



SMARTGLASS
TECHNOLOGIES

TECHNICAL INFORMATION AND INSTALLATION GUIDE

PRIWATT PDLC GLASS

WWW.SMARTGLASSTECH.US

Glass Type	Low Iron	Heat Strengthened	Laminated
		Tempered	
Physical Parameters	Thickness	Overall	3/8 inch
			1/2 inch
			9/16 inch
			Other thickness available upon special request
	Color		White
			Light Gray
	Size	Maxim	1/2" thickness: max size 70" x 126" 9/16" thickness: max size 70" x 144"
Optical Parameters	Shape	Any shape or curved	holes, notches and cut outs
	Weight	Overall	~ 5 lbs/sqft
	Visible Light Transmittance	Power ON	83% Values are nominal (+/- 5%) and are dependent on glass configuration and size.
		Power OFF	73%
	Haze	Power ON	3%
		Power OFF	95%
	Viewing Angle	Power ON	> 170
Environment Parameters	Solar Heat Gain Co-efficiency (SHGC)	Power ON	0.74
		Power OFF	0.31
	Overall heat transfer (U-value)	Power ON	0.49 Btu/h·ft ² ·F
		Power OFF	0.42 Btu/h·ft ² ·F
	UV Blocking	Power ON	> 98%
		Power OFF	100%
	IR Blocking	Power ON	> 20%
		Power OFF	> 85%
	Working Temperature		-22 F to 122 F
	Storage Temperature		-4 F to 158 F
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
Sound transmission class (STC)	ON/OFF		~ 40
Switching Cycle	ON/OFF		2 Million Times
Life Cycle	ON/OFF		> 15 Years



FEATURES AND BENEFITS

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

Custom shapes and sizes can be created and multiple pieces can be joined together to create large switchable glazed panels or partitions.

Greatest clarity, consistency & stability

Low iron, premium float glass, and German-made EVA (ethylene-vinyl acetate) offer the greatest transparency and stability. World's most advanced PDLC (Polymer Dispersed Liquid Crystal) technology provides reliable, consistent performance.

Simple Installation

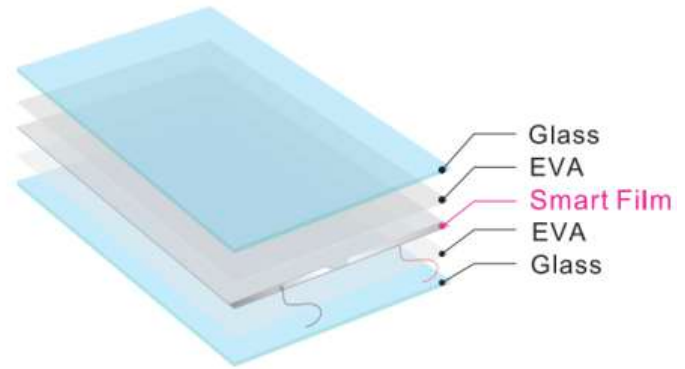
Smart Glass can be easily installed as any regular laminated tempered glass. It can be installed by any certified glazier and connected to power by any certified electrician.

Easy Cleaning

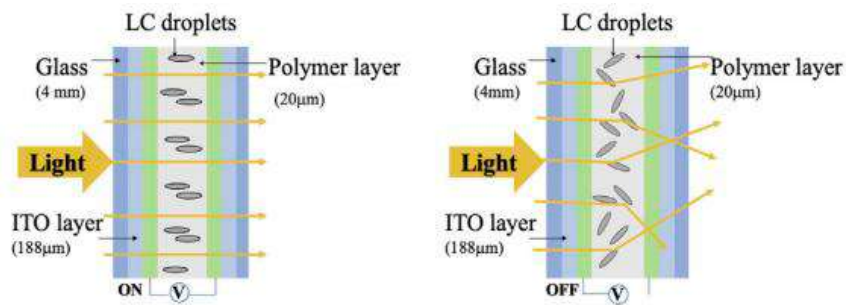
Unlike draperies, blinds, and shutters, glass collects only a fraction of dust, so cleaning is kept to a minimum. Turn it off and use a soft cloth and gentle soap. When done, ensure there is no water or soap left on the glass or the edges.

PRINCIPLE

PriWatt™ Glass is composed of a thin film interlayer of liquid crystals dispersed in a polymer matrix (PDLCs) laminated between two plastic substrates coated on the inner face with a thin layer of conductive material. By applying a small electrical current, its state can change from opaque to transparent and vice versa. Ethylene-vinyl acetate (EVA) is used to bond the thin film with the glass.

