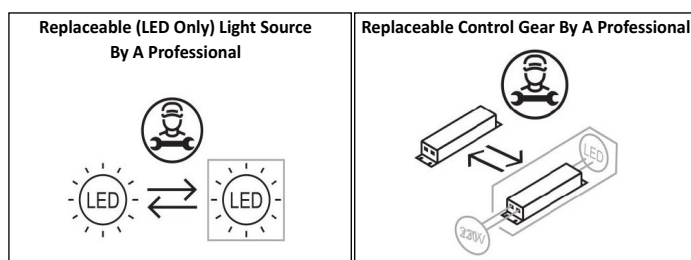
5. Recycling:

End of life disposal of LiFePO4 batteries must be carried out by an authorized lithium recycling facility.



Information

- The System Complies With The SELV Specification (Safe Electrical Low Voltage <60V), The Maintained Insulation Level Is Basic.
-  Maximum Luminaire Mounting Height Is 5m.
- Luminaire Tested To BS EN 60598-2-3. UKCA.
- The Optimal Performance Of The System Is Between The Temperature Range 0°C ... 45°C, At A Lower Temperature Range of 0°C ... -20°C The System Will Still Be Operating But There Will Be An Impact On The Recovery (Recharge Time) Of The Battery. A Maximum Operational Temperature Of 60°C Is Permissible For Short Durations Only.
-  The Solar Panel Shall Be Mounted Using The Pre-installed Post Top Bracket.
- When Fitting The Solar Panel, Care Should Be Made To Ensure The Solar Panel Is Correctly Positioned And Mounted Without Any Obstruction Of The Sun. Note: In The United Kingdom The Optimal Winter Angle of Tilt Will Be 66° From The Horizontal. Outside The United Kingdom The Optimal Angle of Tilt Will Require Re Calculation. Calculating The Optimal Solar Panel Angle Is To Add 15 Degrees To The Latitude Of The Site Location.
 - When The Luminaire Is location In The Northern Hemisphere Face The Solar Panel Due South.
 - When The Luminaire Is location In The Southern Hemisphere Face The Solar Panel Due North.
- Tethering Eye Bolts For Use With A Safety Wire or Chain Are Pre Installed On The Solar Panel Mounting Bracket and to the Associated Post Top Mount. Note: Safety Wire Is Supplied.
- Motion Sensor Operation: Motion Detection Within Range Will Trigger The Output of the Luminaire To Rise To A Pre-set Maximum Power Level, If No Movement Is Detected For An Elapsed Time The Luminaire Will Return To a Pre-set Standby Level.
- The Luminaire Photocell Operation Will Not Occur Until The Ambient Light Level (lux) Level Is 35 Lux.
- When Installed Optimally And As Specified The System Will Operate. From Sunset To Sunrise For 365 Days Per Year Across Mainland UK, Outside Of The UK The System Performance May Differ.
- A Failed Luminaire Should Be Isolated Promptly From The Circuit To Avoid Possible Damage To Control Gear.
- The Control Gear Contained In This Luminaire Shall Only Be Replaced By The Manufacturer Or Service Agent Or Similar Qualified Person.
- The Light Source Contained In This Luminaire Shall Only Be Replaced By The Manufacturer Or Service Agent Or Similar Qualified Person.
- SLR Light Source: Non-User Replaceable.





Controller LED Indicators

Indicator	Colour	Status	Instruction
	Green	On Solid	PV Connection normal but low voltage (irradiance) from PV, no charging
		Off	No PV voltage (night time) or PV connection problem
		Slowly Flashing (1Hz)	In charging
		Fast Flashing (4Hz)	PV over voltage
	Green	On Solid	Normal
		Slowly Flashing (1Hz)	Full
		Fast Flashing (4Hz)	Over voltage
	Orange	On Solid	Under voltage
	Red	On Solid	Over discharged low temperature
		Fast Flashing (4Hz)	Battery Overheating
Charging (green) and battery indicator (orange) flashing simultaneously			System voltage error



