GENERAL INFORMATION

GENERAL INFORMATION ON ROOF WINDOWS

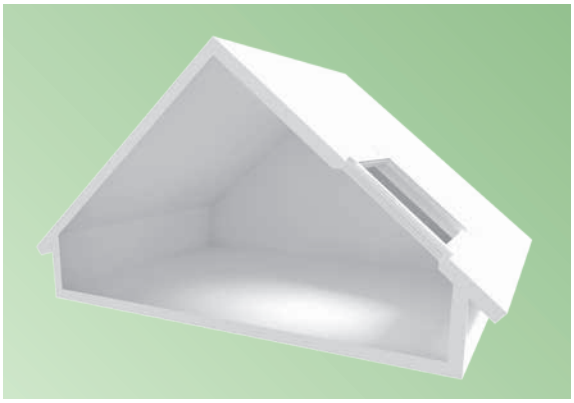
ROOF WINDOW VS DORMER

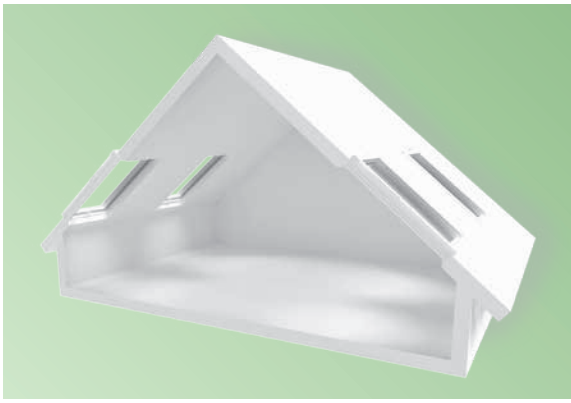
A roof window is a much more advantageous solution when compared with the dormer because:

- enhances room illumination
- uses less materials to construct, is much lighter and cheaper
- the roof window installation is fast, simple and does not require use of complicated tools and substantial changes in the roof framework.

The roof window can be installed in any part of the roof, in places where the dormer installation is not feasible.

GENERAL INFORMATION ON ROOF WINDOWS





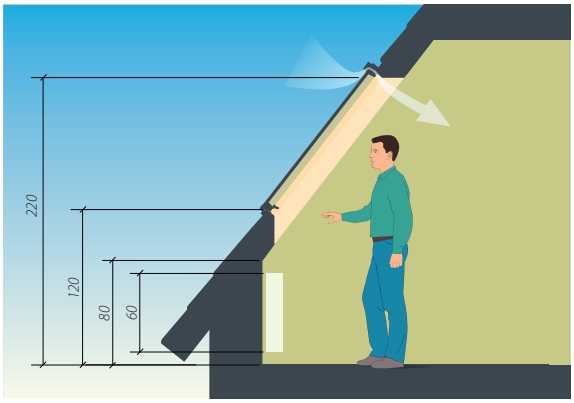
CHOOSING THE ROOF WINDOW

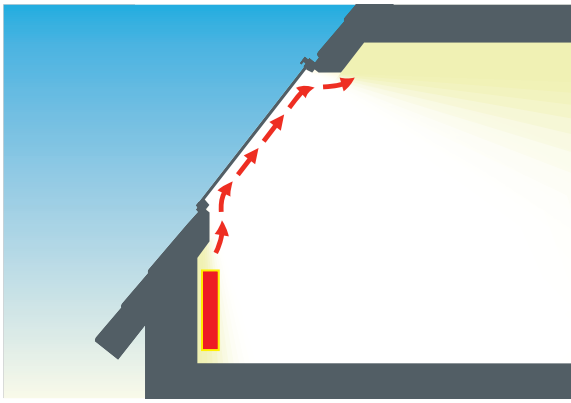
The choice of roof windows depends on:
- intended use, type and height of the room;
- pitch of the roof.

When deciding on the location of roof windows in the roof surface we should take into account an important principle, which states that the better illumination effects are accomplished by installing several windows in various parts of the roof than by grouping them in one place. It should also be noted that the higher the window is fitted, the more even distribution of light in the room.

In a room designed for habitable purposes the proportion of the surface of the window's glass area to the floor area should be at least 1:8, while in other rooms where daylight is required for reasons of their intended use – at least 1:12 (Regulation of the Minister of Infrastructure on technical conditions to be met by buildings and their location. Journal of Laws 202.75.690, §57.2)

GENERAL INFORMATION ON ROOF WINDOWS



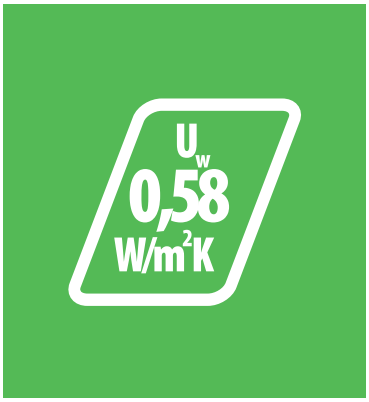


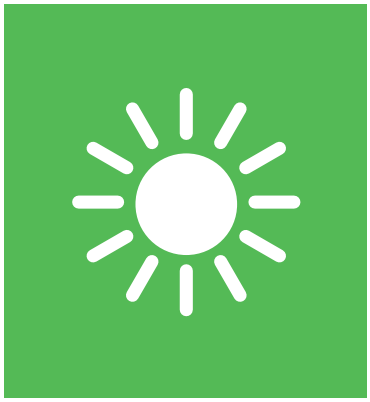
WINDOW INSTALLATION HEIGHT

Recommended installation of FAKRO windows at 110 – 140cm above the floor level (window bottom edge) complies with the requirements imposed by regulations, provides very good illumination and offers an unrestricted view to the outside. A bottom handle opening system in FAKRO windows ensures comfortable operation of windows installed at optimum height.
Installation of the window at this height also allows for fixing a standard radiator below the window and proper lining construction (lower perpendicular and upper parallel to the floor). Thanks to this proper air circulation along the window glazing reduces the risk of condensation appearing on the window.

The top window edge has to be situated minimum 220cm above the floor level (DIN 5034-1 section 4.2.2a). Air inlets should be installed at least 200cm above the floor level, measured from the lower edge of the air inlet (ITB instructions No. 343/96).

WHAT MAKES A FAKRO ROOF WINDOW BETTER?





THERMAL INSULATION
- LOWER HEATING BILLS

Energy-efficient design
One of the top priorities when designing FAKRO windows is their energy-efficiency. Special structure of the FTT U8 Thermo window featuring Uw = 0.58W/m^{2}K makes it the most energy-efficient roof window with a single glazing unit in the world. Such structure allows the retention of thermal energy inside the room. The application of the V40P air inlet in FAKRO windows ensures that the optimum level of fresh air is provided without unnecessary heat loss. The FAKRO roof window design allows for large thermal energy savings in the winter, which guarantees lower heating costs.

Ample natural light
The design of FAKRO roof windows provides appropriate illumination of the room within the loft space. Specially shaped profiles of the frame and sash as well as an air inlet location in the upper part of the frame allows for the influx of high quantities of natural light.

