

SWITCHABLE PRIVACY GLASS

Technical Information & Installation Guide

AUSTRALIA

2 Mooney Place
O'Connor WA 6163
Western Australia

Telephone +61 8 9314 1303
Facsimile +61 8 9337 9011

Email csteam@switchglass.com.au
Website www.switchglass.com.au

YouTube Switchglass Corporate Video
<https://youtu.be/uHLqMHzoGBM>



TABLE OF CONTENTS

Switchable Privacy Glass	4
Features and Benefits	4
Energy Efficiency	4
Acoustic Properties	4
Technology.....	5
Principle	5
PDLC Light Scattering Mechanism.....	5
Technical Data.....	7
Specifications	7
Examples of Switchable Privacy Glass Acoustic Data – GUIDE ONLY	8
Examples of Switchable Privacy Glass Optical Performance – GUIDE ONLY	9
Haze	9
Switchable Privacy Glass Shapes (Can be manufactured with holes).....	10
Glazing	11
General Notes	11
Surface Conditions	11
Installation.....	11
Protection	12
Cleaning	12
Setting.....	12
Glazing Methods	12
Interior Applications – Laminated Switchable Privacy Glass	12
Exterior Applications – Double Glazed (Insulated Glass) Units made with Switchable Privacy Glass.....	12
Butt-Joint Glazing	13
Structural Silicone Glazing.....	13
Frame Design	13
Setting Blocks.....	13
Glass Protection	13
Electrical.....	14
Installation	14
Supplies Needed.....	14
Wiring.....	14
Installation By Switchglass Customer	14
Wiring-in Switchable Privacy Glass into Hinged Doors and Opening Windows.....	14
Power Transfer Units.....	15
Additional Cautionary Information.....	15
Operation of Power Supply and Timer (if installed)	15
Busbar Wiring Options	16
Notes – Fuse Checking or Changing	16
Busbars – Single Glazed or Double Glazed Units.....	17
Busbar on one short edge	17
Busbar on one long edge.....	17
Alternative Busbar Solutions – Two Short Edges.....	18
Alternative Busbar Solutions – Two Long Edges.....	18
Acceptable Positioning of Busbars on Switchable Privacy Glass Panels	19
Transformers and Wiring	20
Wiring Parameters (Transformer to/from Panel).....	20
Switchglass Transformers.....	20
Wiring Single Outlet Transformer (Model No LHA-666501000SA).....	22
Wireless Wall Switch / Remote Control Wiring Diagram	22

Wiring Multiple-Outlet Transformers	23
4 Outlet Transformer (Model No. 0350-4-065)	23
20 Outlet Transformer (Model No. 0500-20-065)	23
Representation of Basic Timer and Power Supply Hookup	24
Troubleshooting	25
Shipping and Receiving	26
Shipping	26
Receiving	26
Storage	26
“Unexpected” Breakage	26
STANDARD Warranty	27
Your Assurance – Our Team, Our Quality Standards and Manufacturing.....	29
Delivery	29
Company Background	29
Applications	30
Commercial	30
Hotels and Restaurants	30
Projection (Rear Projection Only).....	30
Residential.....	30
Security	30
Entertainment, Showrooms and Directories.....	30
Healthcare.....	30
Retail	30
Executive Cars	30
Manufacturing	31
Glass Construction	31
Glass Processing	31
Appendix A.....	32
Example of Operable Glass Wall Wiring.....	32
Appendix B	33
Haze	33
Clarity and Lighting.....	33
Haze Considerations.....	34
For Consideration Before Placing Your Order	35
Supplementary Information.....	36
How To Connect Switchglass to Transformer	37
Caution – Read This First.....	38
Use only Non-Acetic Sealants.....	38
Timers are highly recommended	38
Switchglass as a Rear Projection Screen	39

SWITCHABLE PRIVACY GLASS

FEATURES AND BENEFITS

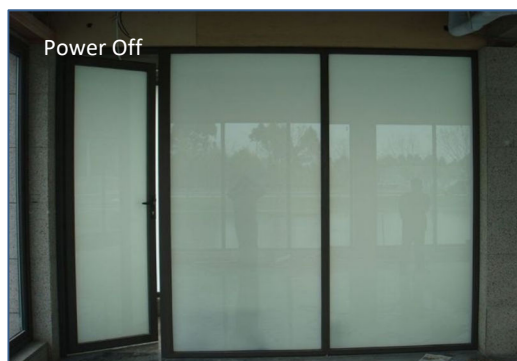
- Transforms from a cloudy white, opaque barrier to an optically clear state with a flick of a switch.
- Allows Architects and Contractors to provide creative design concepts and to incorporate Solar Protection and/or Energy Efficiency with engineering flexibility.
- Can be manufactured in curved form, odd shapes, or even hole-punched to accommodate specific display applications.
- Flexible size – up to 1,820mm by 3,500mm.
- Panels are available in single or double glazed units.
- No distraction of shutters blinds or drapes.
- Great solution for a rear-projection screen with high contrast.
- Blocks 99% of UV rays.
- Low working voltage (consumes less than 5 watts per square metre).
- Average life of 25 years with due care – bench-tested at over 7,000,000 switches (on and off).

ENERGY EFFICIENCY

By the inclusion of special film and/or coated glass in the make-up of a Switchable Privacy Glass panel, its Energy Efficiency can be dramatically increased and its fabrication into Double Glazed (Insulating) Units increases this factor to an even greater extent.

ACOUSTIC PROPERTIES

As a guide, a standard Switchglass™ panel provides an Acoustic Rating of Rw 36.



TECHNOLOGY

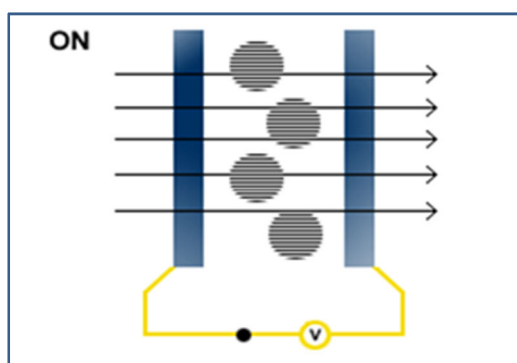
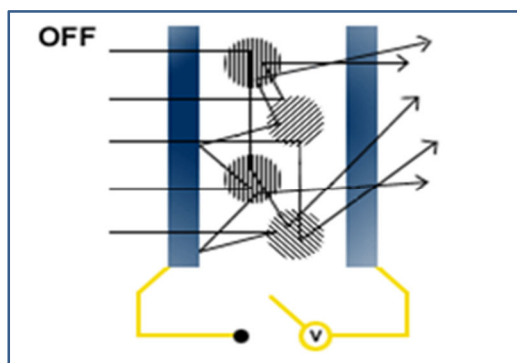
PRINCIPLE

When the power is off the liquid crystal molecules are randomly oriented, scattering incidental light. This renders the Switchable Privacy Glass panel opaque.

When an electric current is applied the liquid crystal molecules line up and the incidental light passes through, making the Switchable Privacy Glass panel clear.



PDLC LIGHT SCATTERING MECHANISM

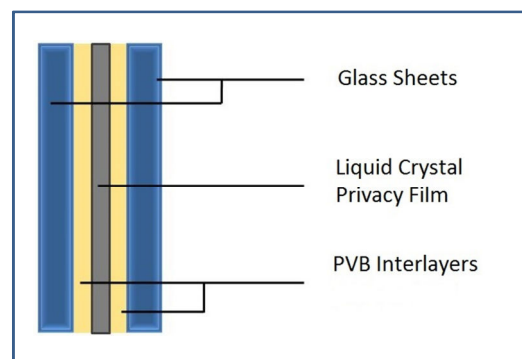
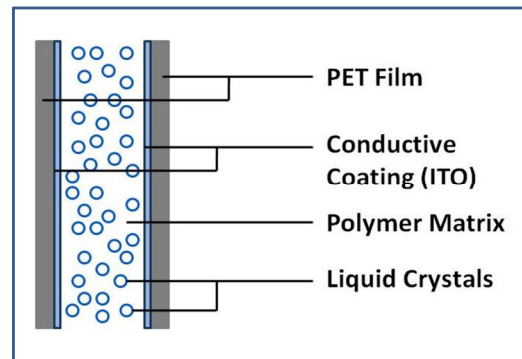


Switchable Privacy Glass is a laminated glass. The laminated material within is Polymer-Dispersed Liquid Crystal (PDLC) Film which responds to an electrical current.

PDLC Film consists of a polymer matrix of liquid crystals enclosed by electrically conductive Indium Tin Oxide-coated PET film. The resulting PDLC Film has wiring attached to a conductive copper strip (busbar) along the film's edge. This wiring is connected to a step-down transformer through which power is supplied for the "on" (clear) state.

