



SMARTGLASS
TECHNOLOGIES

TECHNICAL INFORMATION AND INSTALLATION GUIDE

PRIWATT PDLC FILM

WWW.SMARTGLASSTECH.US

PriWatt™ Film

TECHNICAL DATA

		MODE	VALUE
Optical Parameters	Visible Light Transmittance	Power ON	88%
		Power OFF	73%
	Haze	Power ON	3%
		Power OFF	95%
	Viewing Angle	Power ON	> 170
	IR Blocking	Power ON	> 35%
		Power OFF	> 90%
	UV Blocking	Power ON	> 98%
		Power OFF	> 98%
	Solar Heat Gain Co-efficiency (SHGC)	Power ON	0.78
		Power OFF	0.63
Electrical Parameters	Working Voltage	Power ON	48-55VAC
	Power Consumption	Power ON	< 0.5W/sqft (5W/m2)
	Responding Time	OFF-ON	< 45ms
		ON-OFF	< 10ms
Physical Parameters	Thickness	Overall	0.015 inch (0.4 mm)
	Weight	Overall	~900 g/m2
	Bonding Strength		7gram/cm2
Environment Parameters	Working Temperature		-22 F to 122 F
	Storage Temperature		-4 F to 158 F
Switching Cycle	ON/OFF		2 Million Times
Life Cycle			> 15 Years
Warranty	Limited Warranty		2 Years

FEATURES AND BENEFITS

Instant Upgrade

Switchable film converts simple glass into a smart, dynamic, privacy Smart Glass for immediate use.

Dynamic Privacy Control

A simple ON-OFF switch or a remote turns the Smart Glass from being frosted (opaque) to clear (transparent).

Optimized Space

Replaces thick studded walls with thin partitions or section open floor plans with minimalist solutions. Creates high-tech conference rooms, private offices, wall dividers, windows and doors, etc.

Flexible Design

Using laser cutting, custom shapes and sizes can be created.

Greatest clarity, consistency & stability

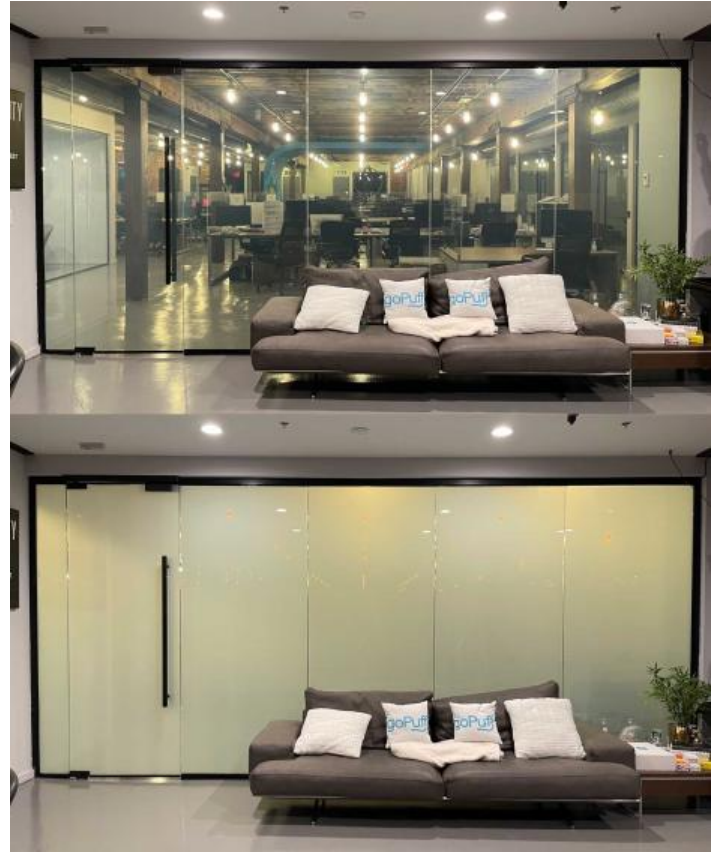
World's most advanced PDLC (Polymer Dispersed Liquid Crystal) technology provides reliable, consistent performance.

Professional Installation

Our certified installers will inspect your project, take precise measurements and apply the PriWatt smart film to any interior or exterior glass, windows and doors.