Sustainable energy balance
In addition to providing an effective light source, roof windows also act as means of passive heating in winter. The larger glazed area provided by FAKRO windows is correspondingly more effective in this respect, with the free thermal energy being retained by virtue of their energy-efficient design. Appropriate structure of FAKRO roof windows enables sustainable balance in terms of acquisition and loss of thermal energy.

WHAT MAKES A FAKRO ROOF WINDOW BETTER?

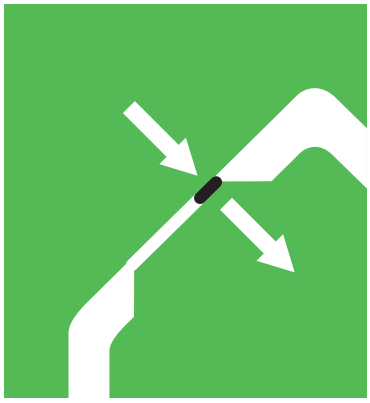
SAFETY
- HIGH SENSE OF SAFETY

Window reinforced structure – topSafe system
Roof windows have to ensure safety of use and protect against unauthorised access to the room from the roof. The patented system of the window structure reinforcement topSafe significantly improves resistance of roof windows to break-in attempts and protects against the sash opening under foot pressure if inadvertently stepped on. The topSafe system consists of:
- innovative installation system of specially shaped hinges
- metal element strengthening the locking system
- metal slat making break-in using tools much more difficult

III safety class
Toughened glass and system of the window structure reinforcement topSafe have enabled FAKRO roof windows to meet a minimum class III safety as per EN 13049 for the whole window including glazing. FAKRO was the first company to introduce to the market a full range of windows achieving at least class III safety, setting a new standard in the roof window sector.

Anti-burglary protection
High level of anti-burglary protection is a crucial issue in FAKRO products. The standard window for pitched roofs – the FTP-V P2 Secure meets European 2nd anti-burglary class RC 2 N as per EN 1627. The DMF DU6 Secure, DXF DU6 Secure, DMC P4 Secure and DXC P4 Secure flat roof windows also comply with European 2nd anti-burglary class RC 2 N as per EN 1627. In addition, flat roof windows are distinguished with the highest impact resistance class SB 1200 according to EN 1873. Installation of this type of windows in the roof considerably enhances safety and anti-burglary resistance of the building.

WHAT MAKES A FAKRO ROOF WINDOW BETTER?



FUNCTIONALITY
- EASY OPERATION

Handle in the bottom of the sash
Positioning the handle in the bottom section of the sash ensures easy operation of the window. Windows with the handle in the bottom section allow correct installation satisfying the requirements of DIN 5034-1* standard, according to which the upper window edge has to be situated 220cm above the floor level. With such installation system, the handle is always within easy reach. By higher installation of windows, even a tall person can freely approach open window with a pivot design. Advantages of the lower handle as an optimal solution have been recognized by other manufacturers and roof windows with the handle in the bottom have been introduced to their product range.

**standard effective on the German market*

Automatic V40P air inlet
High functionality in FAKRO windows is also provided by the automatic V40P air inlet which optimally adjusts the amount of fresh air. Maintenance-free ventilation in FAKRO windows secures a healthy micro-climate in the loft and energy savings. Open air inlet features high watertightness, even during wind. It protects against dust and insects from the outside.

High window tightness
Application of the additional seal and sash guiding system makes the window feature a high tightness. This innovative system ensures the best position of the sash in the frame and good operation of seals during repeated opening and closing the sash. This solution also prevents distortion and possible blockade of the sash as well as facilitates window installation.

ROOF WINDOW CONSTRUCTION

Wooden profile in natural colour

Wooden profile in white colour

Aluminium-plastic profile

WINDOW PROFILES

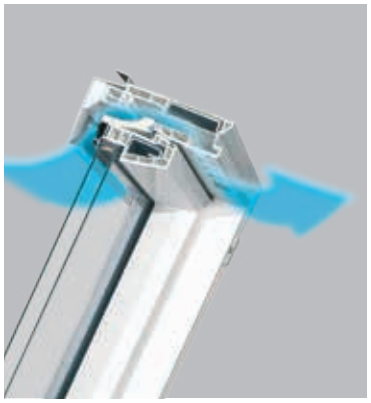
Pinewood coated with acrylic lacquer
The primary raw material used for the manufacture of roof windows is the highest quality pinewood glued in layers. The wood is vacuum impregnated and coated with ecological acrylic lacquer in natural colour.

Pinewood coated with polyurethane lacquer
The wooden windows coated with three layers of polyurethane lacquer create durable and perfectly smooth surface and are designed for rooms with periodically elevated humidity levels (kitchens, bathrooms).

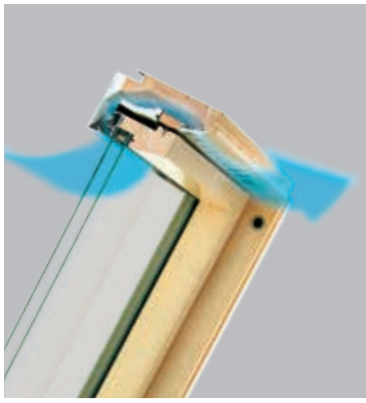
Aluminium-plastic profiles
Another options include aluminium-plastic structure windows with multi-chamber PVC profiles and strengthened from the inside with galvanized steel. The plastic used in the window does not absorb moisture, the window itself is durable and corrosion free. Windows are also available in golden oak veneer and pine colour. They are intended to be installed particularly in rooms with elevated humidity levels (kitchens, bathrooms, laundries).

ROOF WINDOW CONSTRUCTION

V22 air inlet



V35 air inlet



V40P air inlet

STANDARD AIR INLETS IN FAKRO WINDOWS

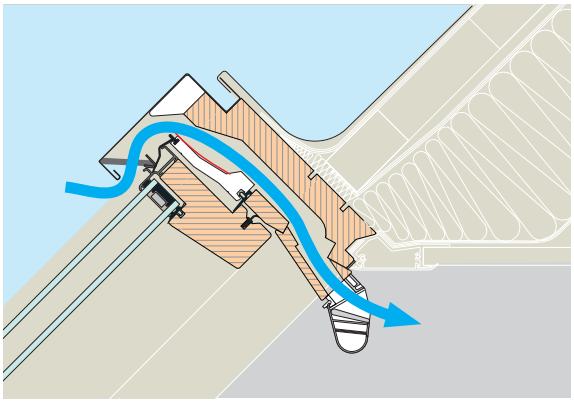
Air inlets in FAKRO windows are positioned in the top part of the frame. They ensure very good filtration properties and acoustic insulation as well as do not reduce glazing area.

V22 air inlet
It has a manual adjustable flow regulator. When fully opened the air inlet supplies fresh air up to **31m³/h** at a pressure difference of 10Pa. The V22 air inlet should be used solely in rooms where unassisted natural ventilation works. Used in FTS-V windows.

V35 air inlet
When fully opened the air inlet ensures fresh air inflow up to **41m³/h** at a pressure difference of 10Pa depending upon the window width. With increased capacity, air humidity inside the room is effectively decreased, thereby reducing condensation. The V35 air inlet can in part discharge air when natural ventilation is not working properly. Its excellent venting efficiency guarantees that a greater amount of stale and humid air is removed from the room.
Used in PTP-V, PPP-V preSelect windows.

