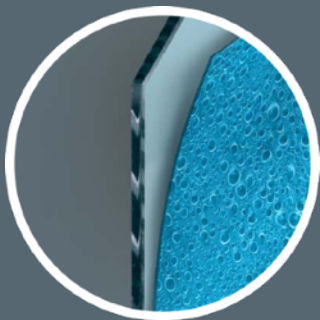


# INNOPTEC

INNOVATIVE OPTICAL TECHNOLOGIES

## Adheasy® FILM



Self-adhesive  
liquid crystal - smart film

ENGLISH

Self-adhesive film [General specifications - V. R7]

## ■ Chapter 1

# Construction Parameters

The film consists of a PDLC switchable film having one side **capable of dry adhesion on glass** or to other transparent substrates.

The adhesive Film is removable without leaving residues on surfaces.

Total Thickness
580 (+/-10) $\mu\text{m}$

Dimensions	
Maximum Width of the active area	1800 mm *
Length of the active area	as standard from 1000 to 3500 mm

\* 1800mm film is available in limited stock and only for the white color. For large projects, longer processing times will be required.

## ■ Chapter 2

# Electro-optical Properties (20 °C) – Average values

Off-state	
Total transmission	55 % (+/- 5%) (Grey version: 30%)
Direct transmission (1° collecting angle)	< 1 %
Lab*	85/0.5/3.9 (Grey version: 63/-1.7/-5)

On-state (60 VAC, 50 Hz, sine wave)	
Total transmission	85% (Grey version: 50%)
Haze	4%
Off-axis haze (45°)	13%
Lab*	89/0.7/3.9 (Grey version: 68/-1.2/-2.6)
Power Consumption	3 - 5 W/m <sup>2</sup>

Response Times	< 0,1 sec
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## ■ Chapter 3

# Operative ranges

### Operating Voltage

60Vac (NZ version)  
45Vac (NK version)

(50 Hz, sine wave)

*Max: 65Vac (50Hz, sine wave)*

### Use Temperature Range

from -20° to +60 °C

## ■ Chapter 4

# Electrical bus bar application

### Standard application

Electrical bus bars are usually placed on one edge of the sheets.

Alternative bus bars positioning are possible.

**Innoptec** will propose you the most appropriate set up in terms of effectiveness and safety.

# Technical and overall specs 1/3

**Innoptec** manufactures a self adhesive electro-optical film to be used in the architectural field (for interior, or slightly exposed positions if not protected). Please refer to Innoptec for advice in case of exterior use or when on insulating glasses . All film is preliminary electrically tested before shipment.

## ■ 1\_Product supply conditions

### Dimensions

Innoptec self-Adhesive Film is supplied as “ready to apply sheets”, cut on customer requested dimensions. Innoptec carries sufficient inventory for quick deliveries.

### Quality release limits

Inspection conditions:

- **Distance** = 1 m - perpendicular view
- **Lighting**: 300 – 500 Lux / white light (400-700 nm)
- **Inspection time**: 10 seconds per sqm.

Single spots smaller than 1 mm are considered acceptable.

Other optical non uniformities are not considered defective if they result invisible at above inspecting conditions.

### Electrical connections

The connection of the sheet contacts to the line needs to be made by a professional electrician. Sheets cut to particular rectangular or other shapes can also be supplied on request, at a case by case pricing.

### Voltage Drivers/Transformers

The Innoptec self-Adhesive film works at 60 or 45Vac/ 50Hz. We can supply different types of transformers (to be referred to EU area, made according European standards (CE) and to be used where the voltage line is 220-230 Vac-50Hz sine wave). Different driving solutions are also available on request (remote control – dimming - etc.).



### Note

- Voltage Stabilizer (UPS systems): In cases when there is risk of line voltage peaks it is advisable to place an UPS system upstream the transformer.
- The voltage input to voltage systems must have a DC component lower than 1 Volt.
- No switches have to be connected on the wires that join the film to the secondary output of the transformer.
- Although our stress test indicates that the film can tolerate long periods in on-state without any problem, we recommend to keep the film in off-state for half an hour, after 8 hours of continuous on-state operating.

# Technical and overall specs 2/3

## ■ 2\_Notes for film handling and application of self-Adhesive film on existing glasses or transparent supports

### Premise 1

This procedure represents the best suggested practices, not a guarantee, for proper use of our film to limit risks of possible failures.

The **self-adhesive film** application requires some skills and practice.