Easy Cleaning

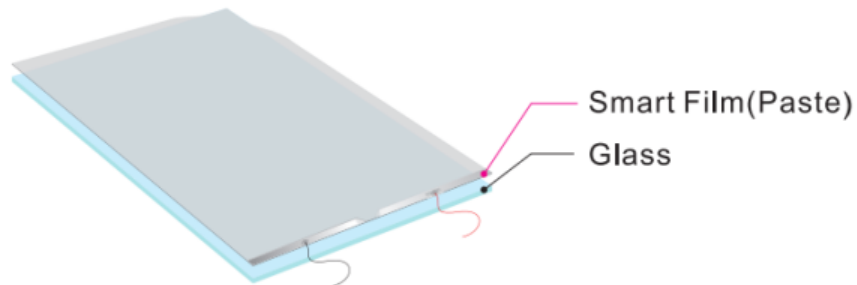
Simply turn it off and use a soft cloth and 99% isopropyl alcohol. When done, make sure there is no liquid left on the edges.



OVERVIEW

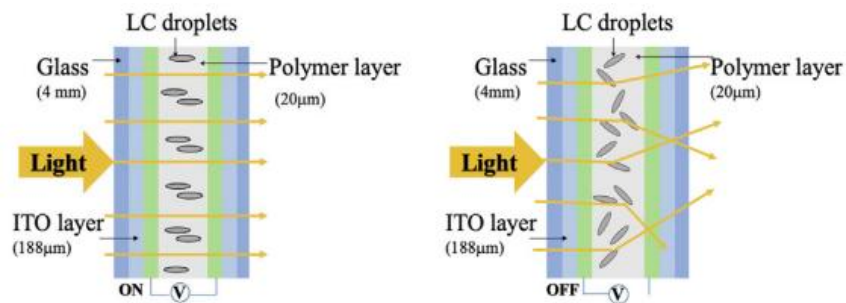
Polymer-Dispersed Liquid Crystal Displays (PDLC) is made up of electrically conductive coatings, a polymer matrix and liquid crystals. PriWatt™ film has electrical wiring to be connected to a transformer to supply power for the “on” (clear state) mode.

PDLC (Polymer Dispersed Liquid Crystal) is electrical switchable adhesive film that can be applied to existing windows and glass.



PRINCIPLE

Stimulated with electrical current, liquid crystal molecules line up and incidental light passes through, creating highly transparent PriWatt™ Film. PDLC technology allows you to switch back and forth between opaque glass and a transparent view, all through a simple electrical current. When an electrical current activates the panel, the liquid crystal molecules instantly align. This positioning allows light to pass through, and the film becomes transparent. When the current is disconnected, the molecules immediately disarrange for instantaneous and total privacy.

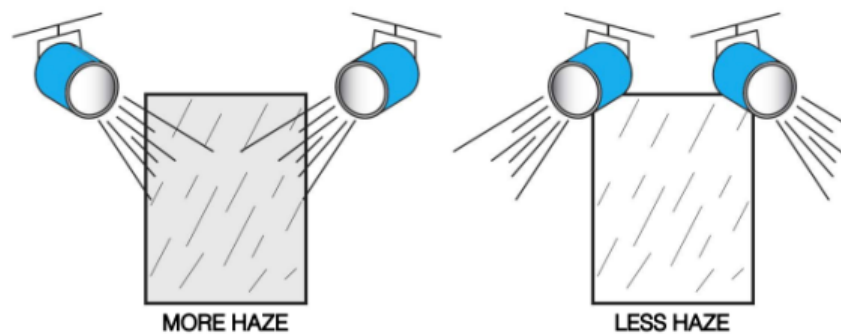


HAZE CONSIDERATIONS

PriWatt™ film has the lowest haze level (3%) on the market today, however, under certain light conditions, the glass will reflect. This will sometimes be more obvious when the glass is viewed from an angle.

When positioned at a direct angle you will get the highest level of transparency and the lowest level of haze. As the viewing angle becomes wider, the level of haze increases.

This phenomenon is known as Wide Angle Scattering, which causes haze due to the loss of transmissive contrast, and Narrow-Angle Scattering which reduces clarity.



*NOTE

Transmission - The amount of light that passes through the material without being scattered.

Haze - The amount of light that is subject to Wide Angle Scattering (at an angle greater than 2.5° from a direct viewing angle).

Clarity - The amount of light that is subject to Narrow Area Scattering (at an angle less than 2.5° from a direct viewing angle).



Upon fabrication completion, PDLC panels are rolled on the drum one by one and secured by stretch wrap. Each panel has a label with number and size.

PACKAGING & SHIPPING

PriWatt film drum box sizes:

12" x 12" x 36"

12" x 12" x 48"

12" x 12" x 60"



Power transformers and wires are normally placed inside the drum and securely packaged.