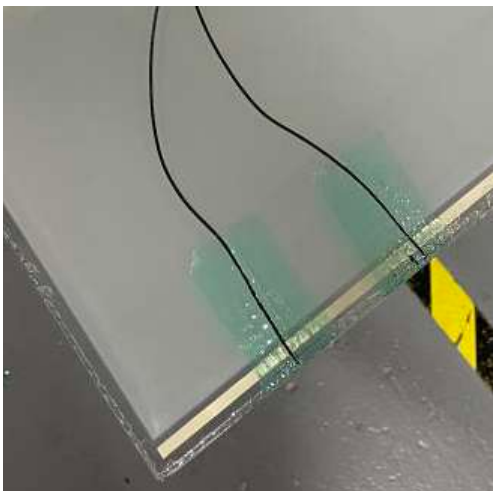


Smart Glass technology allows you to switch back and forth between opaque glass and a transparent view, all through a simple electrical current. PriWatt™ Glass panels contain a film of dispersed liquid crystal molecules in a polymer matrix pressed between two glass sheets. When an electrical current activates the panel, the liquid crystal molecules instantly align. This positioning allows light to pass through, and your glass becomes transparent. When the current is disconnected, the molecules immediately disarrange for instantaneous and total privacy.



IMPORTANT

A clear non/switchable area of approximately 1/8" will be observed around the perimeter of PriWatt Glass panel. This is not a fault of the product.



HAZE CONSIDERATIONS

In the ON position, PriWatt Smart Glass has 77-83% transparency and 3% haziness. This is the world's best performance a PDLC technology can offer to this date.

However, some external factors can create a light reflection or visually add more haze by causing a loss of transmissive contrast. Examples of such factors are sunlight from an angle, excessive ambient light from outer space, and interior lights that have a disadvantageous angle toward the Smart Glass.

Additionally, when viewing the Smart Glass at a direct angle, we 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.

Example of the same glass in different lighting conditions and angles:



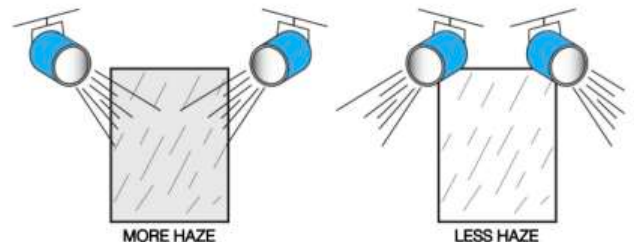
Good contrast



View from a wide angle



Light at an angle towards the smart glass or excessive light from the outdoors



Lighting oriented towards the smart glass will cause more haze

Lighting oriented away the smart glass will give more transparency

Glazing Guidelines

Interior Glazing

Smart glass panels can be butt glazed. Long edges will be polished giving an even vertical finish. Panel thickness will vary depending on several conditions including the height and span of the glazed area. We will advise minimum glass thickness for manufacturing considerations but it is for the client to ensure that glass thickness is suitable for the purpose and complies with all local building codes.

Operable Windows & Doors

Doors and windows can be glazed with PriWatt Glass. The requirement to get the power cable from the glass to the frame of the opening mean that adapted pivots, hinges or connectors must be used. The use of patch fittings is also possible subject to discussion with the smart glass technical specialist.

Cable connectors will be used to protect wires traveling between the door and frame where the wiring is then connected to the transformer/power conditioner. Please ask us for further details if required.

Installation

- *Clients and their installers should inspect each piece of PriWatt Glass immediately prior to the start of installation.*
- *Do not install items that are improperly sized, have damaged edges, or are scratched, abraded, or deficient in any other manner.*
- *Do not remove labels where provided by the manufacturer until so directed by Architect, client, or site manager.*
- *If the installer has any questions or concerns please immediately contact your smart glass technical specialist.*

INSTALLATION VIDEO: [CLICK HERE](#)



Fully Framed Fixed Frames

- As standard, the power supply cable for the panel is at the top center of the panel, therefore a hole must be drilled through the head of the frame to allow for cable routing. The hole must be completely deburred and a bushing or grommet fitted to prevent cable damage.
- Setting blocks used should be of standard width and thickness of all glass panels, as per glass and glazing federation guidelines.
- For applications with more than one single glazed panel per frame, panels can be jointed using a selection of dry joint profiles or silicon as supplied by the manufacturer, see note below.