Automatic V40P air inlet
At a pressure difference of 10Pa air inlet capacity is up to **49m³/h** depending on the window width. The capacity rises up to the point where the optimum value is achieved. If the pressure difference continues to grow, the airflow capacity stays on the same stable level.
An elastic, pneumatic flap deflects, limiting the amount of inflowing air by reducing the air inlet duct area e.g. when strong gusts of wind appear and in the winter time.
Used in the following windows: FTP-V, FTU-V, FPP-V preSelect, FPU-V preSelect, FYP-V proSky, FDY-V Duet proSky, FGH-V Galeria.

ROOF WINDOW CONSTRUCTION



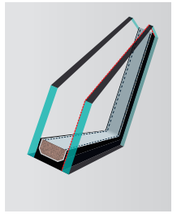
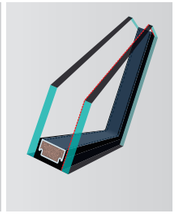
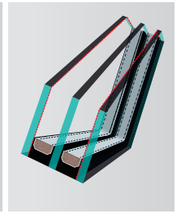
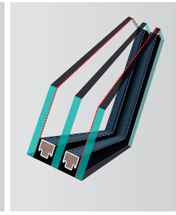
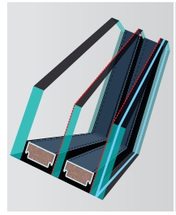
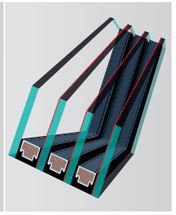
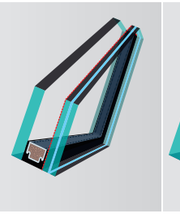
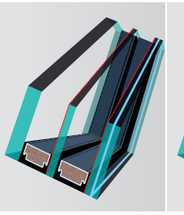
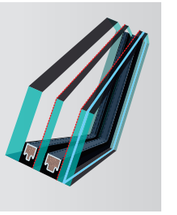
ADDITIONAL AIR INLET

Hygroscopically controlled air inlet
In windows with an automatic V40P air inlet incorporated, the shape of the top part of window frame's design enables easy installation of an additional hygroscopically controlled air inlet by means of XHL slat. In this type of air inlet, the amount of inflowing air depends upon the water vapour content in the air (relative humidity) inside the room. If the level of humidity continues to grow the hygroscopically controlled air inlet increases the amount of inflowing fresh air.
The air inlet can be used in windows equipped with automatic V40P air inlet:
FTP-V, FTU-V, FPP-V preSelect, FPU-V preSelect, FYP-V proSky, FDY-V Duet proSky, from a width of 66cm. Installed with the use of the slat.

FAKRO air inlets feature a continuous adjustment facility with an option of complete air inlet closing. Once closed, the air inlet (automatic air inlet as well) does not work. Windows with the air inlet (e.g. FTP-V) when closed achieve air tightness Class III according to EN 12207.

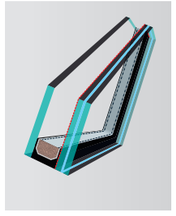
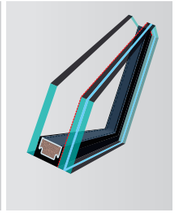
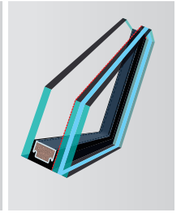
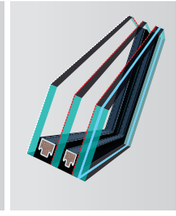
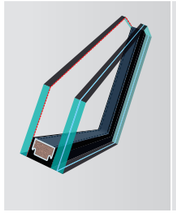
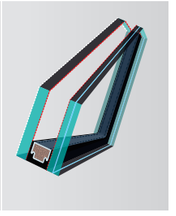
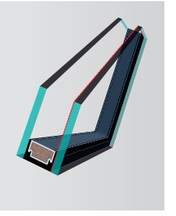
ROOF WINDOW CONSTRUCTION

STANDARD GLAZING UNITS

	ENERGY SAVING		HIGHLY ENERGY EFFICIENT		PASSIVE GLAZING		ACOUSTIC		
									
GLAZING UNIT	**U2**	**U3**	**U4**	**U5**	**U6**	**U8**	**R1**	**R3**	**R4**
Ug (as per EN 673)	1.1 W/m²K	1.0 W/m²K	0.7 W/m²K	0.5 W/m²K	0.5 W/m²K	0.3 W/m²K	1.0 W/m²K	0.5 W/m²K	0.5 W/m²K
GLAZING STRUCTURE	4H-16-4T	4H-16-4T	4HT-12-4-12-4T	4HT-10-4H-10-4HT	6H-18-4HT-18-33.2T	4H-12-4HT-12-4HT-12-4HT	6H-12-33.2SRT	8H-16-4HT-18-33.2SRT	8H-8-4HT-10-33.2SRT
GLAZING	SINGLE CHAMBER	SINGLE CHAMBER	DOUBLE CHAMBER	DOUBLE CHAMBER	DOUBLE CHAMBER	TRIPLE CHAMBER	SINGLE CHAMBER	DOUBLE CHAMBER	DOUBLE CHAMBER
TOUGHENED OUTER PANE	+	+	+	+	+	+	+	+	+
OUTER PANE WITH EASY MAINTENANCE LAYER	—	—	—	—	—	—	—	—	—
LAMINATED INNER PANE	—	—	—	—	+ (class P2A)	—	+ (class P2A)	+ (class P2A)	+ (class P2A)
SPACER	STEEL	WARM TGI	STEEL	WARM TGI	WARM TGI	WARM TGI	WARM TGI	WARM TGI	WARM TGI
INERT GAS	ARGON	ARGON	ARGON	KRYPTON	ARGON	KRYPTON	KRYPTON	ARGON	KRYPTON
SUN RAYS TRANSMISSION (τ_v)	0.76	0.76	0.68	0.73	0.67	0.66	0.75	0.67	0.67
SUN ENERGY TRANSMISSION (SOLAR FACTOR G)	0.53	0.53	0.46	0.53	0.47	0.48	0.51	0.46	0.46
UV RAYS TRANSMISSION (τ_{UV})	0.26	0.26	0.17	0.28	0.01	0.01	0.01	0.01	0.01
	4H - toughened glass 16 - spacer 4T - glass with low -emission layer	4H - toughened glass 16 - spacer 4T - glass with low -emission layer	4HT - toughened glass with low-emission layer 12 - spacer 4 - glass 12 - spacer 4T - glass with low-emission layer	4HT - toughened pane with low-emission layer 10 - spacer 4H - toughened pane 10 - spacer 4HT -toughened pane with low-emission layer	6H - toughened glass 18 - spacer 4HT - toughened glass with low-emission layer 18 - spacer 33.2T -laminated glass with low-emission layer	4H - toughened glass 12 - spacer 4HT - toughened glass with low-emission layer 12 - spacer 4HT - toughened glass with low-emission layer 12 - spacer 4HT - toughened glass with low-emission layer	6H - toughened glass 12 - spacer 33.2 -laminated glass T - low-emission layer SR - soundproofing foil	8H - toughened glass 16 - spacer 4HT - toughened glass with low-emission layer 18 - spacer 33.2 -laminated glass T - low-emission layer SR - soundproofing foil	8H - toughened glass 8 - spacer 4HT - toughened glass with low-emission layer 10 - spacer 33.2 -laminated glass T - low-emission layer SR - soundproofing foil