RECEIVING & UNBOXING

Before signing for and accepting the shipment from the carrier, the box should be inspected for shortages or damage. If shortages or damage is found the shipping documentation should so be noted and the drivers signature obtained as a witness.

If any short deliveries and/or damage to goods, please take pictures/video and notify immediately Smart Glass office via email within 24 hours of delivery in order to pursue a claim with the carrier. The manufacture is not responsible for shortages or damage if the party taking delivery of the goods fails to inspect the consignment at the time of delivery.

1. Please open the box carefully to avoid accidental film damage or cut.
2. We recommend releasing 1/4" of a box knife and cutting along.
3. Be extra careful when removing bubble wrap from the drum.
4. Cut the tape around the drum cup to remove transformers.
5. Place drum vertically in a secured area.

STORAGE

PriWatt™ Film can sustain damage between delivery and installation; therefore, care should be taken when the product is being handled, in line with manufacturer recommended guidelines for the handling of the PriWatt film included in this document.

If PriWatt™ Film is not being installed immediately after un-crating, care must be taken to protect it and stored flat, out of direct sunlight, where the relative humidity is less than 80% and a nearly constant temperature between -4F and +158F to prevent the formation of condensation on the film.

HANDLING

- Never fold, bend or curve PriWatt™ Film.
- Always keep the film flat and straight as shown in the picture.
- Do not remove the protective liners until you are ready to install the film.
- Wear Nitrile gloves when handling the film.
- When handling film, take particular care with the edges to avoid delamination.



INSTALLATION GUIDE

JOB SITE PREPARATION

1. At the job site, please ensure the environment is clean. It is crucial to have a clean floor and surroundings.
2. Place plastic cover on the floor or large table in the office and secure it with blue tape to prevent the plastic sheets from moving or folding.
3. Unwind plastic wrap from the drum and begin unrolling the first panel.
4. Remove the transparent tape that is holding PDLC slowly and unroll steady. There are a few transparent tapes holding film on the other side, so be careful when removing the last one.
5. Please pay attention to the corners of the film when walking by the film panel. If the corner gets hit, it will cause permanent delimitation.
6. Test the film by connecting 48VAC to both busbars. Now you are ready for the next step.
7. Use panel number and size to locate the matching glass pane. Please check the size again to be sure there's no error.

Note: If the film size does not match the label on the panel, please report to the manufacturing office immediately. If an error is found, the film has to be returned to the factory, and the new film will be shipped the next day. If the client trimmed or used film with the incorrect label, he bears full responsibility, and the claim will not be accepted.

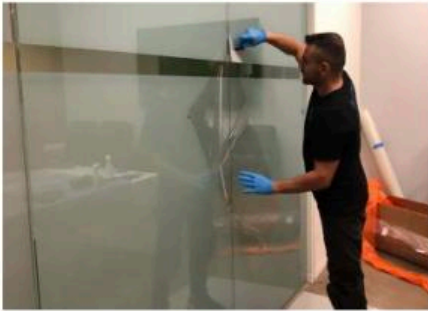
GLASS CLEANING

- Please inspect the glass surface for scratches, drops, or chips. If found, please note and take pictures.
- Use a thin wide razor and isopropyl alcohol to clean the glass surface the first time. Then use microfibre cloth and alcohol to make the surface perfect. REPEAT THIS PROCESS until the surface is COMPLETELY CLEAN.
- It is an extremely important stage, so please clean every inch of the glass surface. Don't forget corners and edges. If this process is done right, the film application will go very smoothly and fast.
- If any dirt, lint, or other particles still remain on the glass, this would slow the application. You would have to roll the film up and manually remove each one of them, creating a risk of damage every time.
- Upon glass cleaning, please wipe the smart film on both sides.