The PDLC film is encapsulated between layers of glass in a protective laminate construction. The outer glass on either side is normally 4, 5 or 6mm annealed. PVB interlayers adhere the PDLC film within the glass makeup.

When electricity is applied to the film via the wiring, the liquid crystals align and the window instantly becomes clear. When the power is turned off, the liquid crystals return to their normal scattered positions rendering the glass opaque.



TECHNICAL DATA

SPECIFICATIONS

Glass Colour	Can be combined with colour interlayers or a wide range of tinted glass to meet any requirement
Decorative Glass	Screen printed, sand blasted, fritted and/or patterned
Glass Type	Low iron, annealed, heat strengthened, tempered/toughened (all laminated)
Thickness	From 9.52mm to multi-layer laminates
Size	Up to 1,820mm x 3,500mm – Switchglass has the largest size available on the market
Shape	Any shape or curved, including holes, notches and cut-outs
Environmental	Storage: -20degC to 70degC Operation: -10degC to 60degC
Electrical	Driving Voltage: 65VAC (Transformer supplied) Current: 200mA per square metre Power: 5Watts per square metre
Switching Time	Approx. 100 milliseconds at room temperature
Optical	Visual Light Transmission: Approx. 75% to 80% (in 'on' state) Scattering Effectiveness: Approx. 25mm
Life	25 years (indoors) when used, installed, and stored properly as per the usage, storage and installation specifications referenced herein

- Claim is supported by Manufacturer's testing data.
- Standard Warranty two (2) years or Extended Warranty of up to five (5) years on Switchable Privacy Glass panel (or as specified on quotation).
- To help preserve the longevity of its liquid crystals, Switchable Privacy Glass panel must have at least 4 to 5 hours in its "off" state during a 24 hour cycle and must not be left "on" continuously for over 20 hours at a time.

EXAMPLES OF SWITCHABLE PRIVACY GLASS ACOUSTIC DATA – GUIDE ONLY

Customised acoustic combinations available on request

Test ID	Overall Thickness	Construction – Laminated	Interlayer	dB Acoustic Rating (Rw)	Specification ID Code
RAL:TL06-151	9.52mm	4mm glass x 1.52 Switchglass interlayer x 4mm glass	Standard	35	SGS-9.52
RAL:TL06-152	10.35mm	4mm glass x 2.35 Switchglass interlayer x 4mm glass	Acoustic	36	SGA-10.35
RAL: TL04-204	11.52mm	5mm glass x 1.52 Switchglass interlayer x 5mm glass	Standard	36	SGS-11.52
RAL: TL07-197	12.35mm	5mm glass x 2.35 Switchglass interlayer x 5mm glass	Acoustic	37	SGA-12.35
RAL: TL04-139	13.52mm	6mm glass x 1.52 Switchglass interlayer x 6mm glass	Standard	37	SGS-13.52
RAL: TL07-186	14.35mm	6mm glass x 2.35 Switchglass interlayer x 6mm glass	Acoustic	39	SGA-14.35
RAL: TL06-140	17.52mm	8mm glass x 1.52 Switchglass interlayer x 8mm glass	Standard	38	SGS-17.52
RAL: TL07-208	18.35mm	8mm glass x 2.35 Switchglass interlayer x 8mm glass	Acoustic	40	SGA-18.35
RAL: TL06-121	21.52mm	10mm glass x 1.52 Switchglass interlayer x 10mm glass	Standard	41	SGS-21.52
RAL: TL06-122	22.35mm	10mm glass x 2.35 Switchglass interlayer x 10mm glass	Acoustic	42	SGA-22.35
RAL: TL04-141	25.52mm	12mm glass x 1.52 Switchglass interlayer x 12mm glass	Standard	42	SGS-25.52
RAL: TL07-188	26.35mm	12mm glass x 2.35 Switchglass interlayer x 12mm glass	Acoustic	43	SGA-26.35

Glass and Framing System Construction					
RAL: TL06-269	42.90mm	8.38mm (25AS) Spacer + 9.52mm Switchglass	Standard	44	SGC-42.9
RAL: TL06-270	119.90mm	8.38mm (102AS) Spacer + 9.52mm Switchglass	Standard	47	SGC-119.9
RAL: TL06-324	131.90mm	8.38mm (114AS) Spacer + 9.52mm Switchglass	Standard	44	SGC-131.9

Construction – Double Laminated IGU					
RAL: TL06-197	27.52mm	6mm (12AS) Spacer + 9.52mm Switchglass	Standard	44	SGDG-27.52

EXAMPLES OF SWITCHABLE PRIVACY GLASS OPTICAL PERFORMANCE – GUIDE ONLY

Values are nominal (+/- 5%) for a 4mm x 1.52mm PVB + PDLC Film x 4mm panel construction

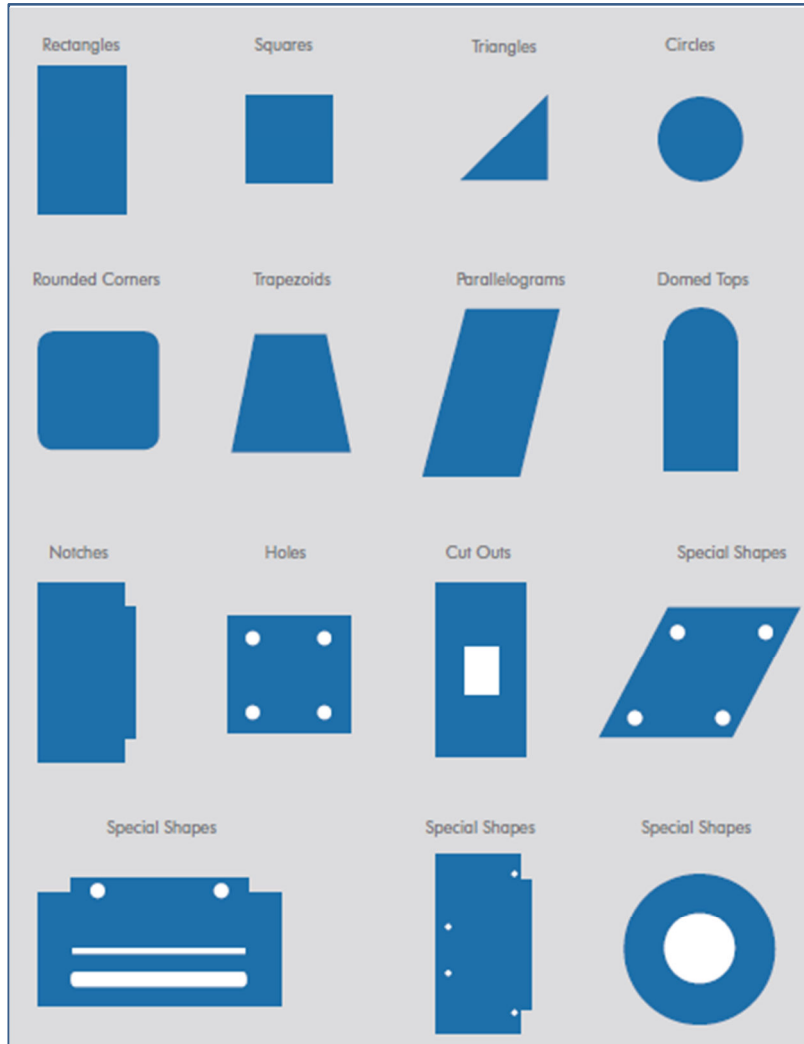
	9.52mm Clear Switchable Privacy Glass Power On Fig 1	9.52mm Clear Switchable Privacy Glass Power Off Fig 2	6mm Clear Float Glass comparing with Fig 1	6mm Frosted Glass comparing with Fig 2
Visible Light Transmission %	75	67	90	80
Clarity %	80	4	99	14



HAZE

Switchable Privacy Glass panels will not be as optically clear as standard float glass. Some degree of haze will always appear due to the nature of the product makeup and will not be considered as a quality failure to replace or refund to the customer.

SWITCHABLE PRIVACY GLASS SHAPES (CAN BE MANUFACTURED WITH HOLES)



Clear, non-switchable areas, very small bubbles and/or visual distortion may be present around notches/holes and cut-outs. Therefore customers must allow for coverage of 10mm all around notches/holes and cut-outs.

GLAZING

GENERAL NOTES

Surface Conditions

- A. Examine the areas and conditions under which work of this Section will be performed. Correct any conditions detrimental to timely and proper completion of this work. Do not proceed until unsatisfactory conditions are corrected.
- B. After preparation of the glazing system, clean glazing channels, stops and rabbets to receive the glazing materials, making free from obstructions and deleterious substances which might impair the work.
 1. Remove protective coatings which might fall in adhesion or interfere with bond of sealants.
 2. Comply with Manufacturer's instructions for final wiping of surfaces immediately prior to application of primer and glazing compounds or tapes.