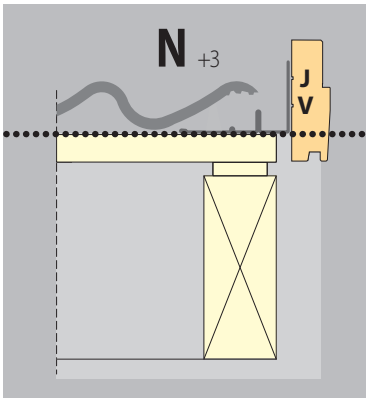
ROOF WINDOW CONSTRUCTION

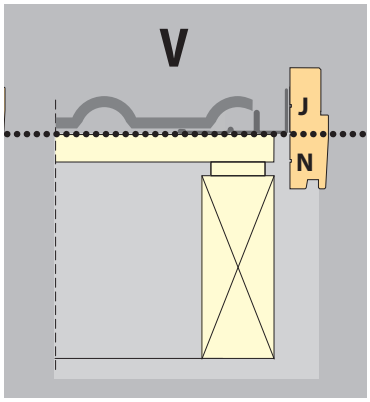
STANDARD GLAZING UNITS

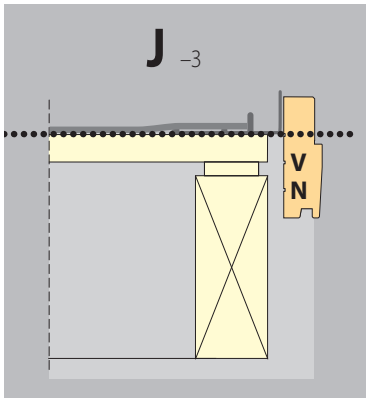
	ANTI-BURGLARY				SOLAR		ENERGY SAVING
							
GLAZING UNIT	**P1**	**P2**	**P4**	**P5**	**G2**	**G61**	**Z6**
Ug (as per EN 673)	1.1 W/m²K	1.0 W/m²K	1.0 W/m²K	0.5 W/m²K	1.0 W/m²K	1.0 W/m²K	1.1 W/m²K
GLAZING STRUCTURE	4H-14-33.2T	4H-15-33.2T	4H-15-33.4T	4HS-10-4HT-8-33.2T	4HT-15-33.1T	6HT-12-33.2	4H-16-4HT
GLAZING	SINGLE CHAMBER	SINGLE CHAMBER	SINGLE CHAMBER	DOUBLE CHAMBER	SINGLE CHAMBER	SINGLE CHAMBER	SINGLE CHAMBER
TOUGHENED OUTER PANE	+	+	+	+	+	+	+
OUTER PANE WITH EASY MAINTENANCE LAYER	—	—	—	+	—	—	—
LAMINATED INNER PANE	+ (class P2A)	+ (class P2A)	+ (class P4A) as per EN 356	+ (class P2A)	+	+ (class P2A)	—
SPACER	STEEL	WARM TGI	WARM TGI	WARM TGI	WARM TGI	WARM TGI	WARM TGI
INERT GAS	ARGON	ARGON	ARGON	KRYPTON	ARGON	KRYPTON	ARGON
SUN RAYS TRANSMISSION (τ_v)	0.75	0.75	0.75	0.68	0.40	0.40	0.81
SUN ENERGY TRANSMISSION (SOLAR FACTOR G)	0.52	0.52	0.52	0.48	0.24	0.23	0.64
UV RAYS TRANSMISSION (τ_{UV})	0.01	0.01	—	0.01	0.01	0.01	0.43
	4H - toughened glass 14 - spacer 33.2T -laminated glass with low-emission layer	4H - toughened glass 15 - spacer 33.2T -laminated glass with low-emission layer	4HT - toughened glass with low-emission layer 15 - spacer 33.4T -laminated glass with low-emission layer	4HS - toughened glass with easy maintenance layer 10 - spacer 4HT - toughened glass with low-emission layer 8 - spacer 33.2T -laminated glass with low-emission layer	4HT - toughened glass with low-emission layer 15 - spacer 33.1T -laminated glass with low-emission layer	6HT - toughened glass with low-emission layer 12 - spacer 33.2T -laminated glass with low-emission layer	4H - toughened glass 16 - spacer 4HT - toughened glass with low-emission layer

In P5 glazing unit, the external pane is toughened and coated with an easy maintenance layer which prevents the build-up of dirt on the glass and helps to keep the window clean. In the first stage, the coating absorbs ultra-violet light from the sun causing a reaction on the glass surface which breaks down and loosens dirt. Secondly, the glass surface has a hydrophilic coating which, when rain or water flows across the window, causes it to do so evenly across the surface instead of forming water droplets, thereby taking dirt with it. In comparison with ordinary glass the water dries quickly without staining.

UNIVERSAL INSTALLATION SYSTEM





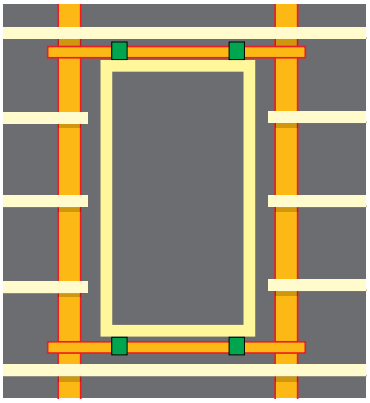


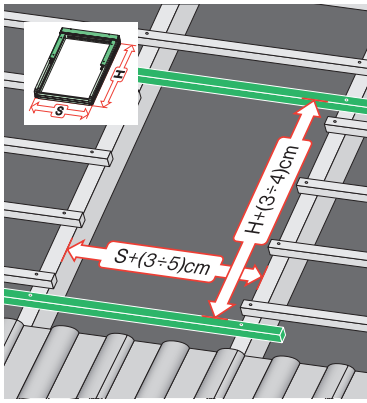
BRACKETS

FAKRO roof windows are equipped with universal brackets, which allow installation either on battens or on rafters. Depending on the roof covering type, FAKRO roof windows can be mounted at three installation depths:

- N (+3 cm) - installation in high-profile roof coverings (covering thickness up to 90 mm)
- V (0 cm) - standard installation depth
- J (– 3 cm) - installation in flat roof coverings (covering thickness up to 10 mm)

UNIVERSAL INSTALLATION SYSTEM





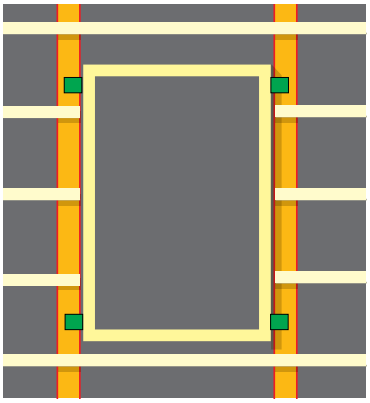
INSTALLATION ON BATTENS

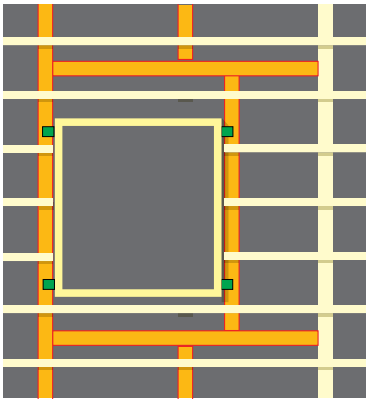
Installation type depends on the window size and roof structure. The roof window is installed on battens when the rafter spacing is bigger than the window width.