FINAL INSPECTION & RECOMMENDATIONS

- The installer should thoroughly inspect each piece of PriWatt™ Film prior to installation.
- Never attempt to install products that you consider to be incorrectly sized, damaged, scratched, abraded or deficient in any other way, in the first instance contact the manufacturer for an initial assessment.
- Any attempt to install a deficient product will signify acceptance of its suitability and as such can not be replaced.
- PriWatt™ Film adheres to glass using a silicone-based cling layer, and is a DRY APPLY product, PriWatt™ FILM **SHOULD NEVER BE WET APPLIED – THIS WILL IRREPARABLY DAMAGE THE FILM.**
- Film Dimensions should be 2 to 3mm smaller in each dimension than the visual area of the glass it is being applied to.
- Never attempt to trim PriWatt film on site without manufacturer approval – Please contact the manufacturer for advice.
- If PriWatt™ Film was trimmed on the job site without approval, the manufacturer will not be liable. The trimmed smart film will null and void warranty.
- The busbar or electrical connections should never be allowed to have contact with metal frames or trims.
- PriWatt™ Film should never be installed in situations where it may be subjected to loading or pressure or mechanical stress, for example, clamped between metal or plastic fittings, door furniture, and framework, or subjected to any other form of concentrated mechanical loads or actions.
- We recommend that the electrical connections are positioned and exit at the top of any installation.
- When the film is installed in environments where it may be subject to dampness or humidity, each edge must be completely sealed to be impervious to moisture ingress, and particular attention must be paid to sealing the bus bar edge.
- We only recommend the use of “**DOWSIL 737 Neutral Cure Sealant Clear/Black/White**” or “**GE SCS2800 SilGlaze II Silicone Sealant, Translucent**” as a sealant for use with any of our products; this can be supplied by us upon request.
- Customer-specified holes and cutouts produced during the manufacturing process may cause the edge of the smart film to discolor slightly and, as such will require 4-6mm coverage by a trim, escutcheon or bezel.
- Great care should be taken when installing fixings and fittings to the film, metal parts should never have direct contact with the surface of the film, and the film should be cut to fit around fixings, fittings, and furniture.
- To avoid the risk of mechanical threaded fixing becoming loose over time, the use of a high quality thread adhesive in line with the manufacturer’s instructions should also be considered.
- When two or more films are being applied side by side on a single piece of glass, a gap of 0.5 to 1mm should be left to prevent an electrical short from damaging the film edges.
- It is also recommended that the busbar tags of films being applied side by side are positioned with the same polarity adjoining each other (eg positive and positive or negative and negative).





FILM APPLICATION

1. Wipe down the protective liner applied to the self-adhesive cling layer of the PriWatt™ Film to remove any dust. Before commencing installation, ensure the film fits the area to be filmed by carefully positioning it against the surface whilst checking for the required clearances.
2. When the film is firmly aligned, you can start pasting. Start applying film using a vinyl scraper from the middle first to secure the film. Then continue to sides.
3. You can continue pasting down when the top portion is successfully applied. Release liner each 5" and repeat the procedure. Please carefully inspect pasted film for bubbles or other imperfections.
4. When finishing panel installation, be extremely careful. At the bottom, start leaning to one side and continue to one corner.
5. Make sure you have access to release the film if needed until the very last moment. The corner has to be pasted very last.
6. Upon completion of the application, please check the sides of the film around the perimeter. Make sure there are no bubbles



ELECTRICAL

Electrical installation of PriWatt™ film requires the following items:

1. A 15 AMP ground fault interrupter circuit breaker with 110VAC 50-60Hz (installer/owner supplied) electricity.
2. A wall mounted switch, 110VAC 50-60Hz (installer/owner supplied). This switch is required to allow the panels to be turned ON.
3. Power transformer (supplied).
4. Transformers contain 2A Fuse within the housing.