Glazing Methods

Wet Glazing: Never use putty or glazing compound to glaze PriWatt Glass. Edges of the PriWatt glass panel are to be protected using Flow strip edge tape. Only use non-acetic sealants, (DOWSIL 737 / 1199 Neutral Cure Sealant Clear/Black/White), supplied by the manufacturer.

Butt-Joint Glazing: PriWatt glass panels can be butt-joint glazed in interior applications (Long edges polished recommended). The joint can be silicone (only use silicone supplied by Smart Glass Group) or dry joint as required.

Exterior Applications: Insulated Glass Units made with PriWatt glass can be installed as per normal glazing with the exception of accommodating the unit wiring. The PriWatt glass panel must be fitted as the interior panel. Smartglass is suitable for glazing steel, timber, aluminum and UPVC framing systems.

Silicone

Smart Glass Technologies only recommends **DOWSIL 737 / 1199 Neutral Cure Sealant Clear/Black/White** as the sealant for use in butt-joint glazed PriWatt glass panel systems. Use of any other type of silicone sealant will void the warranty.

Structural Silicone Glazing: Insulated glass units manufactured with PriWatt glass should not be structurally silicone glazed unless agreed in advance & in writing by the PriWatt glass manufacturer.

Frame design

- Frame edge clearance and face clearances may be used, except the edge bite must be 7/16 inch minimum and framing must include a hole of sufficient diameter to pass wires through. To maintain a proper seal against the infiltration of water and air adequate bite and sealing are required.
- Inadequate clearance for the edges can cause damage due to glass-to-metal contact. Minimum edge clearances should allow for a tolerance of 1/16 inch. This should only be increased if the surrounding materials' tolerances are difficult or impossible to control.

Door Design

There are several options for using PriWatt glass in doors including top and bottom rails and conventional patch fittings. Please contact us for further information.

Door handle detail

Back to Back pull handles are used as standard on PriWatt doors. Ensure the pull handles you are using will cover the hole in the LC Film, this is generally 7/16 inch wider in diameter all around than the borehole in the glass for the pull handle fixing bolts.

Allowances will have to be made for the difference in height between the door and the panel with the receiver to ensure they line up correctly.

Cable routing detail

When using a framed door system, you have to remember that the wiring must make its way from the glass out of the door frame. We recommend that a concealed door loop is used. The cable can then be passed through the stile of the door-door loop-door frame and then continued on to the ceiling void and transformer.

Setting Blocks

Locate sill setting blocks of standard width and thickness at quarter points of all glass lights unless otherwise recommended by the manufacturer or supplier.

In Figure 1, you can find a drawing that summarizes the correct usage and placement of setting blocks including points such as:

1. Setting blocks are placed at a quarter point of the glass.
2. The minimum length of the setting blocks is 4 inches (100 mm).
3. The minimum distance is 6 inches (150 mm) from the glass corner.

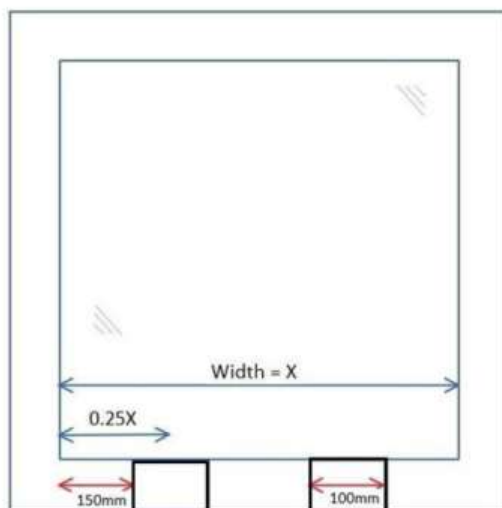


Figure 1: Setting blocks placement. Drawing is not to scale.

It is very important to make sure that once the glass is placed on the setting blocks, the setting blocks are well positioned and will not be able to shift outward/inward in the frame. This will prevent the glass from partially resting on the setting blocks.