When mounting on battens we can move the window horizontally during installation for better adjustment of the mounted window in relation to the roof material profile.
Windows on battens can be mounted at two installation depths:

- N (+3 cm) - installation in high-profile roof coverings (covering thickness up to 90 mm)
- V (0 cm) - standard installation depth

UNIVERSAL INSTALLATION SYSTEM





INSTALLATION ON RAFTERS

We install windows on rafters when the window width matches the spacing between rafters, hence it ensures stability of the construction and durability of the connection. Installation on rafters is recommended especially when we replace old windows (in already existing roofs) with new ones or when we install large windows.
When the window's width is bigger than the spacing between rafters we use trimmers in the roof structure. Horizontal trimmer beams should be situated around 30-50 cm below the bottom and top edge of the window. It will allow proper lining construction of the window (bottom lining should be vertical to the floor and the head lining should be horizontal to the floor).

Depending on the roof covering type, FAKRO roof windows can be mounted at three installation depths:

- N (+3 cm) – installation in high-profile roof coverings (covering thickness up to 90 mm)
- V (0 cm) – standard installation depth
- J (– 3 cm) – installation in flat roof coverings (covering thickness up to 10 mm)

When installing window on rafters one must keep in mind that the rafter spacing can be greater than the window width by minimum of 3 cm and maximum of 5cm (up to 2.5cm on each side of the window frame).

UNIVERSAL INSTALLATION SYSTEM

BLOCK COMBINATION SYSTEM

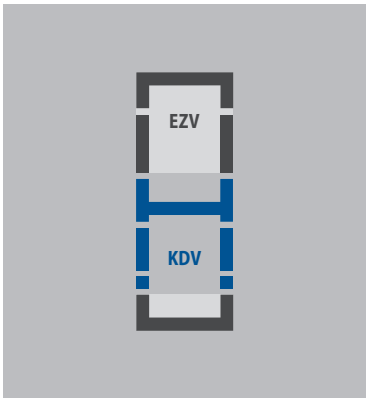
Combination flashing are ready made flashing systems for joining windows in groups:
- horizontal
- vertical
- block.

The distance between windows joined horizontally and vertically is 10cm as standard. If external shutters are mounted on windows installed vertically, a gap of at least 20cm between windows is required.

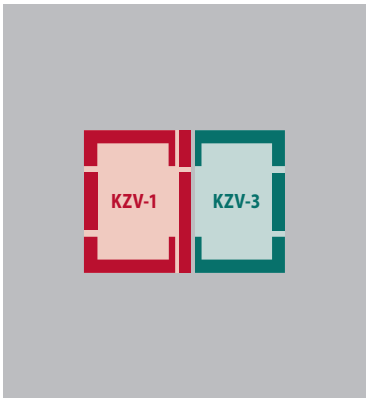
The FAKRO combination system enables to install all types of FAKRO roof windows: top hung and pivot windows as well as centre pivot. With uniform design of external cladding, windows featuring different structures can be combined into groups.

There are seven modules in FAKRO combination system to ensure realization of each standard combination. The "Module" is a single and properly marked element of the flashing and assigned to its specific place in combination.

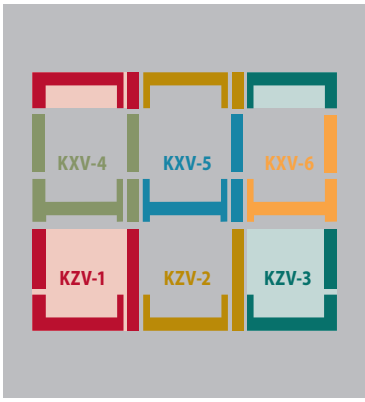
UNIVERSAL INSTALLATION SYSTEM



Vertical combination **B1/2**



Horizontal combination **B2/1**



Block combination **B3/2**

MODULES

There are seven modules in FAKRO combination system to ensure realization of each standard combination. The "Module" is a single and properly marked element of the flashing and assigned to its specific place in combination.

Example of modules creating block combination system for profiled roofing materials, which are used when installing at a standard "V" depth:

KZV-1 - extreme left module
KZV-2 - middle module
KZV-3 - extreme right module
KXV-4 - top left module
KXV-5 - top middle module
KXV-6 - top right module
KDV - module for vertical combination

A sketch of the external view is required when ordering.

B2/1 - horizontal combination KZV-1+KZV-3
B1/2 - vertical combination EZV+KDV
B2/2 - block combination KZV-1+KZV-3+ KXV-4 + KXV-6
B3/2 - block combination KZV-1+KZV-2+KZV-3+KXV-4+KXV-5+KXV-6

All standard combinations can be created when installing windows at a depth of N (+3 cm) and V (0cm). However, when installing at a depth of J (–3cm) horizontal combinations can be used in standard distance between windows (10cm) and vertical combinations with a distance of 20cm between windows.
When the distance between windows is not exactly 10cm, such a combination of flashings with non-standard width of internal gutter can be prepared to individual order. No surcharge for internal gutter with a width between 6-14cm.

ACCESSORIES FOR ROOF WINDOWS

SPECIFICATIONS

Internal decoration - AJP, ARS, ARP, ARF, APS, APF
The main function of internal accessories is to enhance interior design. The wide range of their types and colours ensures harmony with the decor of any interior and offers the possibility of creating all kinds of atmosphere in the loft.

Protection from overheating inside - AMZ, ARZ
The best protection against uncomfortable heat is ensured by external accessories (awning blind, roller blind) which effectively protect the loft from overheating on hot, summer days. The application of external accessories does not reduce glazed area of the window.

Control of light - AJP, ARS, ARP, ARF, APS, APF, AMZ, ARZ
Accessories enable you to regulate the amount and intensity of light entering the room.
As a result you can even achieve complete darkness for bedrooms when you want to rest. They additionally protect eyes from harmful effects of reflections, especially uncomfortable when working on the computer.