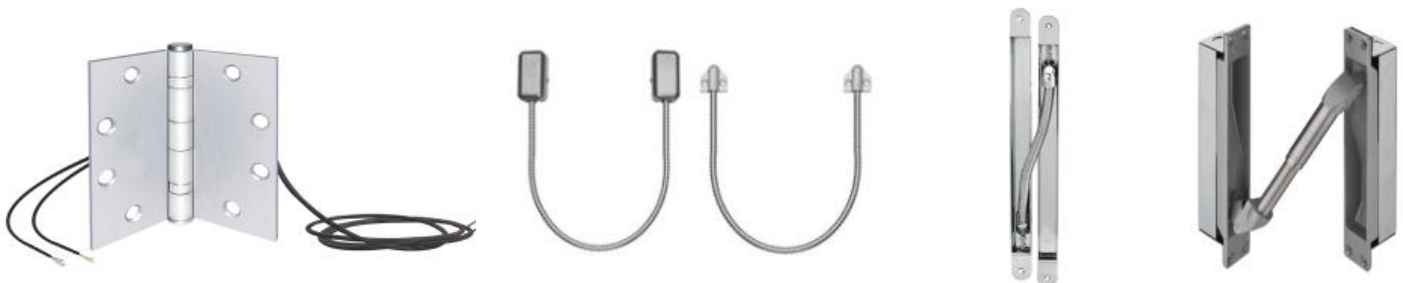
Wiring

1. Once the film installation is satisfactorily completed, electrical installation can commence. Begin by carefully soldering the electrical cables to the copper busbars.
2. NOTE: Special "Anchor" is installed on each busbar - DO NOT SOLDER TO ANCHOR.
3. Solder a cable to one of the busbars (positive) and one on the (negative).
4. Use home run or parallel wiring method to connect all film panels.
5. It is recommended that the film is tested for correct operation at this stage by temporarily connecting the cables to the transformer and switch to ensure that the film is switching from opaque to clear. Once testing is complete, neatly fold/roll dedicated wires and attach them to the non-conductive side with blue tape, this can prevent accidental pull.
6. Before turning on the power supply the electrician must test the resistance reading between the frame and the electrode to ensure the reading is infinite/open circuit, i.e. there is no connection between the frame and the panels. If the reading is not infinite than the electrician will need to check all busbars, electrodes and cables until the short circuit is found and insulated accordingly.

IT IS VERY IMPORTANT TO APPLY RECOMMENDED SILICONE AROUND FILM EDGES AND BUSBAR. THIS WILL PROVIDE INSULATION AND GLUE FILM EDGE INTO THE GLASS.

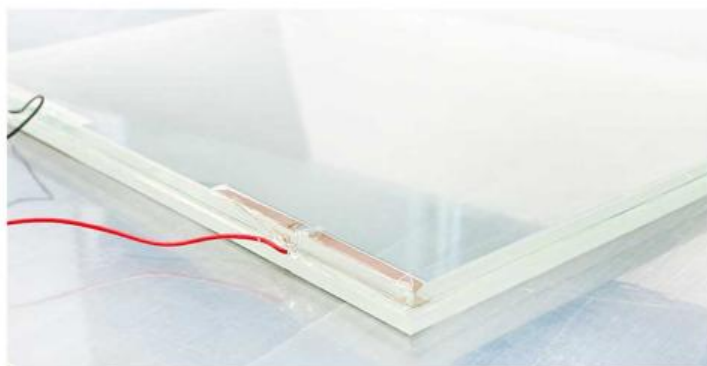
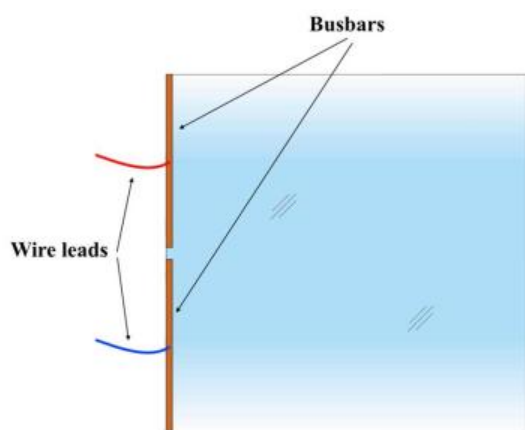
Wiring-in PriWatt™ Film into Hinged Doors and Opening Windows

When fitting PriWatt™ film panels into swinging doors or opening windows, it is desirable to fit a concealed device into the frame to accommodate the required flexibility in the power cord. Which device you would require would depend on the specific nature of the frame, be it door or window. Power Transfer Units are made specifically for this purpose.