USE ONLY NEUTRAL CURE SILICONES. DO NOT USE ACETIC SILICONES.

The following sealants are listed as non-acetic by their Manufacturers:

- Tremsil 200 (Tremco)
- Pecora 895 (Pecora)
- Tremsil 600 (Tremco)
- DC Instant Glaze 18578 (Dow Corning)

Confirm with these Manufacturers the compatibility of their respective sealants with regard to butt-joint glazing Switchable Privacy Glass panels (a PVB laminated flat glass product).

Installation

- A. Inspect each piece of glass immediately prior to start of installation.
 1. Do not install items which are improperly sized, have damaged edges, or are scratched, abraded, or deficient in any other manner.
 2. Do not remove labels where provided by the glass supplier from glass until so directed by the Architect.
 3. Adhere to all Switchglass' installation instructions and installation drawings.
- B. Locate setting blocks of standard width and thickness at quarter points of all glass panes unless otherwise recommended by Manufacturer or Supplier.
 1. Use blocks of proper durometer size and thickness to support the glass in accordance with the manufacturer's recommendations.
 2. Glass lap and edge clearances must be provided accordingly to pertinent codes and standards of the Manufacturer.
- C. Set glass in a manner which produces the greatest possible degree of uniformity of appearance.
 1. Indicate clearly when glass is installed in dynamic frames such as operable windows or sliding doors.
 2. Glazing Switchable Privacy Glass units in exterior and/or wet interior conditions, the units must be wet-sealed and impervious to moisture and with provisions to allow for weeping of condensation that may infiltrate the system.
 3. Pressure glazing systems without positive positioning stops are not to be used with this glass.

4. Glazier to place electrical connections properly to allow access by an electrician.
 5. In wet environment applications, electrical connections must exit at the head condition of any framing system using Switchable Privacy Glass panels.
- D. Cut and seal the joints of glazing gaskets in accordance with the Manufacturer's recommendations, provide watertight and airtight seal at corners and other locations where joints are required.

PROTECTION

Protect glass from breakage after installation by promptly installing streamers of ribbons, suitably attached to the framing and held free from the glass. Do not apply warning markings, streamers, ribbons or other items directly to the glass except as specifically directed by the Architect.

NOTE: Windblown objects, welding sparks, or other material applied to the glass surface during construction may cause irreversible damage.

CLEANING

Cleaning of the glass during the subsequent weathering period is necessary. Abrasive cleaners should never be used, particularly when the surface to be cleaned has a reflective coating.

For routine cleaning, use a conventional window washing solution or mild soap and water. Uniformly spray the cleaning solution or apply it with a clean, soft, grit free applicator and rinse thoroughly. The glass surface should then be either wiped dry with a clean, grit free cloth or squeegeed dry. Do not allow any metal or hard parts of the cleaning equipment to contact the glass surfaces.

SETTING

Switchable Privacy Glass panels may be oriented in any direction.

The Australian Glass and Glazing Association Glazing Guidelines are to be followed.

GLAZING METHODS

Interior Applications –

Laminated Switchable Privacy Glass

Dry Glazing

This is the preferred interior glazing method.

Wet Glazing

If an elastomeric (non-acetic) sealant is used, it must be compatible with the panel's polyvinyl butyral (PVB) interlayer or with any other stated interlayer.

Never use putty or glazing compound to glaze a Switchable Privacy Glass panel.

Exterior Applications –

Double Glazed (Insulated Glass) Units made with Switchable Privacy Glass

Panel Position: When used in external IGU, Switchglass panel MUST BE positioned as the internal panel.

NOTE

In wet environment applications electrical connections must exit at the head of any Switchglass panel.

Wet Glazing

Pre-shimmed glazing tape and non-acetic sealants are required to create a seal impervious to moisture for all applications.

Butt-Joint Glazing

Switchable Privacy Glass can be butt-joint glazed in interior applications.

Structural Silicone Glazing

Double Glazed (Insulating Glass) Units manufactured with Switchable Privacy Glass shall NOT be structurally silicon glazed.

FRAME DESIGN

- Standard frame edge clearance and face clearances may be used, EXCEPT edge bite must be 11mm minimum and framing must have a hole of at least 6mm diameter for wiring. To maintain a proper seal against the infiltration of water and air, adequate bite is required.
- Inadequate clearance for the edges can cause damage due to glass-to-metal contact.
- The industry standard for framing deflection must be adhered to. The deflection must not exceed either the length of the span divided by 175, or 18mm, whichever is less. All expansion joints and anchors must be designed so that the glass framing does not incur a load due to structural movement.

SETTING BLOCKS

- Glass larger than 0.5 square metres should be placed on two EPDM or neoprene setting blocks.
- These blocks should have a durometer hardness of 85 ± 5 .
- They should be centred at the bottom quarter points (i.e. equal distance).
- The blocks should be 1.5mm narrower than the channel width.
- Lock-strip gasket systems also require setting blocks.

Recommendations can be obtained from the gasket manufacturers.

GLASS PROTECTION

- Once the glass is installed, the Architect, general contractor, or owner should provide for glass protection and cleaning.
- Weathering steel or alkaline materials may cause surface damage due to staining.
- Abrasive cleaners should never be used, particularly when the surface to be cleaned has a reflective coating.
- Windblown objects, welding sparks, or other material applied to the glass surface during construction may cause irreversible damage.

ELECTRICAL

INSTALLATION

Supplies Needed

Installation of Switchable Privacy Glass panels requires the following items:

1. A 10 AMP (minimum) ground fault interrupter circuit breaker with 240VAC 50Hz (installer/owner supplied) electricity.
2. A wall mounted switch, 240VAC 50Hz (installer/owner supplied). This switch is required to allow the panels to be turned ON (vision mode).
3. Power transformer (supplied).

Transformers must be accessible as they contain a Fuse within the housing.

Wiring

1. Switchable Privacy Glass requires all electrical installations 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 Switchglass™ 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.

No exposed busbars, electrode leads, or wires should contact any metal frames that will damage the transformer and Switchable Privacy Glass. Should busbars, electrode leads, or wires have become exposed during glass lamination or shipping, the exposed parts should be wrapped with insulation tape.

Installation By Switchglass Customer

Any metal framework into which panels will be installed must be earthed.

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 Switchable Privacy Glass into Hinged Doors and Opening Windows

When fitting Switchable Privacy 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 door or window. Power Transfer Units are made specifically for this purpose.

Power Transfer Units

A typical Power Transfer Unit suitable for doors or windows is the LOCKWOOD LWLC8810 LEAD COVER LC8810 (shown)



Features

- Ensures unbroken transfer of wires between door and frame.
- Suits 90 to 120 degree opening doors.
- Maximum cable diameter is 8mm.
- Concealed when the door is shut.
- Fits timber or aluminium doors.

Useful links:

[How To Connect Switchglass To The Transformer](#)
[Frequently Asked Questions](#)

Additional Cautionary Information

Switchglass provides wiring diagram examples for the operation of its Switchable Privacy Glass panels, however Switchglass 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.

Operation of Power Supply and Timer (if installed)