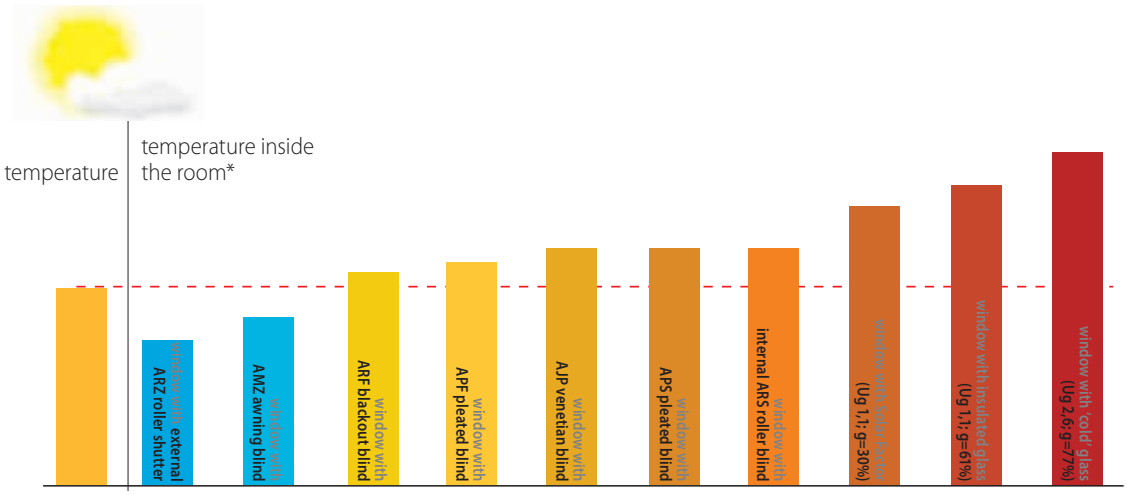
Protection from UV rays - AJP, ARS, ARP, ARF, APS, APF, AMZ, ARZ
Internal and external accessories reduce penetration of UV radiation into the room. They protect materials and furniture placed in the room from fading.

Protection of privacy - AJP, ARS, ARP, ARF, APS, APF, AMZ, ARZ
Accessories for roof windows protect your house interior against viewers and ensure a feeling of privacy.

Easy installation - AJP, ARS, ARP, ARF, APS, APF, AMZ
FAKRO original accessories are distinguished with high quality, innovative solutions and aesthetic design. The exact matching of accessories makes their installation process quick and simple. Internal and external accessories come with 2-year warranty.

Comfort of use - AJP Z-Wave, ARP Z-Wave, ARF Z-Wave, AMZ Z-Wave, AMZ Solar, ARZ Z-Wave, ARZ Solar
Both internal and external accessories are characterized by comfort of use. FAKRO product range also includes electric accessories equipped with a Z-Wave module which are controlled via remote control or wall switch.

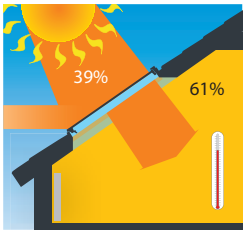
ACCESSORIES FOR ROOF WINDOWS

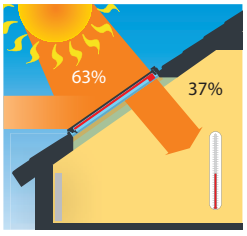


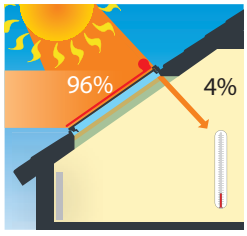
** Presented results and diagram are for illustrative purposes only - they relate to specific weather conditions during the test.*

TESTS & RESEARCH

FAKRO continually analyses all accessories for their efficiency of protection against heat gain in order to improve their performance and enhance user comfort.
We have built eight identical room environments to enable us to carry out tests in relation to solar and UV exposure. Windows have been closed during the research and the temperature was constantly measured one metre above the floor at different points and it is these test results which are reflected in the graph.







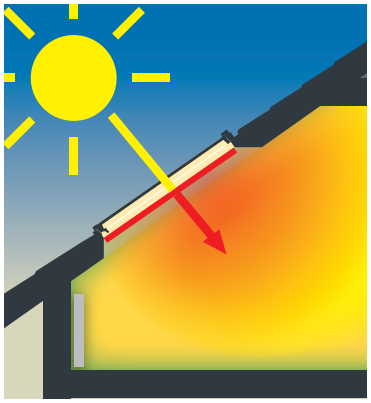
Sun energy transmittance %

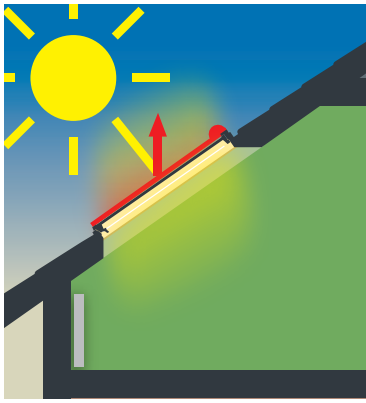
Fig.1 Window without blinds	61 % ; g = 0,61 (as per EN 410)
Fig.2 Window with internal blackout blind	37 % ; g = 0,37 (as per EN13363-1)
Fig.3 Window with awning blind (depending on the fabric used)	4 – 20 % ; g = 0,04 – 0,20 (as per EN13363-1)

Solar radiation coefficient 'g' informs about the amount of solar energy reaching the glass which penetrates into the room. The higher value of 'g' coefficient, the room heats up faster. The external awning blind offers up to **8 times more effective protection** in comparison with internal blackout blinds.

8 times more effective

ACCESSORIES FOR ROOF WINDOWS





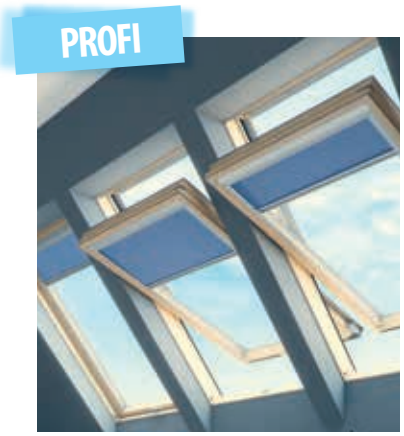
PROTECTION FROM OVERHEATING

According to the DIN 5034-1 standard rooms should be protected from overheating with the use of external accessories (awning blind, roller blind) which secure better protection than internal accessories. *"The space should be protected from overheating on summer days with use of external covers placed outside the glass which reflect the heat. The overheating of rooms is a result of absorption of global radiation by objects in the room and surface which delimit the space (walls, floor). The absorbed radiation changes into long-wave infrared radiation (heat radiation) which does not pass the glass and causes undesirable overheating in the summer"* - DIN 5034-1

Solar radiation which passes through the pane is absorbed by an internal accessory. Once overheated, the accessory radiates heat to the interior in the form of long-wave infrared radiation which is not transmitted through the glass to the outside. It leads to undesirable overheating of rooms, particularly from the south on sunny, hot days.

External accessories are the best protection from high temperatures. They absorb the UV radiation before the pane and keep warm air outside which helps prevent overheating.

ROOF WINDOW CLASSES



Roof windows are visually similar to each other, however, they differ in many respects. Not only thermal insulation and acoustic parameters determine their differences. A very important issue is the window design, all kinds of security and insulation systems, type of applied glazing unit as well as additional equipment.
All these elements influence the comfort of use of roof windows in the loft. For easier identification, FAKRO roof windows are divided into three classes: STANDARD, PROFI and LUX.

ROOF WINDOWS – STANDARD

Products in this class ensure the basic functions required from roof windows. They provide good illumination of the interior with natural daylight, ventilation of the attic and view to the outside. They feature good insulation and acoustic parameters as well as high quality which distinguish all FAKRO products. They are economically priced and widely used in construction.