So we highly recommend to have some preliminary trials made with small samples provided by Innoptec before approaching big sheet film application.

The adhesive process is dry and is based on a slight peel adhesive (“Gecko” effect) which allow fast removing and new application in case of air bubbles or dust particle to remain entrapped.

### Premise 2

Surfaces of **self-adhesive film** are externally protected by two masking release sheets.

One release film covers the adhesive surface of the film (R\_AD).

Adhesive surface will be applied on glass surface.

The other one covers the exposed external surface of the film (R\_ES).

### Premise 3

The **self-adhesive film** application can be highly affected by dust contamination.

So all possible actions to clean all surfaces and minimize dust contamination are highly recommended as dust particles between film and glass can negatively affect final result.

# Technical and overall specs 3/3

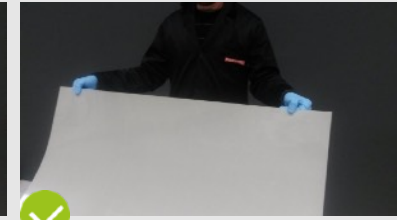
## 3\_Application of self-adhesive film to glass

Un-package the film and place on a cleaned flat plane or table.

**⚠ Note:** Don't fold the film. In case of film folding film could be irreversibly damaged. During film handling, take care to avoid bad curvature of the film as reported in figures below.



Handling Not OK



Handling OK

Before any process double-check if film size perfectly matches with glass size you want to cover. For this purpose use a measuring tape or place (if possible) the film on glass to check the proper fitting.

**⚠ Note:** self-adhesive film application on glass will be processed from glass top to bottom. Other approaches (left to right or right to left or from bottom to top) are not suggested.

In following figures are reported the tools requested for film application. If requested tools can be included in the film package.



A



B



< Gloves without powder

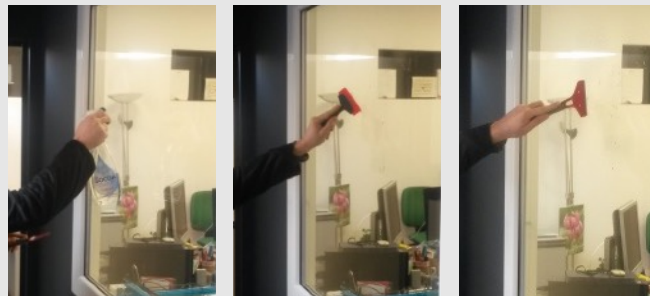


# ⚠ Note! 1/3

**Do not use water to clean the film or glass. We strictly recommend to use isopropyl alcohol.**

## STEP 1

**Glass cleaning** – see figures here below. Clean the glass with alcohol. Remove excess of liquid by using toll “A”. Then by using the blade tool “B” remove all possible particles attached on glass. After using the blade, clean again the glass with isopropyl alcohol. Leave the glass completely dry. No water or alcohol rests must lay on glass before film application.



## STEP 2

**Film cleaning** – Without removing any release film, clean R\_AD and R\_ES surfaces of the film. The cleaning of R\_AD is particularly important as dust particles on this face can again contaminate the glass surface during the application process.



# ⚠ Note! 2/3

**Do not use water to clean the film or glass. We strictly recommend to use isopropyl alcohol.**

## STEP 3

**First film fitting** – Peel off just 3-4 cm top side of R\_AD to uncover adhesive surface to be stuck on glass. Keeping the release film fold down behind the switchable film (between glass and self-adhesive film), apply on glass this first side of the self-adhesive film. Remove air bubbles with the soft spatula “C” from middle to left and right edges of the panel. In case you can easily but carefully detach part of the film already attached to remove some possible air bubbles or particle dust.

C



## STEP 4

**Film application** – After application of first 3-4 cm, process with downward removing of the R\_AD in steps of 4-5 cm and assure sticking without air bubbles and dust particle by using the spatula “C”. This step must be repeated down to the bottom side of the film and complete film application.

## STEP 5

**Edge sealing** – We recommend sealing the perimeter of film with a thin layer of neutral silicone to prevent the film from being degraded by moisture or chemical agents.

# ⚠ Note! 3/3

**Do not use water to clean the film or glass. We strictly recommend to use isopropyl alcohol.**

## STEP 6

**R\_ES release film removal**– Before silicone drying, carefully remove the R\_ES masking film. During this release film removal, pay attention to avoid to be contaminated by silicone residues.