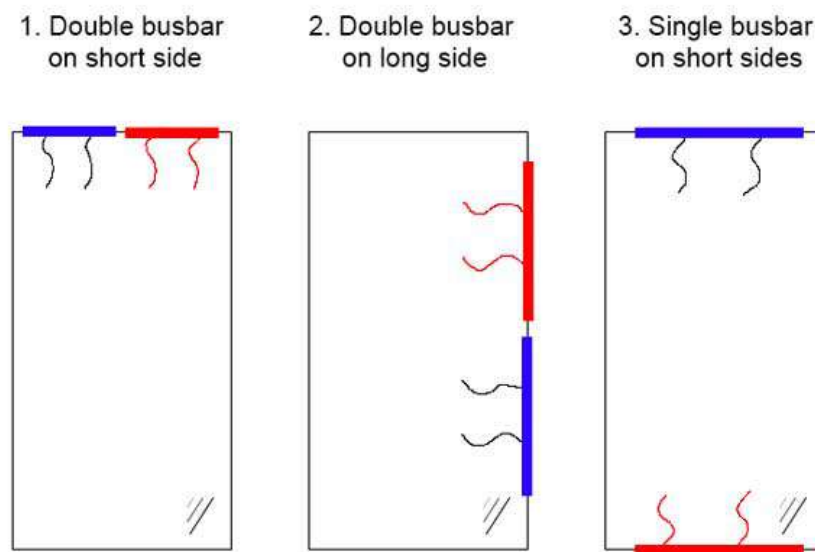
ELECTRICAL GUIDELINES

Electrical installation of PriWatt™ Glass 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.

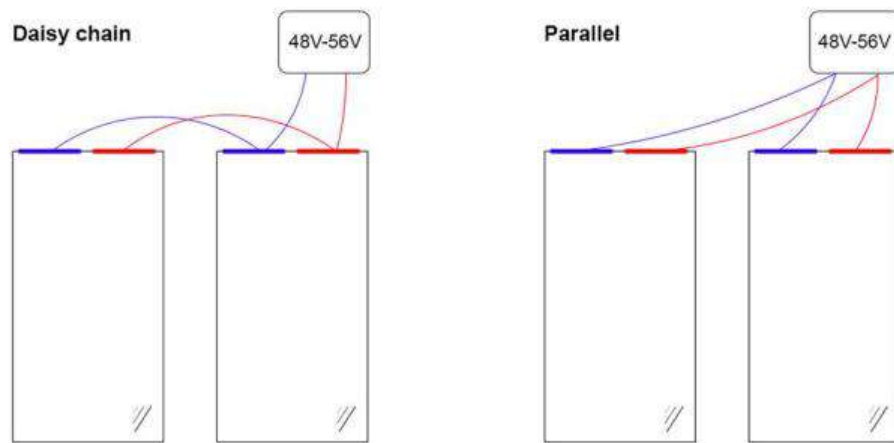
ELECTRICAL CONNECTION VIDEO: [CLICK HERE](#)

In a standard case scenario, each PriWatt Glass panel has two busbars. Busbars can be located as follows:



1. If your panel has a different busbar setup, please call your Smart Glass consultant prior to commencing the installation.
2. Each busbar has two wire leads. One busbar has 2 RED wire leads, another busbar has 2 BLACK wire leads.
3. One of the wire leads is SPARE in case of any damage during the transportation or installation process. Please shrink-wrap it and conceal it safely in the frame.
4. You have to connect one of the RED wires to one polarity of the Transformer Output (48-56 Volts) and one of the BLACK wires to the other polarity of the Transformer Output (48-56 Volts).

The PriWatt glass panels can be connected in Daisy chain or Parallel:



1. PriWatt™ Glass requires all electrical installations to be completed by a Licensed Electrician and in compliance with all code requirements.
2. Before installation, inspect busbars, electrode leads, and wires to assure insulation.
3. Twin (or dual) wires are attached to each end of the PriWatt™ Glass busbar. This apparent double-up is to compensate in the case of a wire becoming detached or dislodged during the installation process. The ends of each of the twin wires are to be twisted together as one, ready for connection. Neither end of the busbar is 'Polarity Conscious' - the wires can be considered as Negative or Positive when connecting them to the Transformer.
4. No exposed busbars, electrode leads, or wires should contact any metal frames that will damage the transformer and PriWatt™ Glass. If busbars, electrode leads, or wires have become exposed during glass lamination or shipping, the exposed parts must be wrapped with insulation tape.
5. Any metal framework into which panels will be installed must be earthed.
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 then the electrician will need to check all busbars, electrodes, and cables until the short circuit is found and insulated accordingly.