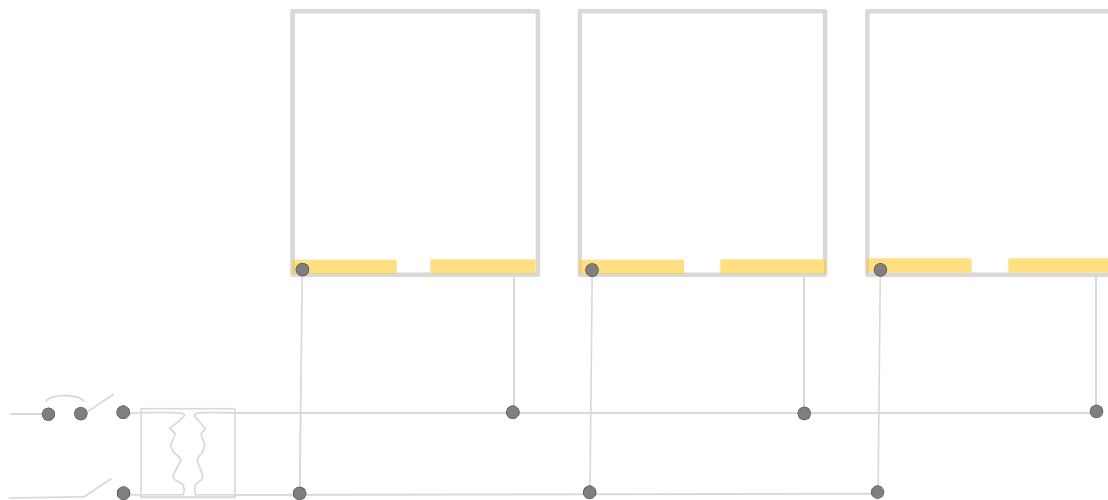
DO NOT ATTEMPT TO INSTALL THE SWITCHGLASS PANELS ON A LIVE CIRCUIT

- It is important not to exceed the maximum Square Metre Area Power Limit of the provided transformers (Model Nos HBW-65 ($\leq 5\text{m}^2$), 0350-4-065 ($\leq 25\text{m}^2$) or 0500-20-065 ($\leq 38\text{m}^2$))
- Switchable Privacy Glass panels may be installed in either a residential or commercial environment. **Install only on a GROUNDED 240VAC circuit protected by 10A fuse or breaker. The circuit must also be protected by a ground fault circuit interrupter (GFCI).**
- Switchglass standard power module circuitry is rated for a maximum continuous output of 1 Amp. If the installation requires the operation of more than 5 square metres of glass surface from a single switch, the switch lines from multiple transformer modules may be ganged together.
- Installing a single pole switch on the switch wires is considered standard, however remotes can be used.
- Do not connect any other devices or products to the output of the Switchglass transformer.
- There are no serviceable parts or replaceable parts within the Switchglass power supplies.
- Approved regulated transformers should not exceed 65VAC output (in the case of our Extra Low Voltage Transformer the figure is 36VAC).
- Caution must be taken to prevent damage to Switchglass provided wiring or wiring insulation. Do not seat the Switchable Privacy Glass panel on Switchglass provided wiring.

BUSBAR WIRING OPTIONS



NOTE: Edges where the busbars are placed must be covered by minimum 12mm (recommend 18mm)



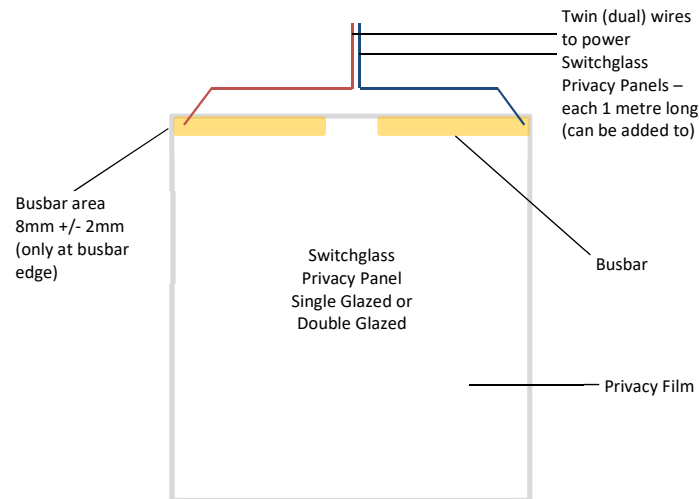
Notes – Fuse Checking or Changing

- Use care when opening the transformer and allow a few minutes to cool down. Internal electronic parts may be very hot. This is normal.
- WARNING – Do not substitute a higher fuse rating! Fuse rating is critical to properly protect Switchable Privacy Glass panels and the transformer.

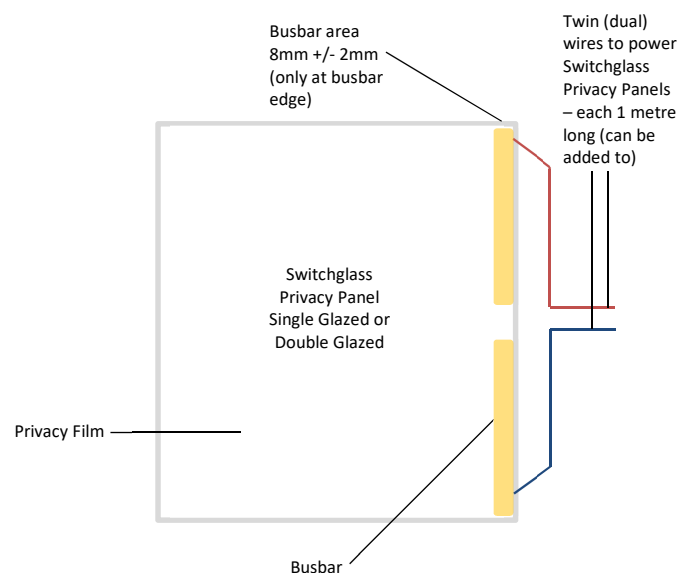
BUSBARS – SINGLE GLAZED OR DOUBLE GLAZED UNITS

Allow at least 12mm edge cover over busbars (recommended 18mm)

Busbar on one short edge

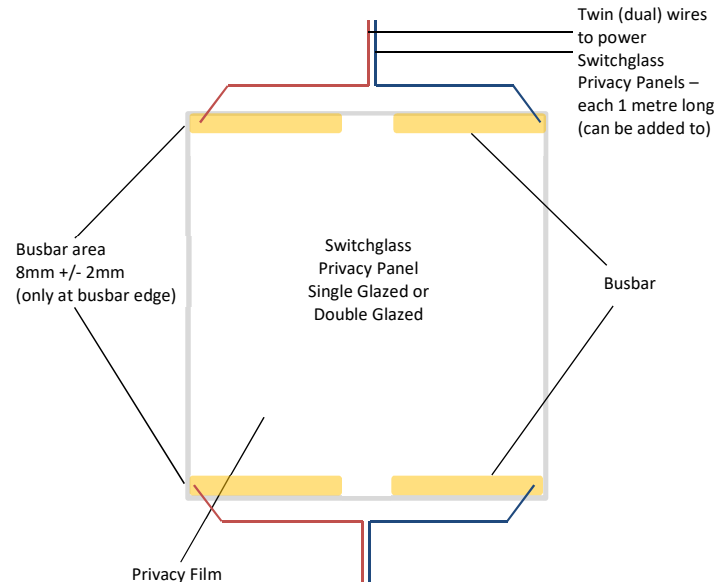


Busbar on one long edge

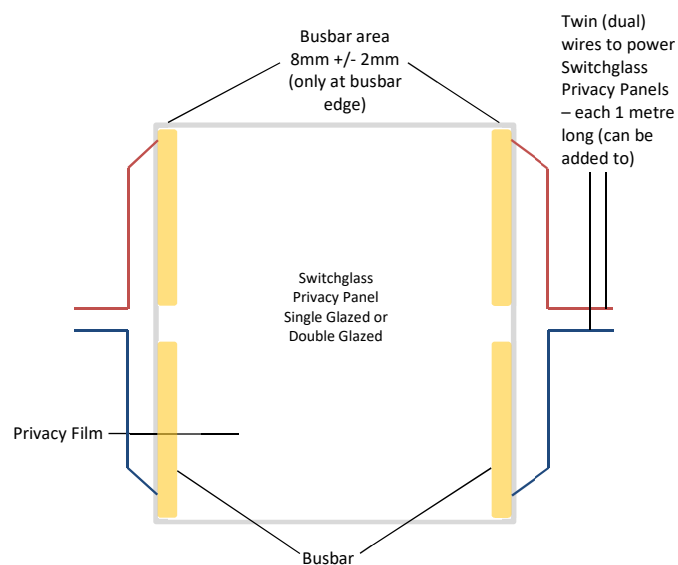


Allow at least 12mm edge cover over busbars (recommended 18mm)

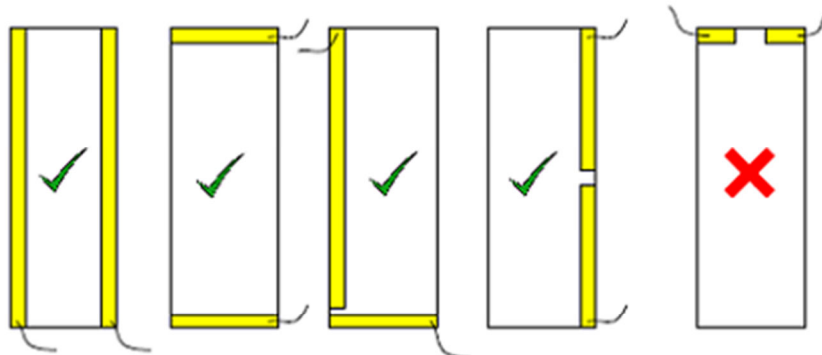
Alternative Busbar Solutions – Two Short Edges