## STEP 7

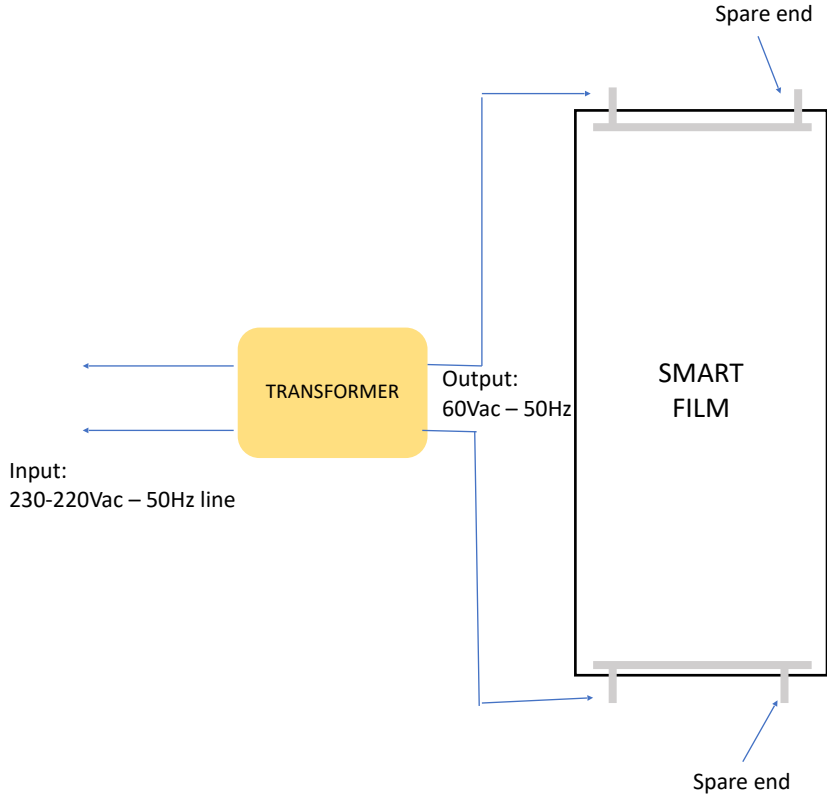
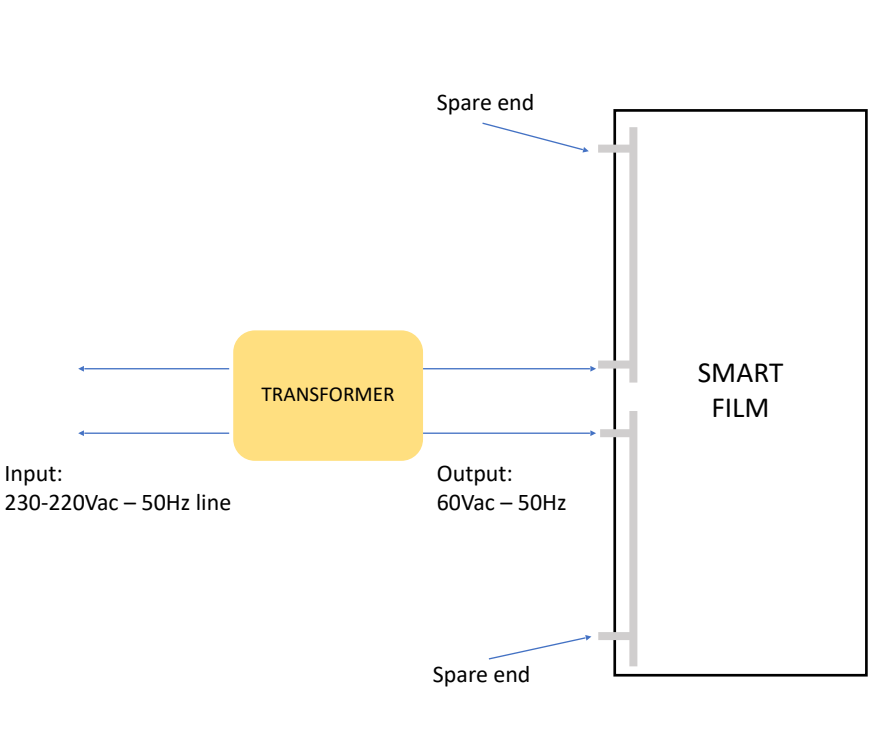
**Electrical contact** – Now film is ready to be electrically connected by soldering of wires to bus-bar ends and complete connection to electrical transformer.