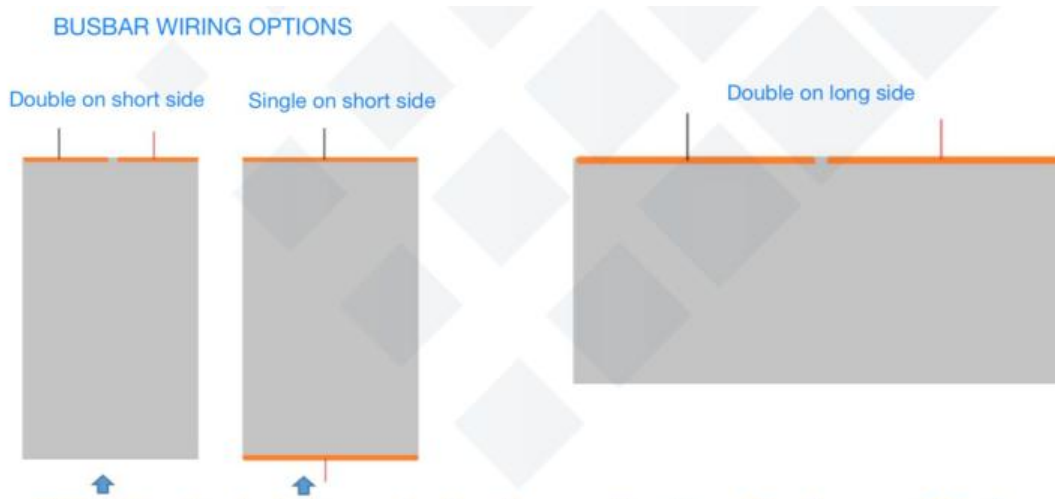
Additional Cautionary Information

- The manufacture provides wiring diagram examples for the operation of its PriWatt™ film panels, however manufacturer assumes no liability for the wiring of any products and recommends that the purchaser or purchaser's designated agent consult with a licensed electrician for compliance with area Building Codes and professional electrical system wiring.
- **DO NOT ATTEMPT TO INSTALL THE PriWatt™ FILM PANELS ON A LIVE CIRCUIT.**
- It is important not to exceed the maximum square feet area power limit of the provided transformers.
- Install only on a GROUNDED 110VAC circuit protected by 15A fuse or breaker. The circuit must also be protected by a ground fault circuit interrupter.
- Do not connect any other devices or products to the output of the PriWatt™ transformer.



Busbar wiring options

- Edges where the busbars are placed must be covered by minimum 1/2 inches.



POWER TRANSFORMERS

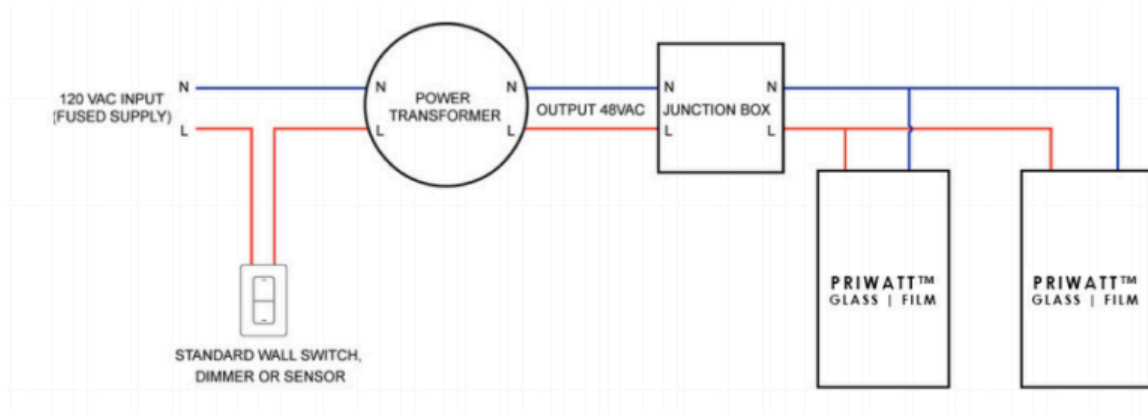


- ✓ PRI: 110V / 50-60Hz
- ✓ SEC: 48V / 2.08 A
- ✓ Power 100W / 300W
- ✓ Covers 100/300 SqFt
- ✓ IP56
- ✓ EN 61558-2-4
- ✓ UL E125651
- ✓ Size 4.7" x 3" x 3"
- ✓ Closed resin box
- ✓ 2 x 0.75mm / 1 ft wire
- ✓ Temp. Fuse / 110°C
- ✓ Screw connectors

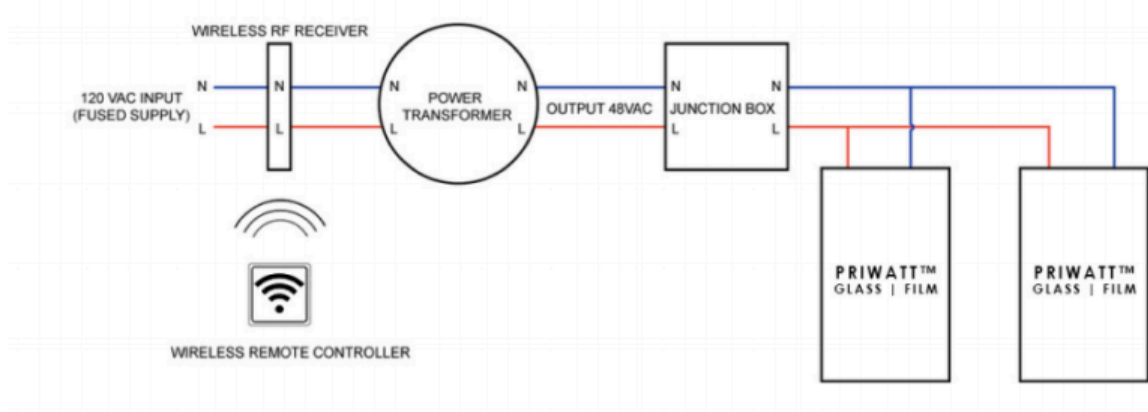
- WARNING: The transformer must be installed by the electrical contractor in an easily accessible and well ventilated area. They must be installed into a suitable enclosure supplied by others.