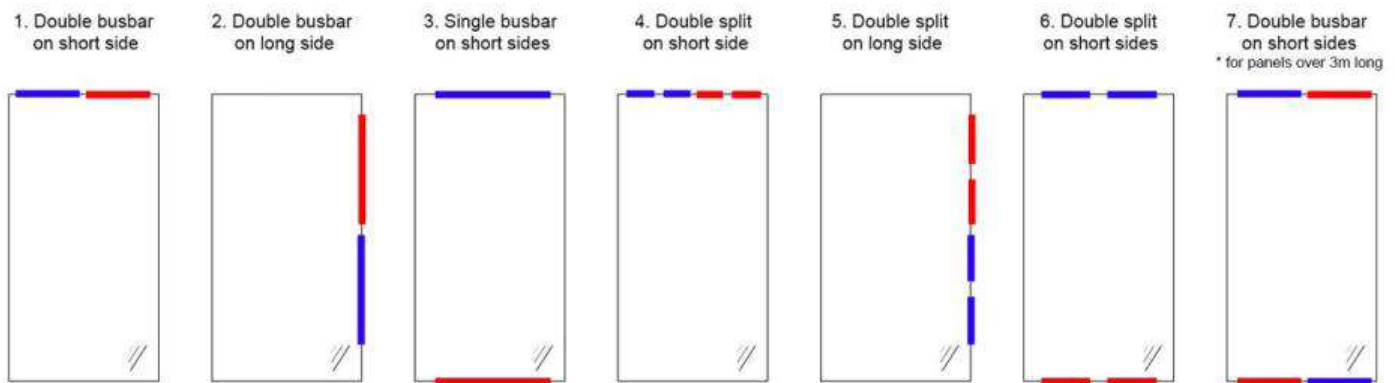
Wiring-in PriWatt™ Glass into Hinged Doors and Opening Windows

When fitting PriWatt™ Glass 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 a door or window. Power Transfer Units are made specifically for this purpose.



Additional Cautionary Information

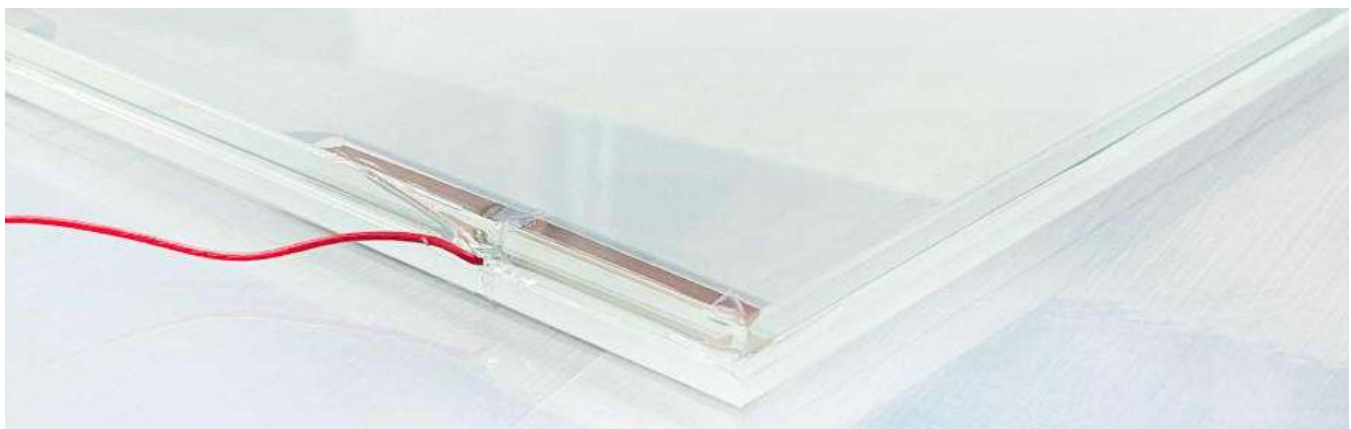
- Smart Glass Group provides wiring diagram examples for the operation of its PriWatt™ Glass panels, however, Smart Glass Group assumes no liability for the wiring of any products and recommends that the purchaser or purchaser's designated agent consult with a licensed electrician for compliance with area Building Codes and professional electrical system wiring.
- **DO NOT ATTEMPT TO INSTALL THE PriWatt™ GLASS 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 a 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 a minimum of 1/2 inches.