## ⚠ Warnings!

- All electrical connections of self-adhesive film to 60 or 45Vac electrical voltage driver and this driver to 220Vac line must be performed according the local regulations and by qualified personnel. Innoptec cannot take responsibility for material and/or personal damages suffered by LPF film user employees, and/or customers and/or any third party (including application patent holders) involved in the use of our product. Innoptec will be kept harmless of any liability and possible request of indemnification claimed against the LPF film user parties as above specified.
- In case of film surface cleaning, before and after film application, it is mandatory to avoid rough manual actions and use anti-scratch clothes slightly wet with Ethanol, as reported on “Step 2” and in the following picture.



# Wiring diagram examples

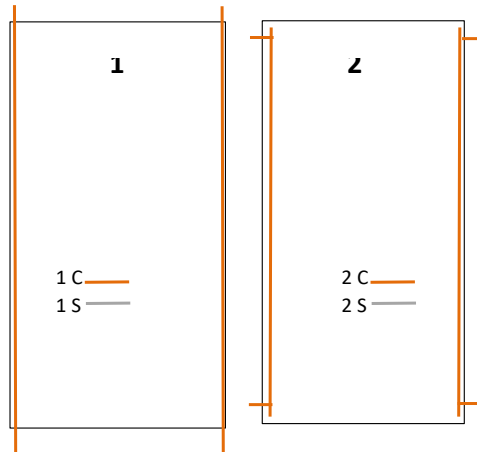


**NOTE:** Each busbar has two ends. Wire can be joined on only one of them. The other one end is a spare end.

# Busbar sketch list 1/3

Busbars can be realized in two different tape colors

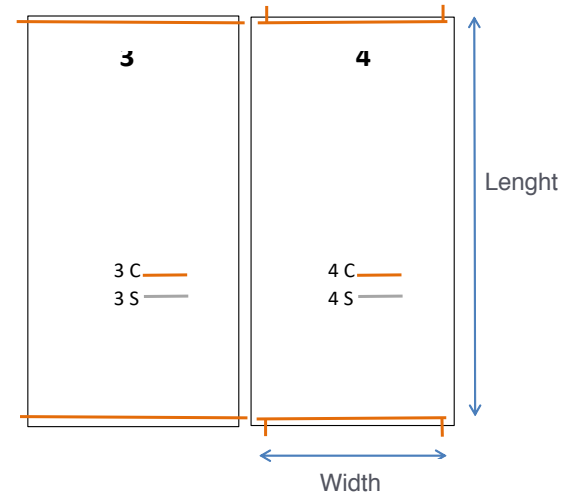
On both long edges  
Max lenght =  
5000 mm



Copper — (orange)

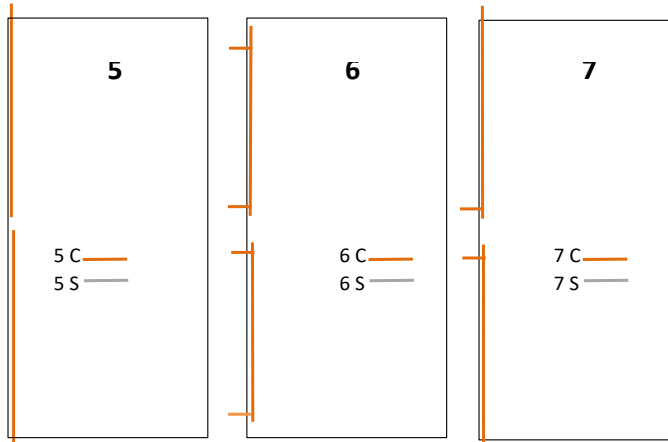
On both short  
edges  
Max lenght =  
3200 mm