Electrical installation notes

Standard Hardwire Diagram



Wireless Diagram



- PriWatt™ Film is an electrical component and should be provided for in the electrical layout, including the provision of fused spurs, switches, cable management, and electrical connection boxes.
- All installations must meet the requirements of local regulations and guidelines and be carried out by a qualified electrician.
- Any metal framework close to or adjoining the wiring of the panel MUST be earthed.
- PriWatt™ Film must NEVER be installed in direct contact with a metal frame. If in doubt, consult a qualified electrician prior to commencing any installation work.
- Before installation commences, busbars, connection leads, and cables should be inspected to ensure the integrity of the insulation.
- Where ever possible, it is recommended that the operation of PriWatt™ Film is tested prior to commencement of installation.
- Great care should be taken to ensure that exposed busbars, leads, or cables do not come into contact with the framework, and any metal frames must be earthed and sealed to prevent the ingress of moisture or water.
- PriWatt™ Film operates at 48VAC, if the local mains voltage is higher than 110VAC, a step-down transformer is required.
- Smart Glass Group manufacture and supplies a range of thermally protected UL & CSA Certified isolating transformers. Failure to use PriWatt™ Transformers may result in irreparable damage to the PriWatt film. (Data Sheets can be supplied upon request).
- When connecting the power supply, please ensure that the device will not give unwanted tripping due to high inrush currents generated by the transformer(s).
- The manual switch or remote control must be wired into the circuit on the mains voltage side of the transformer; failure to observe this requirement may lead to irreparable damage to the PriWatt™ film panels.
- Before turning on the power to a new installation, the electrician should test the resistance reading between the frame and the bus bar feed cables to ensure that the reading resistance is infinite. If this is not the case, the short circuit should be found and insulated accordingly.

SWITCH AND REMOTE

- PriWatt film can be controlled with a variety of devices and can be easily configured to work with your smart home system or a phone app.
- Control of single or multiple glass panels or segments is possible.
- Manufacture recommendation is LUTRON CASETA



INSTALLATION PRECAUTIONS GUIDE

Burned pixels

- Always check if you are connecting input voltage to correct transformer size. Please pay attention at table INPUT & OUTPUT.
- Connecting output to 110VAC would create x3 times more voltage and will burn busbar and film leaving permanent burned pixels.



Two panels with opposite polarity busbars installed too close to each other

- When busbars of opposite polarity on two adjoining panels are connecting or are too close to each other, this will create a short circuit causing burning or even sparking. ALWAYS make sure that close busbars have the same polarity!

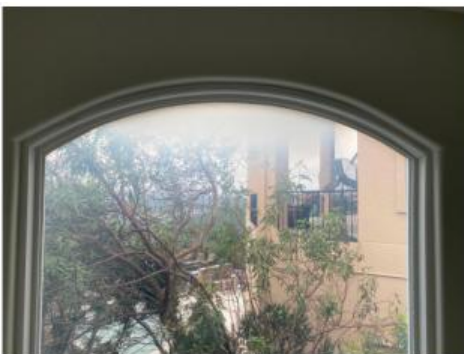
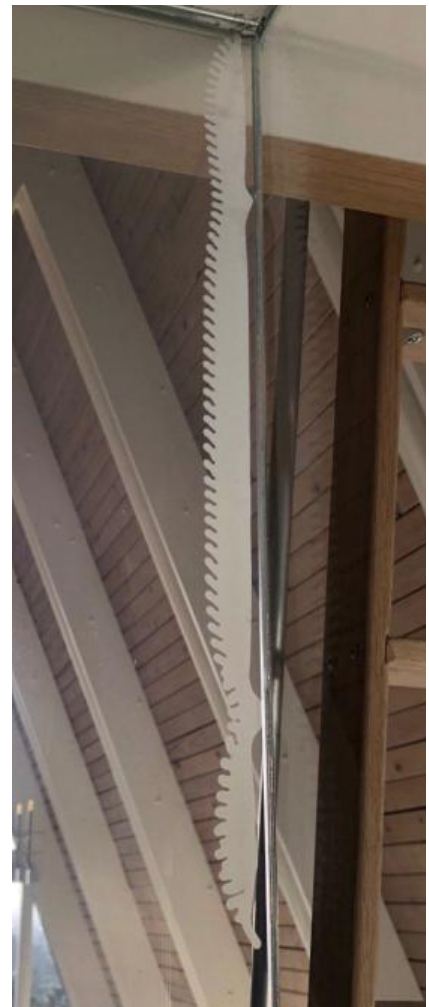