Alternative Busbar Solutions – Two Long Edges

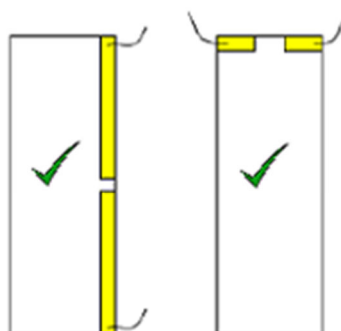


Acceptable Positioning of Busbars on Switchable Privacy Glass Panels



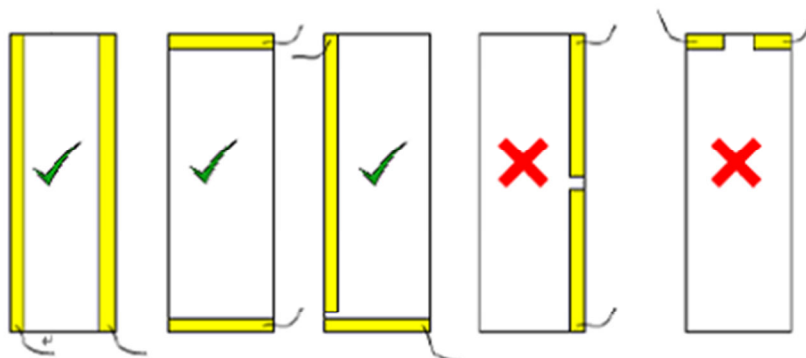
**Where the size ratio is over 1:4
(e.g. 300mm x 1500mm)**

- Busbar **MUST NOT** be applied along one shorter edge only.
- Busbar can be applied along one long edge only, or on any two edges.



Where the size ratio is under 1:4 (e.g. 821mm x 1952mm)

- Busbar can be along any one edge.



**In the case of our maximum size
1820 x 3500mm**

- Two busbars **MUST** be applied.
- The two busbars can be on any two edges

TRANSFORMERS AND WIRING

Wiring Parameters (Transformer to/from Panel)

Maximum panel distance for copper wires of the following thicknesses (from transformer to panel)

Wire Thickness	P/N LHA-666501000SA (65V @ 1A)	P/N 0350-4-065 (65V @ 5.38A)	P/N 0500-20-065 (65V @ 7.69A)
1.5mm ²	400m	75m	50m
0.7mm ²	200m	35m	25m
0.5mm ²	100m	25m	16m

Panels placed outside the maximum distances from the transformer (as stipulated above) will require another, separate transformer, or thicker wire.

Switchglass Transformers

Single Outlet Transformer

Model No LHA-666501000SA

Dimensions	130(L) x 90(W) x 70(H)mm
Plug Cord	1700mm
Switch Cord	1750mm
Total Length	3580mm
Input	240VAC
Output	65VAC 1A

This transformer is able to power up to 5 square metres of glass and given all panels are placed within the maximum distance to the transformer (refer table above), a junction box may be used to more economically or tidily wire the panels. Advice should be sought for the correct AWG wire thicknesses.

A typical allowance would be 1 transformer per Switchglass panel, allowing optimum performance and individual panel operation.

Fuse housed in single outlet transformer is 1.25 Amps.

Single Outlet Transformer Model No LHA-666501000SA



Multiple Outlet Transformers

Four Outlet Transformer Model No 0350-4-065

Powers a total glass area of 25m²

Dimensions 230(L) x 140(W) x 75(H)mm
 Plug and Cord lengths to suit (nominal
 plug/input cord 1.8m)
 Input 240VAC
 Output 65VAC 5.38A



Twenty Outlet Transformer Model No 0500-20-065

Powers a total glass area of 38m²

Dimensions 240(L) x 150(W) x 125(H)mm
 Plug and Cord lengths to suit (nominal
 plug/input cord 1.8m)
 Input 240VAC
 Output 65VAC 7.69A



NOTE

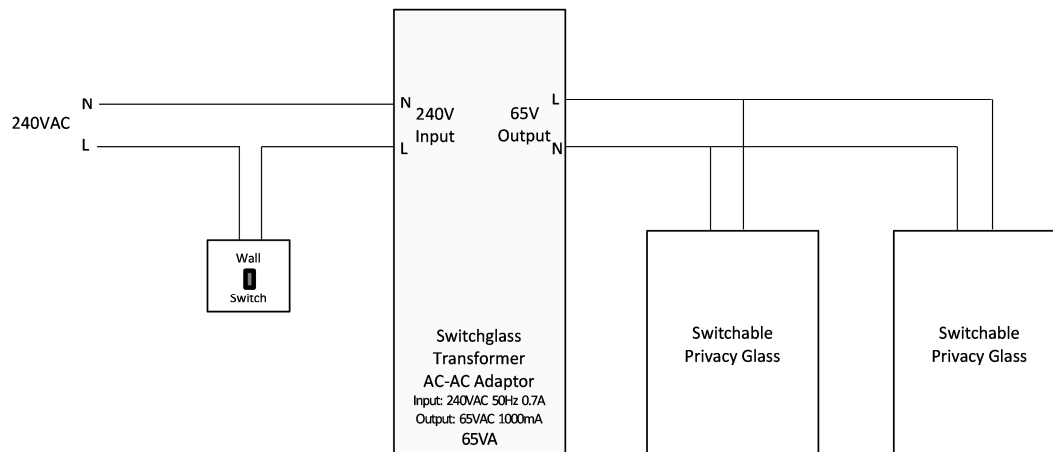
- Transformers must be accessible because they contain a replaceable circuit-breaker fuse within the housing.
- Fuse housed in multiple outlet transformers is 1.6 Amps (slow blow).
- Switchglass warrants its transformers for a period of two (2) years. They are CE Certified.

Extra Low Voltage 36VAC Transformers

To be used in Switchglass panels incorporating 36VAC PDLC Film for Operable Walls, Stackable or Bi-fold Glass Doors

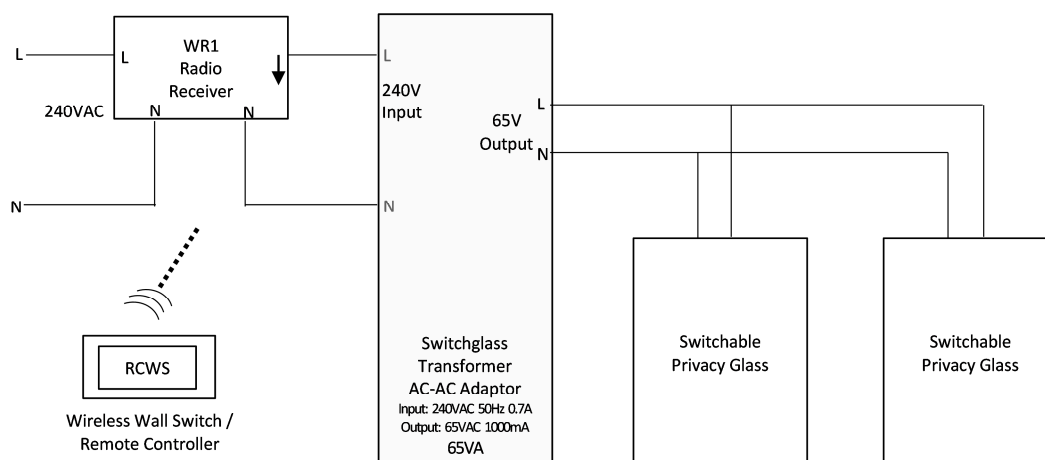
- Reduces 230VAC/240VAC to an output of 36VAC and 1500mA.
- Maximum extra low voltage panel size is 1524mm x 2540mm.
- Powers up to 5m² of glass.

Wiring Single Outlet Transformer (Model No LHA-666501000SA)



Switchglass 65VAC Transformer (240VAC to 65VAC) (130 x 90 x 70mm): 1 required per switchable area up to 5m².
PLEASE NOTE: The Transformer has a built-in fuse and must be located in an accessible position.

Wireless Wall Switch / Remote Control Wiring Diagram



Switchglass 65VAC Transformer (240VAC to 65VAC) (130 x 90 x 70mm): 1 required per switchable area up to 5m².
PLEASE NOTE: The Transformer has a built-in fuse and must be located in an accessible position.

WIRING MULTIPLE-OUTLET TRANSFORMERS

For multiple-panel installations Switchglass can provide single, multiple-outlet transformers to suit your requirements.

4 Outlet Transformer (Model No. 0350-4-065)

Has the potential to power a total area of 25m² of Switchable Privacy Glass.