Troubleshooting

Faults	Possible Reasons	Troubleshooting
LED Charging indicator turn off during daytime when sunshine falls on PV modules properly	PV array disconnection	Confirm that PV and battery wire connection are correct and tight.
No LED indicator	Battery voltage maybe less than 8.5V	Measure battery voltage with the multi-meter. Min 8.5V can start up the controller.
Battery LED indicator green fast flashing	Battery over voltage	Check if battery voltage is higher than OVD, and disconnect the PV.
Battery LED indicator red	Battery over discharged	When the battery voltage is restored to or above LVR point (low voltage reconnect voltage), the load will recover.
Battery LED indicator red flashing	Battery Overheating	The controller will automatically turn the system off. But while the temperature decline to be below 50°C, the controller will resume.
Load is not output	Load Overload *	1) Reduce the number of electric equipments. 2) Restart the controller. 3) Wait for one night-day cycle (night time>3 hours).
	Load Short Circuit *	1) Cheak carefully loads connection, clear the fault. 2) Restart the controller. 3) Wait for one night-day cycle (night time>3 hours).

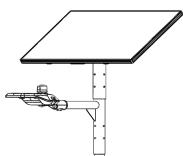
*** When it is overload or short circuit, the load have 5 times auto-recovery output function, which each times delay respectively 5s, 10s, 15s, 20s, 25s.**



Maintenance Guide

- Cleaning & Inspection Of The System Should Be Carried Out Periodically (With A Recommended Time Frame Of No Greater Than Every Six Months).
- Also, It Is Recommended After An Event Of Extreme Weather An Inspection Is Carried Out (When Safe To Do So) To Verify The Safe Operational Status Of The System.
- Note: Correct PPE Must Be Worn At All Times When Carrying Out Any Cleaning Or Any Maintenance To The System. Large Amounts Of Dust Accumulation, Bird Droppings & Localised Shade Caused By Plant Growth Can Impact The Ability Of The Solar Panel To Convert The Available UV Energy Into Sufficient Power Required For The System To Operate Correctly, Similarly The Operational Efficiency Of Luminaire & Motion Sensor / Photocell (If Installed) Can Also Be Impacted By External Accumulation Of Foreign Matter So Inspection & Maintenance Of These Components Will Also Be Periodically Required.
- Disconnect The Solar Panel & Luminaire At The Base Of The Column (As Shown Below).
- Verify By Inspection:
 - Any surrounding plant growth does not cover the front of the solar panel and if present should be cleared away.
 - All Visible Conductors Are Not Damaged.
 - All Connectors Are Mated & Remain Intact.
 - Externally The Solar Panel Is Undamaged On All Surfaces.
 - All External Fixings Remain Tightened Correctly.
 - The Solar Panel Mount Remains Undamaged & Set To The Correct Orientation.
 - The Luminaire Is Not Damaged & Remains Intact.
- Cleaning Of Solar Panel & Luminaire:
 - **Warning:** Care Should Be Taken When Applying Cold Water To A Potentially Warm - Hot Solar Panel & Luminaire, There Is A Small Potential Risk From Thermal Shock Which Can Cause Damage In Extreme Circumstances.
 - Cleaning Using High Pressure Should Be Avoided As This Can Eventually Impact On The Integrity Of The Solar Panel.
 - Use Only Lukewarm Water & A Non-Abrasive Sponge Or Equivalent.
 - If Cleaning With Hard Water, Ensure No White Residue Is Left On Any Glass Surface When Dry, As This Can Impact The Operational Performance Of The System.

Before Scheduled Maintenance Disconnect The Solar Panel & Luminaire



Disconnect The Solar Panel &
Luminaire Terminated In The
Base Of The Column

Avoid Harsh Cleaning Products:

Harsh Products & Coarse
Sponges Are Likely To Harm
The Solar Panel & Luminaire
Surface

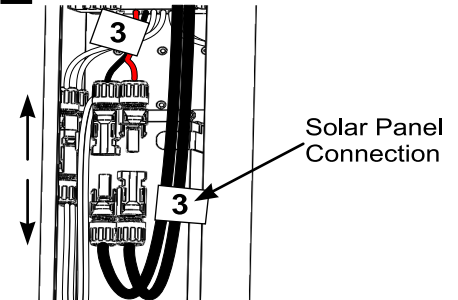


Clean Solar Panel & Luminaire On a Cloudy Day:

Never Clean The Solar Panel
& Luminaire On A Hot Day
Water Can Evaporate Too
Quickly, Leaving Marks

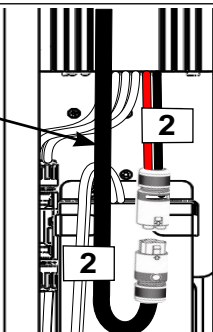


1 Before Maintenance



2

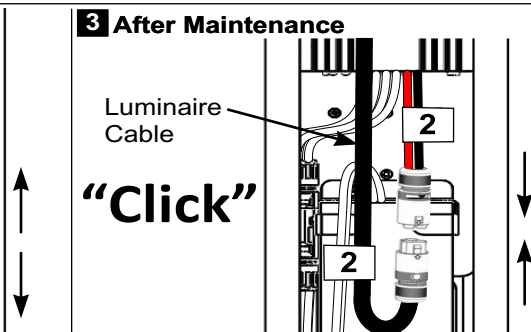
Luminaire
Cable



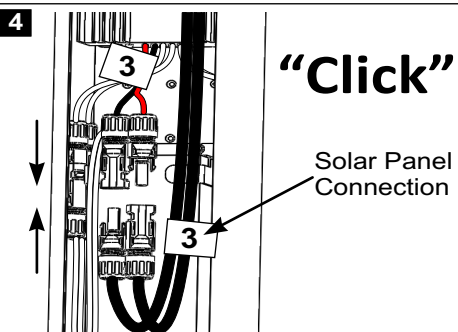
3 After Maintenance

Luminaire
Cable

“Click”



4



“Click”

Solar Panel
Connection



Safety

- Ensure No Cables / Wires Are Trapped During Assembly.
- When Attaching The Glare Shield Use The Set Torque Settings Indicated, Preventing Water Ingest.
- Type 'Y' Supply Cord Replacement Associated With The Solar Panel Or Luminaire Can Only Be Amended By The Manufacturer (Gemma Lighting), Its Service Agent Or Similar Qualified Person.
- Before Carrying Out Any Servicing On These Luminaires, Ensure The Solar Panel (3) And Battery (1) Are Disconnected / Isolated.
- Any Desired Alterations To The System And Or Luminaire, Will Require Prior Confirmation From Gemma Lighting Before Being Carried Out. If Alterations Have Been Carried Out To The System And Or Luminaire Without Prior Confirmation Any Safety And Or Warranty Will Be At Risk.
- Connection Of The Charge Controller To The Battery, Luminaire & Solar Panel Must Be Done In The Correct Sequence Otherwise Damage To The Controller Can Occur.
- 1. Connection Of The Battery, 2. Connection Of The Load (Supply To The Luminaire), 3. Connection Of The PV Cell (Solar Panel).
- When Disconnecting Any Part From The System The Order Must Be The Reverse Sequence (3,2,1).
- **Read And Follow The Lithium Battery Handling Manual, Provided.**
- After Power On The Controller, Check The Battery LED Indicator, It Should Be Green (Solid Or Flashing). If It's Not Then Refer To Troubleshooting Section.
- Upon Initial Start Up The Load Self-Test Function Will Operate Resulting In The Luminaire Illuminating At Full Power For Approx 10s , If No Movement Is Detected By Motion Sensor The Luminaire Will Revert To The Standby State or Turn Off If The Ambient Light Level Is Greater Than 35Lux.
- **Failure To Follow The Requirements Outlined In This Manual During Its Installation / Operation Could Void Any Applicable Warranty Given By The Manufacturer.**
- **The Recommendations Within This Manual Are Set Out For Safety Reasons And Therefore Are Not Intended To Be Deviated From.**
- **If The System Has Been Installed By A Third Party, Please Provide This Instruction To The End Customer / Owner For Future Reference And Inform Them Of All Relevant Safety & Operational Maintenance Requirements & Recommendations Set Out Within.**



Do Not Stare At
The Operating
Light Source

The Luminaire Should Be Positioned So That
Prolonged Staring Into The Luminaire At A Distance
Closer Than 1.25m Is Not Expected.