Unapproved silicon causing crystals to dissolve

- Please make sure you are using acid free silicon;
- Approved silicon:
DOWSIL 737 Neutral Cure Sealant Clear/Black/White

Short circuit caused by the frame contact or rough trim

- During installation of the film always make sure that it doesn't touch the frame. This might cause ITO jam and local short circuit. Also make sure you are using sharp scissors when trimming the film. Rough cut might cause slight shortage around the cut. To fix this issue, just trim shorted area with new razor.



CLEANING & AFTERCARE

Once the PriWatt™ Film has been installed, the glazing contractor should make provisions to ensure that the films are protected from possible damage caused by the construction practices of other trades. Special care must be taken during the initial cleaning, cleaning during the construction period, or when film surfaces are severely oiled to prevent marking or damage caused by abrasive contaminants.

If the film surfaces become heavily contaminated with abrasive particles, the film's surface should initially be blown with low-pressure compressed air or an electrical blower to remove as much contaminant as possible.

Any remaining contamination should be removed by gently flicking the film's surface with a soft-bristled cleaning/dusting brush.

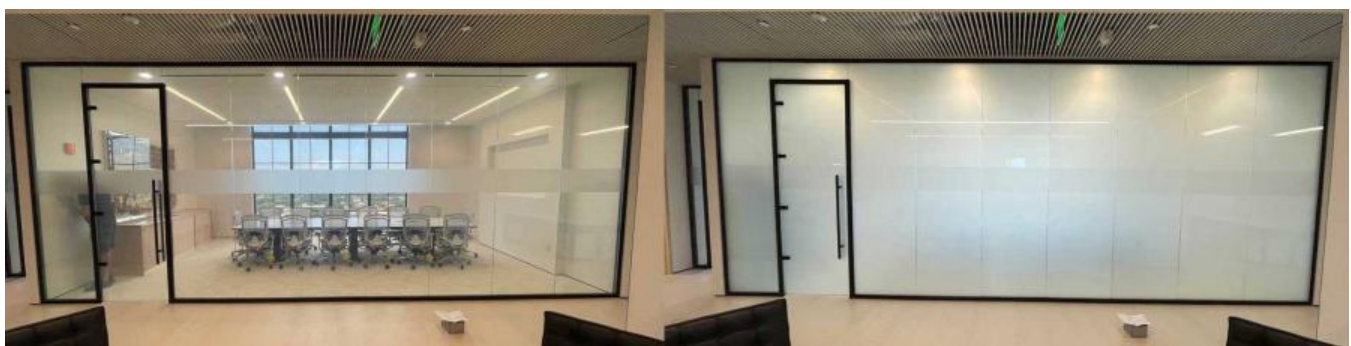
Caution must be taken to ensure that any remaining abrasive materials do not become trapped and dragged across the film surface and the brush; otherwise, the surfaces may be scratched.



CLEANING PriWatt™ FILM

- Clean the film, when in OFF position (opaque state) with soft cotton or microfibre cloth. A small amount of 99% isopropyl alcohol should be used as a cleaning solution. PriWatt™ film surface is durable however if you could avoid harsh paper towels it would prevent light scratches and hazing over time.
- DO NOT use water on the edge of Smart Film.
- DO NOT use any abrasive cleaners, industrial strength glass cleaners, and/or any other window cleaning tools that may scratch the smart film.

Remember, the surface of the film is scratch-resistant, not scratch-proof.



MAINTENANCE PriWatt™ FILM

- PriWatt™ Film has to be switched OFF (opaque mode) for a minimum of 4 hours every 24 hours. To ensure the correct functionality of switchable smart film, Smart Glass recommends the panels be turned ON and OFF regularly.

ANNUAL REVISIONS

- Revise all wiring in installation is in good condition, making sure wires aren't peeled or have poor contact with film or transformer.
- Make sure transformer(s) and switch are in good condition, without visible damages or excess heat.
- Frames should be kept free from any damage and in good condition.
- The silicone used in joints or other parts of the glass surface should be always kept in good condition. Over time, silicone is prone to deteriorate. Please ONLY use silicone recommended by Smart Glass.
- The ceiling, floor, walls, etc should be checked for structural integrity, excess humidity, or temperature.