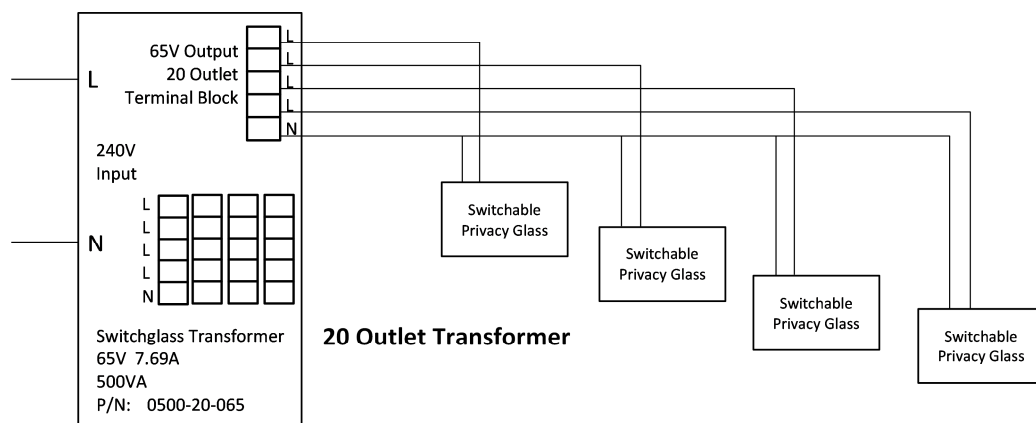
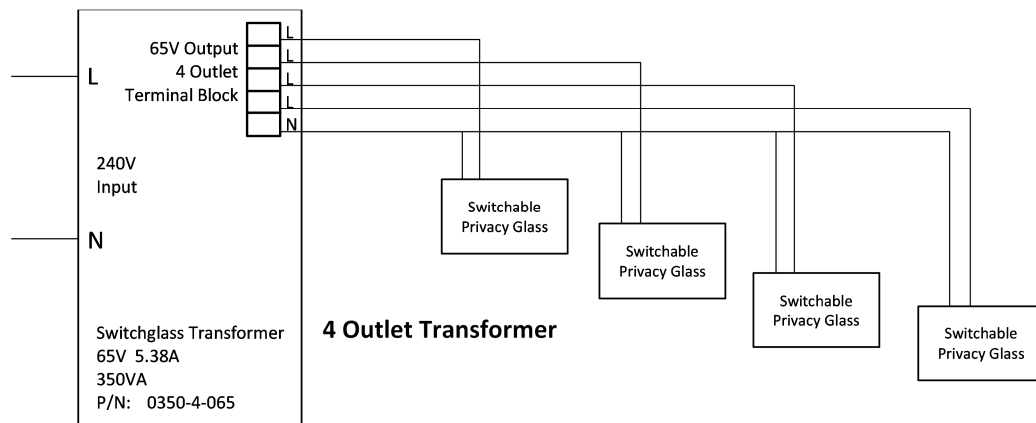
20 Outlet Transformer (Model No. 0500-20-065)

Has the potential to power a total area of 38m² of Switchable Privacy Glass.

- Each outlet can take a maximum 16AWG wire.
- A remote control unit and wireless receiver may be installed as per our Single Outlet Transformer Diagram in the Wiring section of this manual.

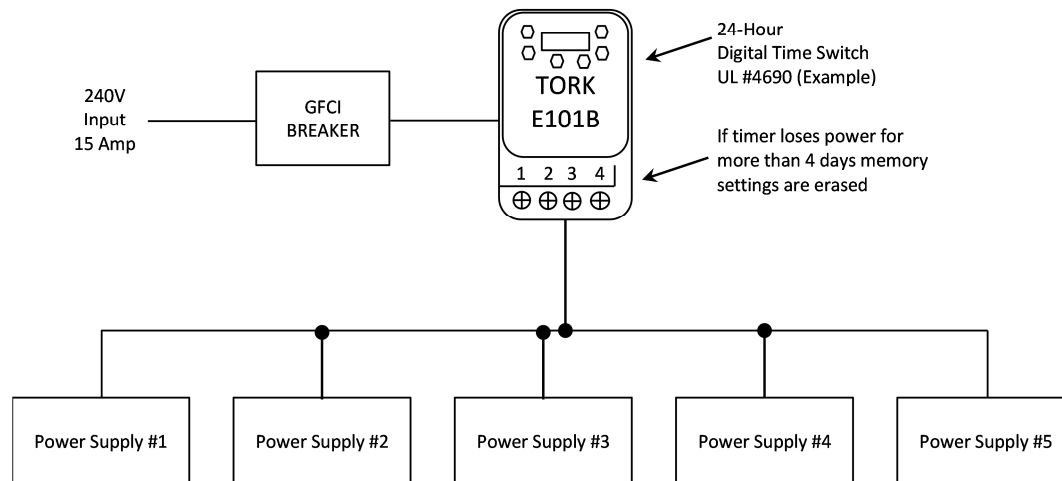
NOTE

Transformers must be accessible as they contain a Fuse within the housing.



REPRESENTATION OF BASIC TIMER AND POWER SUPPLY HOOKUP

Some Timers may be used for up to 20 power supplies



TROUBLESHOOTING

CAUTION: Switchable Privacy Glass operates at a maximum of 65VAC and 50Hz. Higher voltage and frequency may cause permanent damage.

Troubleshooting and electrical service must be performed by a Certified Electrician who has read and understood this document.

Switch the power ON. Verify that the panels turn clear. If one or more Switchable Privacy Glass panels are not operating:

1. Check the circuit breaker to verify power. If there is no power from the circuit breaker, reset or replace the circuit breaker.
2. Check the wall switch to verify power. If there is no power from the wall switch check the connection or replace the wall switch.
3. Check input to the power supply of affected panels to verify power. If there is no input power to the transformer, check the wiring between the wall switch and the transformer.
4. Check output from the transformer to the affected panels to verify power. If there is no output power from the transformer, the fuse may have blown. Replace fuse with the same size and specifications which is available at electronic supply stores.

SHIPPING AND RECEIVING

SHIPPING

- Domestic customers: Unless a preferred carrier is requested or nominated, Switchglass will transport the Switchable Privacy Glass panels through a common logistics ground carrier.
- Overseas customers: It is necessary to specify whether the freight should be shipped via Air or Sea. Where available, it is recommended to have your own agent take care of the shipping and customs clearance issues.
- Unless otherwise stated, Switchglass pricing includes all Packaging, Crating, Freight and Insurance.

RECEIVING

- Before signing for and accepting the shipment from the carrier, inspect the crate(s) for the following items:
 - Inspect crate(s) for damage.
 - Check Tip 'N Tell indicator where used.
- If there are any indications of possible damage, you should immediately, in the presence of the carrier, open the crate(s) and inspect each Switchglass Privacy Glass panel for damage. If you fail to inspect the shipment, neither the carrier nor Switchglass will be held responsible for damage that becomes apparent at a later time.
- If damage to any of the panel or panels is found, the shipping documents should be so noted and the driver's signature obtained as a witness. You should inform Switchglass immediately of any damaged panels. Photographs should be furnished. A freight claim should be filed to the carrier as early as possible.

STORAGE

- Glass edges frequently sustain damage due to careless handling at some point between manufacture and installation.
- Handle with care!
- If the 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, Switchglass product must be stored where the relative humidity is less than 80% to prevent the glass from staining.
- The glass temperature should be held nearly constant to prevent moisture or condensation on the panels. Storage temperature range is - 20°C to 70°C.
- The crate of panels should be kept in an upright position, or the panels tilted at 5° to 7° from vertical at all times using broad, sturdy uprights to support the weight of the glass.

"UNEXPECTED" BREAKAGE

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

- Thermal stress.
- Damage during sand blasting (if not performed by Switchglass).
- Glazing system pressures.
- Damage during glazing.
- Handling and storage problems.
- Excessive wind loads.
- Objects and debris striking the glass.
- Damage by persons/objects at the construction site.