— (grey) or Tinned copper



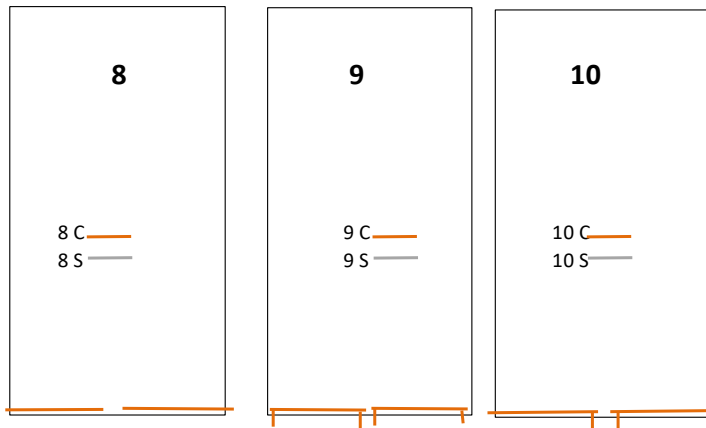
# Busbar sketch list 2/3

On one long edge  
Max lenght = 2700  
mm

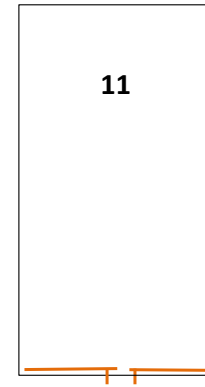


# Busbar sketch list 3/3


On one short edge  
Max lenght = 2700  
mm





For A3/A4  
samples



## ■ Safety Information

 **IMPORTANT:** Please read these instructions fully before installing or operating

 **IMPORTANT:** Installation must be made by qualified personnel.

 **IMPORTANT:** Innoptec liquid crystal film must be driven with CE marked transformers with a maximum output voltage of 60Vac.  
All Innoptec transformers have the following safety features:



- Short-circuit and Overload protection
- Insulation **Class II**



- **CE Mark**



- 2006/95/CE – (LVD) LOW VOLTAGE DIRECTIVE of 12/12/2006
- 2004/108/CE – (EMC) ELECTRO MAGNETIC COMPATIBILITY
- 2006/42/CE – MACHINE SAFETY

Furthermore, they comply with the following directives:

- EN 61558-1 Safety of transformers, reactors, power supply units and combinations.
- EN 61558-2-4 Particular requirements and tests for isolating transformers and power supply units incorporating isolating transformers for general applications.
- Wiring and electrical connections must be made by qualified personnel according the local regulations.
- Periodically check the good condition of the cables and connections.
- After installation electrical connections and perimeter of film must be sealed to prevent any type of short circuits.
- Use only neutral silicone sealants.
- Keep a safety distance of 2-3mm from the edge of the film to the frame of the installation surface specially with metal frames.
- Do not use water or liquids with solvent on the liquid crystal film.
- Before cleaning, unplug main power of transformer. Only use a soft, dry cloth while cleaning.
- We recommend placing the electrical connections on the upper side of the glass.
- Be sure that the INPUT voltage correspond exactly to the specifications given on the supplied power supply units.
- Provide appropriate ventilation to power supply units.



# Warranty

Considering the application and on site electrical wiring are made not by **Innoptec**, the same is in principle not available to consider warranty on Product installed in the field.

In case of demonstrated failure of Innoptec **self-adhesive** switchable film applied on glass, latest within two years from delivery date, the maximum compensation will be free of charge replacement of the area of lost film. Black spots (caused by short circuit) appearing at first electrical loading will not be considered **Innoptec** failure, as film is 100% electrically controlled before shipment.

**Innoptec** wants to stress that Buyer should inform customers not to use adhesives and sealants containing migrating, low molecular weight components (like plasticizers, liquid stabilizers, residual solvents, monomers) and to avoid contacts with oils and greases as they will, sometime after application, damage the liquid crystal compound, resulting in clear spots and loss of switching capability in the damaged area. Oily wood frames should be protected by a reactive paint (Polyurethane or Epoxy) to prevent oils or resins to migrate into the switchable film.

## Usable neutral sealant

Among neutral sealants Innoptec customers experienced good results by using:

- Alcosil by Zucchini
- 791T by Dow Corning

Sealant for insulating glass unit: Dow Corning 3793 Black



## ALCOSIL (Marke Zucchini) – 791T (Marke Dow Corning)

Low modulus neutral silicone sealants. High movement accommodation and good adhesion onto most of building materials, glass, metals, painted surfaces, marble, clean concrete. Excellent weather resistance as well as to sunlight in a wide temperature range.

- **Applications:** Suitable for glazing windows, skylights, curtainwalls, for perimeter joints of door and window frames made of metal, PVC and wood
- **Specification compliance:** ISO 11600 F+G 25 LM
- **Packaging:** Cartridge 310 ml
- **Colours:** Translucent – White



# Warnings and general disclaimer

Above indications represent the best result of **Innoptec** experience in the field of its Switchable film use and of Innoptec lab experimental activity. It is not **Innoptec** responsibility to decide the film processing conditions and final use practices and setup in order to obtain the best result.