ROOF WINDOWS – PROFI

Increased parameters and higher functionality distinguish PROFI type windows. Greater thermal energy savings, improved anti-burglary safety and solutions enabling effective and optimum ventilation of the roof are only some of the characteristics specifying these products. PROFI windows are high quality product at a competitive price.

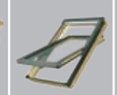
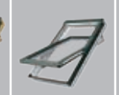
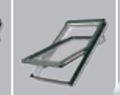
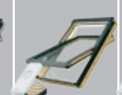
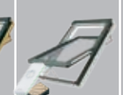
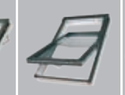
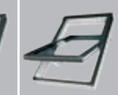
ROOF WINDOWS – LUX

The highest quality and unique functionality of products in terms of both design and functional aspects. Roof windows in this class feature special solutions which distinguish them in markets all over the world. Numerous solutions used in windows are protected by patents and have considerable influence on the functionality and comfort of roof window use. The best coefficients of insulation, high level of safety, aesthetics and ease of operation ensure that they are products of the highest quality which meet expectations of the most demanding customers. LUX class windows are unique and innovative products not offered by other manufacturers.

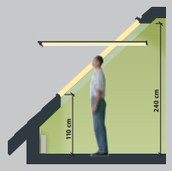
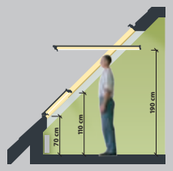
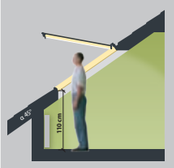
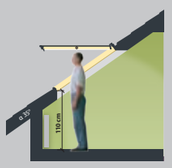
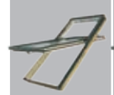
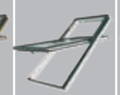
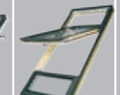
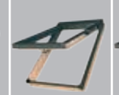
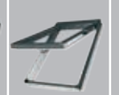
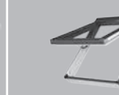
PRODUCTS - TYPES

ROOF WINDOWS

PIVOT

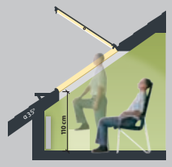
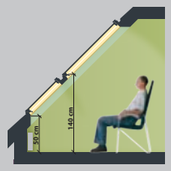
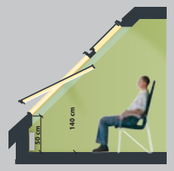
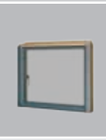
FTS	FTS-V	FTP-V	FTW-V	FTU-V	FTP-V Z-Wave	FTU-V Z-Wave	PTP	PTP-V	FTT	FTT U8 Thermo
										
Features: - Pivot design. - Manufactured in pine and vacuum impregnated. - Coated with ecological acrylic varnish. - Handle ‚Standard' in the base of the sash. - The sash can be rotated through 180° and locked.	**Features:** - Pivot design. - Manufactured in pine and vacuum impregnated. - **FTP-V** coated with ecological acrylic varnish in natural color. - **FTW-V** coated with ecological acrylic varnish in white color. - **FTU-V** coated with triple layer of white polyurethane varnish NCS-S0502-Y (similar to RAL 9010). - **FTU-V** designed for rooms with periodically elevated humidity levels varnished three fold, color white. - Handle ‚Elegant' in the base of the sash. - The sash can be rotated through 180° and locked. - Increased operational safety and burglary resistance - **topSafe system**. - Greater energy-efficiency, durability and tightness of roof windows - **thermoPro** technology.	**Features:** - Pivot roof window. - Manufactured in pine and vacuum impregnated. • **FTP-V Z-Wave** coated with ecological acrylic varnish in natural colour. • **FTU-V Z-Wave** coated with three layers of polyurethane lacquer in white NCS-S0502-Y (similar to RAL 9010) which is homogeneous without a trace of wood grains. Suitable for rooms with periodically elevated humidity levels. - Equipped with the V40P air inlet. - Factory equipped with the Z-Wave module, actuator, power supply, remote control and rain sensor. - Actuator with a reach of 24 cm in the bottom of the sash. - The sash can be rotated through 180° and locked. - Increased operational safety and burglary resistance – topSafe system. - Increased energy-efficiency performance, durability and tightness – **thermoPro** technology.	**Features:** - Pivot design. **- Aluminium clad - plastic windows.** - Constructed of PVC profiles strengthened from the inside with galvanized steel. Available in **white (RAL 9010), golden oak veneer (GO) and pine veneer (PI)**. - Designed for rooms with periodically elevated humidity levels. - Handle 'Elegant' in the base of the sash. - The sash can be rotated through 180° and locked. - Increased operational safety and burglary resistance - **topSafe system**. - Greater energy-efficiency, durability and tightness of roof windows - **thermoPro** technology.	**Features:** - Pivot design. **- Widened profiles and specially designed frame of the sash.** - Coated with ecological acrylic varnish. **- Designed for energy-efficient and passive construction.** - Manufactured in pine and vacuum impregnated. - **FTT** coated with ecological acrylic varnish in natural color. - **FTT/U** coated with triple layer of white polyurethane varnish NCS-S0502-Y (similar to RAL 9010). - **FTT U8 Thermo** comes complete with EHV-AT Thermo flashing and XDK flashing kit. - FTT U8 Thermo is the warmest roof window on the market with a single glazing unit. - 'Passive House' certified - Handle 'Elegant' in the base of the sash. - The sash can be rotated through 180° and locked. - Increased operational safety and burglary resistance - **topSafe system**. -Greater energy-efficiency, durability and tightness of roof windows - **thermoPro** technology.

ROOF WINDOWS

WITH RAISED AXIS OF ROTATION		WITH RAISED AXIS OF ROTATION WITH LOWER TRANSOM		TOP HUNG AND PIVOT				
								
FYP-V proSky	FYU-V proSky	FDY-V U3 Duet proSky	FDY-V/U Duet proSky	FPP-V preSelect MAX	FPU-V preSelect MAX	FPP-V preSelect	FPW-V preSelect	FPU-V preSelect	PPP-V preSelect
									