STANDARD WARRANTY

- Switchglass (the Manufacturer) provides a two (2) year standard warranty (or as agreed on quotation and specified on the Warranty Certificate (refer "Note A)" below) of the Switchglass™ panel (the Product) to the purchaser (the Customer) against electrical failure and/or delamination of material or product failure because of workmanship. The Manufacturer is not liable for any damages or costs associated with improper storage, installation, hardware or usage of the Product.
- The Manufacturer warrants that the electrical component of the Product, being the transformer, shall be free from electrical defects that prevent operation of the Product for a period of two (2) years from the date of manufacture. (Note: The transformer contains a replaceable fuse.)
- Limitations:
 - a) If the Product is not installed in accordance with all the Manufacturer's recommendations and by qualified glaziers or electricians as recommended in the Manufacturer's TECHNICAL INFORMATION & INSTALLATION GUIDE the warranty will be null and void.
 - b) In the event of failure of the Product switching due to incorrect installation of the electrical supply, the customer must provide a copy of the electrical installation certificate relating specifically to the installation of the Product which meets all local legislation, regulations and codes of practice.
 - c) Delamination shall not be considered a manufacturing defect under this warranty unless:
 - i) it becomes apparent prior to installation; or
 - ii) visibility is no more assured.
 - d) Delamination on the edge of the glass will be permitted in the case of penetration of humidity into the PVB interlayer of operable side door glazing (polished edges).
 - e) If bubbles appear within the interlayer as a consequence of temperatures in excess of +65° Celsius, the warranty will not apply.
- The Manufacturer, in its discretion, may elect either to replace the Product at no cost or refund all or a prorated portion of the Customer cost based on the useful life of the Product. The Customer agrees to assume all financial responsibility for removal of old Product and installation of new one. The Manufacturer is not liable for any labour or transport costs associated with removal of old, or installation of new Product.
- It may be required that the panel or panels designated as defective or faulty be returned to the Manufacturer for analysis. The cost and onus of freighting the panel or panels to the Manufacturer will be at the expense of the Customer and due care must be taken in its packaging and handling.
- These remedies are the exclusive remedies available under this warranty. The Manufacturer is not liable for any consequential, liquidated, exemplary, or other damages that might result from any product failure of the Product.
- The Manufacturer is not obligated to honour any part of the above warranty or provide further service until full payment for the Product, as ordered, has been received.
- Non receipt of the signed Warranty Certificate will render the warranty null and void.

For this warranty to be valid, the Product must be in the OFF state (opaque) for a minimum of 4 hours every 24 hours. Switching ON and OFF daily is encouraged to ensure that the Product remains functional. Timers are strongly recommended.

NOTE

- A. An Extended Warranty Period of up to five (5) years is available upon negotiation.
- B. The Customer must make themselves fully cognisant of the Manufacturer's TECHNICAL INFORMATION & INSTALLATION GUIDE prior to the installation of the Product.
- C. If the Product is to be subjected to prolonged, excessive exposure to heat – particularly direct sunlight, the Customer should consider that the Product be constructed with Low E glass. Otherwise, such a situation could be deleterious to the PDLC film and may render the warranty null and void.
- D. If the Product is intended to be installed where it will be subjected to excessive moisture (wet glazing) then it is imperative that all the edges of the Product be properly sealed prior to framing with the appropriate tape and non-acetic, neutral silicon sealant as stipulated in the Manufacturer's TECHNICAL INFORMATION & INSTALLATION GUIDE. Failure to comply with this will render this warranty null and void.

Please refer to the following link for any updates or changes to the conditions of the warranty:

www.switchglass.com.au/knowledge-centre/

YOUR ASSURANCE – OUR TEAM, OUR QUALITY STANDARDS AND MANUFACTURING

Switchglass is the leading manufacturer of switchable privacy glass in Australia. We are the manufacturers of Switchglass™ PDLC privacy glass. Our experience and product knowledge enables us to inform you better and to be able to give sound, measured advice on all its aspects. Our investment in leading-edge technology, plant and equipment and a dedicated team of glass specialists enables us to provide you with service of the highest standard.

Switchglass Privacy Glass is a Grade 'A' Safety Glass. All Switchglass products are manufactured to AGGA standards and the product tested after its manufacture. All stages of the production process are precisely monitored and controlled.

We are able to:

- Incorporate various types of glass in shapes, curved, notched, cut-outs or with holes.
- Manufacture special product: bullet resistant Switchable Privacy Glass, fire-resistant Switchable Privacy Glass or polycarbonate panels

DELIVERY

We pride ourselves on the reliable and efficient delivery service we use. Getting your order to you on time is of paramount importance.

COMPANY BACKGROUND

Switchglass is a wholly-owned subsidiary of Secure Glass (established in the early 1990s) and was formed to better meet the ever increasing demand for the select range of electric glass products. To this end, Switchglass has invested in specific expertise, marketing and specialised equipment which enable the company to provide a premium service to our customers.

Switchglass now has a live display of some of their leading products on the ground floor ramp at Home Base Expo in Subiaco, Perth, Western Australia.

APPLICATIONS

COMMERCIAL

Meeting rooms, conference rooms, operable doors and windows, office partition screens, executive offices, doors, sliding doors, skylights, tradeshow exhibits and command centres.

HOTELS AND RESTAURANTS

Hotel room privacy partitions, bathroom/bedroom privacy screen, external windows, doors, conference centre windows and skylights, bar and restaurant screens, toilet cubicles, balustrades and balconies.

PROJECTION (REAR PROJECTION ONLY)

Internal or external high resolution rear projection screens. The projector should be 1 to 3 metres away and slightly inclined for optimal resolution.

RESIDENTIAL

Bathroom dividers, operable doors and windows, projection screens, doors, sliding doors, skylights and as a replacement for blinds or curtains.

SECURITY

Security windows (incorporating bullet resistant glass), bank cashier window and automated teller security windows, vision panels, entrance foyer and cell doors and windows.

ENTERTAINMENT, SHOWROOMS AND DIRECTORIES

Rear projection screens, feature screens, special effects panels and vanity screens.

HEALTHCARE

Hospital (nursery, emergency, ICU, operation room), clinics, fire-resistant doors, privacy/restrictive viewing areas.

RETAIL

Advertising projection screens and changing rooms.

EXECUTIVE CARS

Privacy screens and as a security solution.

MANUFACTURING

GLASS CONSTRUCTION

Can be constructed with:

- Tempered glass
- Fire resistant glass
- Bullet Resistant glass
- Security glass
- UV tinted glass
- Low E glass
- Coloured glass

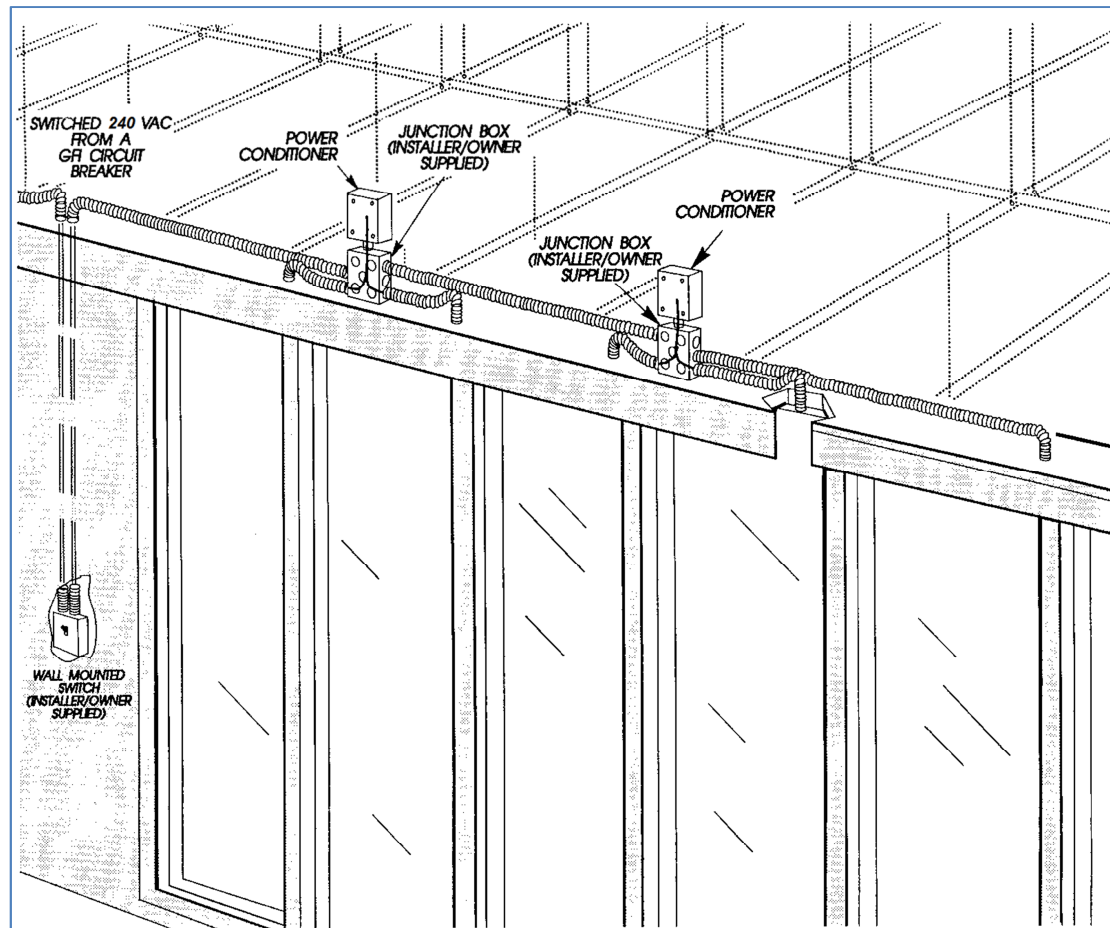
GLASS PROCESSING

Switchglass panels can be pre-processed as follows:

- Cut to shapes
- Drilled
- Edges-ground and/or polished

APPENDIX A

EXAMPLE OF OPERABLE GLASS WALL WIRING



APPENDIX B

HAZE

Clarity and Lighting

The following demonstration photos relate to a conference room setting. They illustrate the best and worst lighting effects.