ELECTRICAL CONNECTION VIDEO: [CLICK HERE](#)

FUSE REPLACEMENT VIDEO: [CLICK HERE](#)



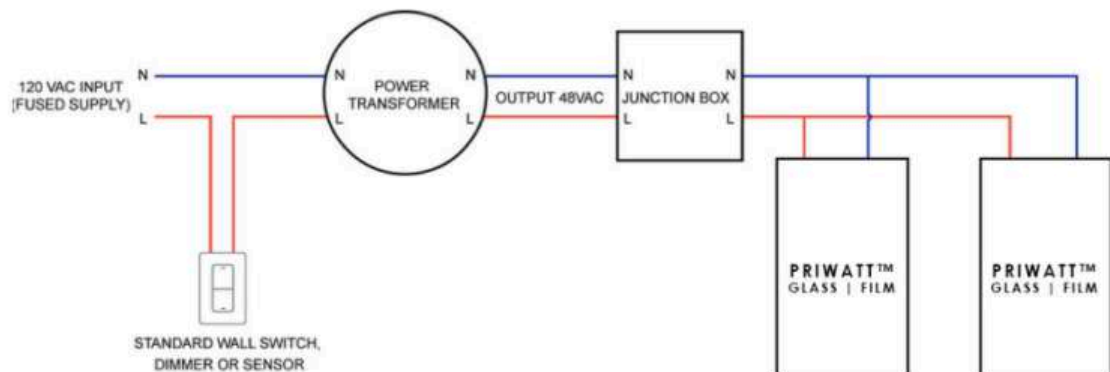
POWER TRANSFORMERS



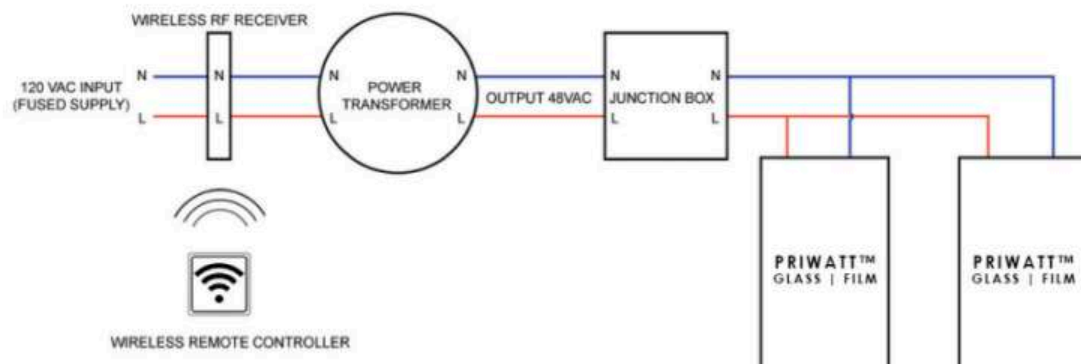
- ✓ PRI: 110V / 50-60Hz
- ✓ SEC: 48V / 2.08 A
- ✓ Power 100W / 300W
- ✓ Covers 100/300 SqFt
- ✓ IP56
- ✓ EN 61558-2-4
- ✓ UL E125651
- ✓ Size 4.7" x 3" x 3"
- ✓ Closed resin box
- ✓ 2 x 0.75mm / 1 ft wire
- ✓ Temp. Fuse / 110°C
- ✓ Screw connectors

- **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.

Standard Hardwire Diagram



Wireless Diagram



Shipping

Where applicable we manufacture shipping crates for all individual customer orders. These crates allow for the protection of glass in transit, but correct handling methods should be observed when off-loading.

Note: It is the responsibility of the client to offload glass deliveries unless otherwise agreed prior to dispatch.

Receiving

Before signing for and accepting the shipment from the carrier, inspect the crate(s) for any visible damage.

If damage to any of the panel(s) is found, the shipping documents should be so noted and the driver's signature obtained as a witness. You should inform us immediately of any damaged panels. Photographs or videos should be sent within 24 hours. A freight claim should be filed to the carrier as early as possible.

The customer is responsible for unloading the crate/skid from the truck.

When lifting the crate the forks must be in a central position and the crate must be fully supported. Do not attempt to lift the crate unless it is evenly supported.

When the shipping or receiving location does not have a loading dock, manual loading or unloading is necessary.

Lift-gate service is not always available depending on the crate size. You must let us know in advance if you require a lift-gate delivery.

Opening the crate

Ensure the crate is on a level surface. Before removing the lid unscrew the screws which are holding the lid down. Be careful to lift the lid off the crate level on all corners. Remove straps holding panels on. Remove the panels carefully, one at a time, using the appropriate lifting methods.