Anyhow **Innoptec** is available to make its experience available to customers facing specific cases and problems. Furthermore is Buyer responsibility to check whether the use of the Switchable film abides by any safety regulation prevailing in any country where it will be installed alone or in combination with other materials. It is also Buyer responsibility to ascertain whether the application or design of final goods containing the Innoptec Switchable film may infringe third parties rights covered by patents, trademarks and any other type of intellectual property. By signing order confirmations Buyers of Innoptec film keep the same harmless of possible claims and indemnification requests raised by persons or organizations in connection of above Buyer responsibilities.

## On receiving the film:

1. Inspect carefully the packages before accepting them: if there is a damage, even if it appears as a minor scratch, or detached tapes, or lack of label and/or accompanying documents, refuse the delivery or accept it with reserve to ask for damages. Take good quality pictures. In case of delivery refusal drop immediately the claim with the forwarder. Report the case, with pictures, to Innoptec within the same dates as above.
2. If delivery has been accepted, open carefully and check for internal damages: in case of damages to the goods, send immediately a fax or email with good quality pictures to the forwarder with reference to the acceptance reserve. All claims have to be completed latest within one week after refusal or accepted delivery.
3. Innoptec will not accept any claim for any damages to the film after masking film removal.

**E-Mail: [info@innoptec.it](mailto:info@innoptec.it)**

# Order request example

Client .....

Date .....

Total Nr. .... films

- Glass size
- Film size

Nr. .... Transformers Rif. ....

Nr. .... Receivers

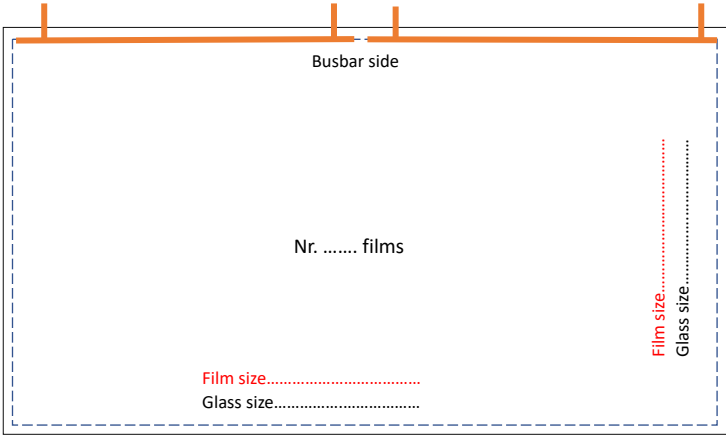
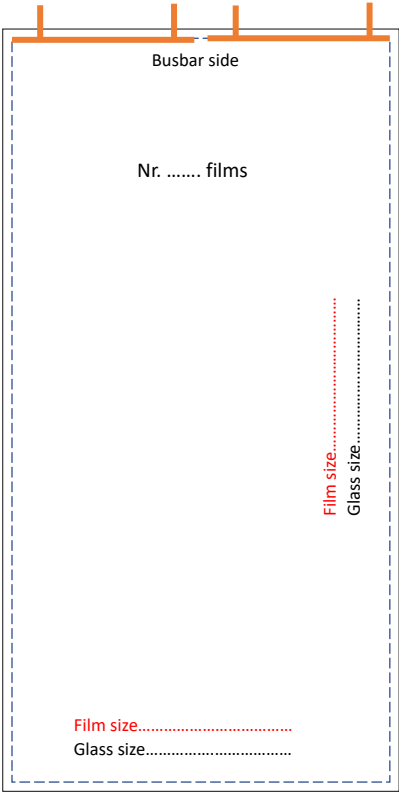
Nr. .... Transmitters

Film Color White/Grey

Busbar type .....

NOTE:

APPLICATION SIDE/VIEW





Distributed and installed by  
**serisolar**  
LET'S MAKE IT SUSTAINABLE

**Serisolar Trento**  
**Via Kempten 28**  
**38121 - Trento**  
[info@serisolar.com](mailto:info@serisolar.com)

**Serisolar Milano**  
**Via Donizetti 9**  
**20020 - Solaro MI**  
[infomilano@serisolar.com](mailto:infomilano@serisolar.com)

**ENGLISH**

**Self-adhesive film [General specifications - V. R7]**

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