Note the exterior lighting's reflection in the glass.



1. Worst Lighting Conditions

Lights that are only on the outside of the conference room will cause an imbalance in light intensity. This will increase the haze.



2. Better Lighting Conditions

Lights on the outside of the conference room are higher in intensity than on the inside. This will result in a slight haze.



3. Best Lighting Conditions

Lights on the inside of the conference room and outside are evenly balanced in intensity and sufficiently diffused at appropriate distances.



4. Low Haze In Dark State (all lights 'off')

No lights on the inside or outside of the conference room will result in little haze.

HAZE CONSIDERATIONS

All glass, under certain light conditions, will reflect images and at times be difficult to see through clearly. This will sometimes be more obvious when the glass is viewed from an angle. The same applies to your Switchable Privacy Glass panels.

Additionally, the PDLC film within its PVB layers in this laminated glass product manifests a slight haze in its 'on' state, and more so when viewed at an angle.

To minimise this effect and to get the best out of your product, it is important that you, your Architect or Designer should consider the ambient and/or artificial lighting adjacent to the panels prior to its installation as per the image suggestions under "Haze – Clarity and Lighting" within this section.

FOR CONSIDERATION BEFORE PLACING YOUR ORDER

- Very small bubbles and /or visual distortion MAY be present on clear / non switchable areas around notches, holes or cut outs, therefore customers must provide for / allow coverage of 10mm around all notches, holes or cut outs.
- A clear / non switchable area of 5mm around the perimeter of Switchglass panels may be observed. This is not a fault with the product.
- Once glazed, Switchable Privacy Glass panels must be switched off (in opaque state) for a minimum of 4 hours a day to avoid damage to the panel.
- Maximum size of standard film is 1520mm x 3000mm. Maximum size of oversized film is 1820mm x 3500mm. Any dimension over standard film size will incur an oversize charge.
- Please note there is always an element of haze in all smart type PDLC switchable privacy glass products, even in its transparent state. Please ensure that this level of haze is acceptable to you before ordering as this will not be considered or constitute a reason for rejection or refund once the goods have been manufactured.
- All panels are supplied with 1m low voltage wires attached to each busbar as standard. The length can be added to, but must be specified when you order. This may affect your price.

SUPPLEMENTARY INFORMATION

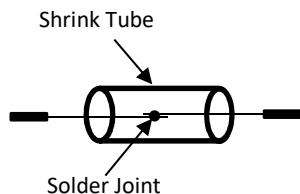
HOW TO CONNECT SWITCHGLASS TO TRANSFORMER

Your Switchglass Panel comes with wires of opposing polarity - coloured black and white, they are twin or dual wires.

Twist the two black ends together and the two white ends together.

The twin black and white wires are not "polarity conscious", nor are the black wires exiting from the transformer.

Connect twin black wires from Switchglass Panel to one of the single wires exiting from the transformer and the twin white wires to the second single wire exiting from the transformer.



All connections must be soldered and sealed with shrink tubing. Wires can be extended with 18 AWG wires

Link to YouTube:
How to Connect Switchglass to Transformer
<https://youtu.be/B790NN0d6pw>

Twin black wires exiting from Switchglass Panel

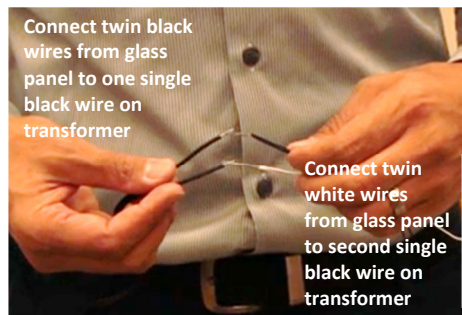
Twin white wires exiting from Switchglass Panel



1



2



3



Switchglass panels must be turned off for a minimum of 4 hours every 24 hour period

CAUTION – READ THIS FIRST

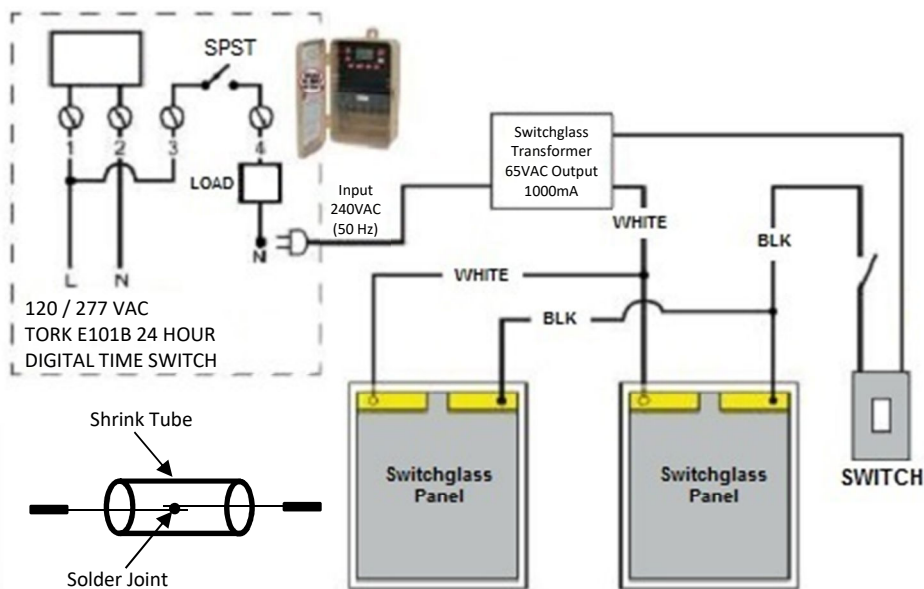
- It is critical that customers inspect the goods in the presence of the freight delivery driver.
- If you fail to inspect the goods the Carrier and Switchglass will not be responsible for damages.
- Inspect each panel of glass for damages.
- Check packing slip for quantities of glass panels and power supplies.
- Switchglass panels must be stored where the relative humidity is less than 80% to prevent glass from staining – refer to Switchglass Technical Manual for additional installation cautions and information.

USE ONLY NON-ACETIC SEALANTS

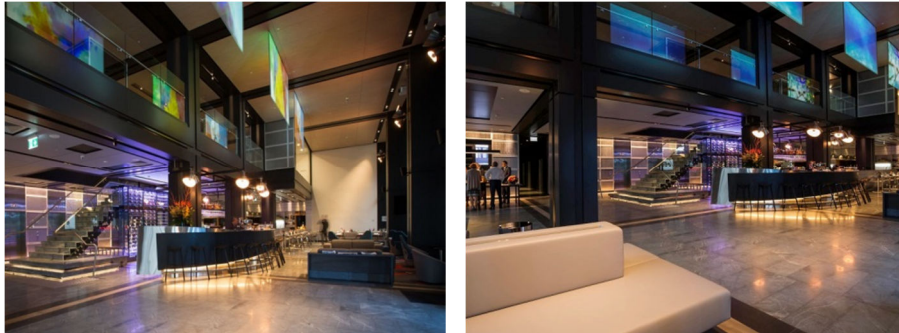
- GE SSG4000
- Rhodorsi 3B (Rhone-Poulenc)
- Dow Corning 399, 795, 991, 995, 1199
- Schnee-Morehead SM5731

TIMERS ARE HIGHLY RECOMMENDED

(diagram shows wiring using a timer or without a timer)



All connections must be soldered and sealed with shrink tubing. Wires can be extended with 18 AWG wires.



SWITCHGLASS AS A REAR PROJECTION SCREEN

Your Switchglass panels can be used as a rear projection screen.

In its opaque 'off' state Switchglass makes an excellent high-resolution rear projection screen for video presentations or movies, and provides remarkable image clarity.

The projector should be 1 to 3 metres away and slightly inclined with room lighting dimmed for optimal resolution - as per standard film presentation.

Care should be taken NOT to turn the Switchglass panel 'on' during projection as the projector's light beam may injure the eyes of viewers.

Front projection is not suitable for Switchglass because the image will be blurred.

Link to:
Case Study – Pullman Hotels
www.switchglass.com.au/case-study/pullman-hotels/

Example of Rear Projection