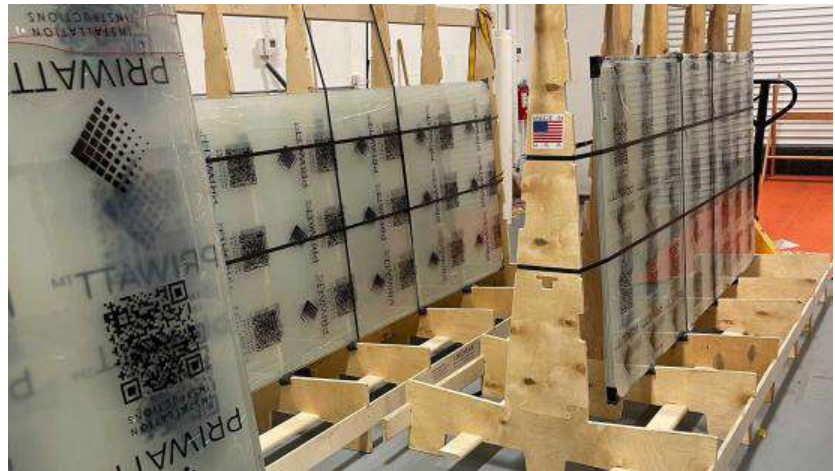
Warning: Loose cables from PriWatt glass panels are not to be used for lifting, moving or positioning the glass panels. Ensure not to snag cables whilst lifting.



Storage

Glass edges frequently sustain damage due to careless handling at some point between manufacture and installation. Handle with care. If the PriWatt glass is to be stored on the job site or in warehouse conditions, proper blocking and protection should be maintained at all times. As with other flat glass products, the PriWatt glass panels must be stored where the relative humidity is less than 80% to prevent the PriWatt glass from staining. The PriWatt glass temperature should be held nearly constant to prevent moisture condensation on the panels. Storage temperature range is -4 to +122°F. The crate should be kept in an upright position or tilted at 5-7° from vertical at all times using broad, sturdy uprights to support the weight of the crate. Alternatively, the PriWatt glass should be stored on a glass "A" frame in a position free from obstruction, traffic and danger.

Note: PriWatt glass panels can be heavy at approximately ~5 lbs/sqft. Please be careful and take the weight loads into account when moving and storing.



Unexpected Breakage

"Unexplained" glass breakage may occur after all precautions have been taken. Such breakage is beyond the control of the manufacturer and therefore not warrantable. This includes but is not limited to the following items:

- Thermal stress;
- Glazing system pressures;
- Damage during glazing by others;
- Handling and storage problems;
- Damage by inappropriate cleaning;



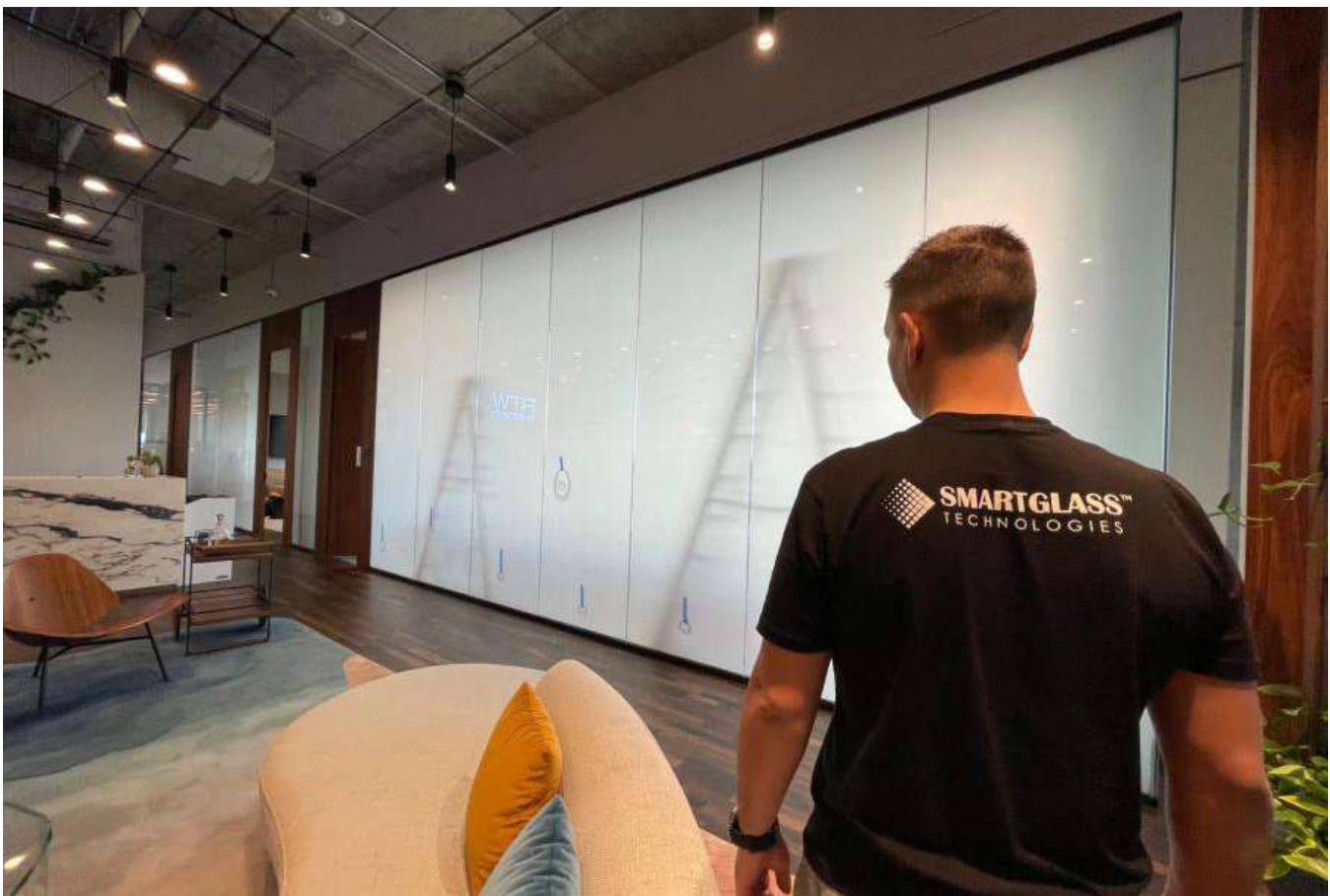
Troubleshooting

PriWatt glass operates at 48-57 VAC and 50/60 Hz. Higher voltages and frequency may cause permanent damage. Electrical service must be performed by a qualified electrician who has read and understood this document.

Switch the power ON. Verify that the PriWatt glass panel switches. If one or more PriWatt glass panels are not operating, check the following:

1. Check the circuit breaker to verify power. If there is no power from the circuit breaker, reset or replace the circuit breaker.
2. Visually check the condition of all wiring and that connections have not been broken.
3. Check the switch to verify power. If there is no power from the wall switch check the connection or replace the switch.
4. Check input to the power transformer of affected panels to verify power. If there is no input power to the power transformer, check the wiring between the wall switch and the power transformer for damage and continuous current flow.
5. Check the output from the power transformer of affected panels to verify power. If there is no output power from the transformer, the fuse may have blown. Replace the fuse with the same size and specifications which is available at electronic supply shops such as Home Depot.

FUSE REPLACEMENT VIDEO: [CLICK HERE](#)





Maintenance

Once the PriWatt glass is installed, the glazing contractor should make provisions to ensure that glass surfaces 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, or when surfaces are severely soiled, in order to prevent marking or damage to the glass surface from abrasive contaminants.

In the event that the glass surface becomes heavily contaminated, the glass should be blown down with low-pressure air or an electric blower to remove as much contaminant as possible.

Any remaining surface contamination should be removed by gently flicking the surface with a soft-bristled cleaning/dusting brush. Care must be taken to ensure that any remaining abrasive materials do not become trapped and dragged across the surface.

Once this has been carried out and for routine cleaning the glass surface should be cleaned with a soft IPA wipe and/or a PH-neutral, non-abrasive liquid glass cleaner sparingly applied to a lint-free, clean soft cloth.

Do not allow any metal or hard parts of the cleaning equipment to have direct contact with the glass surface.

Remember; PriWatt glass is an electrical product, never attempt to clean PriWatt glass with a wet cloth and bucket or other window cleaning technique which drenches the surface of the glass. This may cause irreparable damage to the product and will invalidate the warranty.

Daily maintenance is generally as simple as keeping the PriWatt glass clean. Regular cleaning with neutral materials is recommended for optimum performance. In external windows, soapy warm water performs best. The soft-coated glass should be cleaned very carefully following the manufacturer's own instructions. Use a professional glass cleaner or a reputable cleaner.

In addition to keeping the glass clean, it's recommended that the glass be switched off for roughly 4 hrs per day. It is essential to regularly allow the molecules in the film to return to a state of random arrangement and not become polarized in a rigid position, this keeps the PriWatt glass functioning at its optimal performance and guarantees the longevity of the product.

Annual checks: The client should check that all wiring is in good condition, framing materials are free of any damage, and that the transformer and switch are in good visible order. The areas adjoining the PriWatt glass including walls, ceilings, and floors should be checked for structural integrity, excess humidity, and temperature. Should any of these items appear unusual the client should immediately notify the original supplier / installer / contractor or the manufacturer.