Features: - Pivot design with axis of rotation situated above the centre of the window. - When installed in roofs with pitches 39˚ - 43˚ the window satisfies the requirements of DIN 5034-1 standard, according to which the bottom window edge has to be placed 95cm above the floor level and the top minimum 220cm. - **FYP-V** manufactured in pine and vacuum impregnated - **FYP-V** coated with ecological acrylic varnish. - **FYU-V** coated with triple layer of white polyurethane varnish NCS-S0502-Y (similar to RAL 9010). Designed for rooms with periodically elevated humidity levels varnished three fold, color white. - Handle 'Elegant' in the base of the sash. - The sash can be rotated through 160° and locked. - Increased operational safety and burglary resistance - **topSafe system**. - Greater energy-efficiency, durability and tightness of roof windows - **thermoPro** technology.	**Features:** - Double sash window. - The upper sash opened like a pivot window but its axis of rotation is situated above the centre of the window. - When installed in roofs with pitches 39˚ - 43˚ the window satisfies the requirements of DIN 5034-1 standard, according to which the bottom window edge has to be placed 95cm above the floor level and the top minimum 220cm. - Manufactured in pine and vacuum impregnated - **FDY-V** coated with ecological acrylic varnish. - **FDY-V/U** coated with triple layer of white polyurethane varnish NCS-S0502-Y (similar to RAL 9010). - **FDY-V/U** designed for rooms with periodically elevated humidity levels. - Handle 'Elegant' in the base of the sash. - The sash can be rotated through 160° and locked. - Increased operational safety and burglary resistance - **topSafe system**. - Greater energy-efficiency, durability and tightness of roof windows - **thermoPro** technology.	**Features** - Top hung and pivot window. - Two independent opening mechanisms: top hung and pivot. - Top hung option - the sash can be opened up to 45°. - Pivot option - the sash can be rotated through 180° and locked. - Manufactured in pine and vacuum impregnated. • **FPP-V** coated with ecological acrylic varnish in natural colour. • **FPU-V** coated with three layers of polyurethane lacquer in white NCS-S0502-Y (similar to RAL 9010) which is homogeneous without a trace of wood grains. Suitable for rooms with periodically elevated humidity levels. - Equipped with the V40P air inlet. - Handle ‚Elegant' in the base of the sash. - Switch to change the opening method placed in the bottom of the frame. - Available in large sizes (even 134x160 cm). - Increased operational safety and burglary resistance – topSafe system. - Increased energy-efficiency performance, durability and tightness – **thermoPro** technology.	**Features:** - Top hung and pivot design. - Two independent opening mechanisms. - The outward opening function enables the sash to be opened in any position from 0° to 35°. - Pivot function enables the sash to be rotated through 180° and locked. - **FP_-V** manufactured in pine and vacuum impregnated. - **FPP-V** coated with ecological acrylic varnish in natural color. - **FPW-V** coated with ecological acrylic varnish in white color. - **FPU-V** coated with triple layer of white polyurethane varnish NCS-S0502-Y (similar to RAL 9010). - **FTU-V** designed for rooms with periodically elevated humidity levels varnished three fold, color white. - Handle 'Elegant' in the base of the sash. - Increased operational safety and burglary resistance - **topSafe system**. - Greater energy-efficiency, durability and tightness of roof windows - **thermoPro** technology.	**Features:** - Top hung and pivot design. - Two independent opening mechanisms. - The outward opening function enables the sash to be opened in any position from 0° to 35°. - Pivot function enables the sash to be rotated through 180° and locked. **- Aluminium clad - plastic windows.** - Constructed of PVC profiles strengthened from the inside with galvanized steel. Available in white (RAL 9010), golden oak veneer (GO) and pine veneer (PI). - Designed for rooms with periodically elevated humidity levels. - Handle 'Elegant' in the base of the sash. - Increased operational safety and burglary resistance - **topSafe system**. - Greater energy-efficiency, durability and tightness of roof windows - **thermoPro** technology.

PRODUCTS - TYPES

ROOF WINDOWS

PANORAMIC	BALCONY	WINDOWS FOR COMBINATIONS						
		L-SHAPED	ROOF WINDOWS				TOP WINDOWS	
								
FEP	**FGH-V Galeria**	**BDL, BDR BVP BXP**	**FTP/D**	**FTU/D**	**FXP**	**FXU**	**FAP**	**FBP**
								

Features:
- Top hung and pivot design.
- Double opening system.
- The outward opening function enables the sash to be rotated to 40°, and up to 68° once the lock is released.
- Pivot function enables the sash to be rotated through 180° and locked.
- Large dimensions of the window enable easy access to the roof (maintenance, emergency escape).
- Manufactured in pine and vacuum impregnated.
- Coated with ecological acrylic varnish.
- Handle 'Elegant' in the base of the sash.
- Increased operational safety and burglary resistance - **topSafe system**.

Features:
- Innovative, large roof window whose sashes when opened create a balcony.
- The upper top hung sash opens outwards, while the lower sash can be tiled forwards, allowing easy access to the balcony recess.
- Side safety barriers integrated into the bottom sash do not spoil aesthetics of the roof.
- Manufactured in pine and vacuum impregnated.
- Coated with ecological acrylic varnish.
- The sash can be rotated through 180° and locked.
- Increased operational safety and burglary resistance - **topSafe system**.

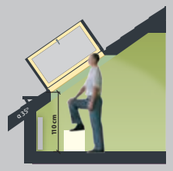
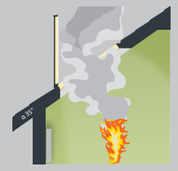
Features:
- Can be opened in tilt and turn.
- Designed for installation in a vertical wall within the loft space (dwarf wall) to extend the roof window into the wall.
- Can be combined with FAKRO roof windows of any design.
- **BD_** can be opened in tilt and turn by means of one handle. The window can be closed using a lock (**BDR** - opened to the right, **BDL** - opened to the left).
- **BVP** features tilt opening function. Handle with a lock placed in the top part of the sash.
- **BXP** is non-opening.
- Manufactured in pine and vacuum impregnated.
- Coated with ecological acrylic varnish.

Features:
- Pivot window designed for combinations.
- Can be installed beneath and above FAKRO standard roof window.
- **FTP-D** coated with ecological acrylic varnish.
- **FTU-D** coated with triple layer of white polyurethane varnish NCS-S0502-Y (similar to RAL 9010).
- **FTU-D** designed for rooms with periodically elevated humidity levels.
- Manufactured in pine and vacuum impregnated.
- Handle „Elegant' in the base of the sash.
- Increased operational safety and burglary resistance - **topSafe system**.
- Greater energy-efficiency, durability and tightness of roof windows - **thermoPro** technology**.**

Features:
- **Non-opening** window designed for combinations.
- Installed exclusively beneath standard FAKRO roof window.
- **FXP** coated with ecological acrylic varnish.
- **FXU** coated with triple layer of white polyurethane varnish NCS-S0502-Y (similar to RAL 9010).
- **FXU** designed for rooms with periodically elevated humidity levels.
- Manufactured in pine and vacuum impregnated.
- Increased operational safety and burglary resistance - **topSafe system**.
- Greater energy-efficiency, durability and tightness of roof windows - **thermoPro** technology.

Features:
- Installed in combinations, **non-opening**, triangular (FAP) or arched (FBP).
- Flashing integrated with top window.
- Fitted exclusively over FAKRO roof windows of any design.
- Manufactured in pine and vacuum impregnated.
- Coated with ecological acrylic varnish in natural colour.

ROOF WINDOWS

SIDE HUNG ESCAPE					KLAPY	
					SMOKE VENTILATION	
						
FWP	**FWU**	**PWP**	**FWR**	**FWL**	**FSP**	**FSR**
						

Features:
- Top hung design with intended use in heated rooms.
- The sash can be opened to 90°.
- Opening mechanism protects the sash against accidental closure.
- Universal design allows installation with any opening side (right or left).
- Factory delivered as right-opening version.
- Sizes 94x98 and 94x118 comply with technical conditions to be met by buildings and their location.
- Manufactured in pine and vacuum impregnated.
- **FWP** - coated with ecological acrylic varnish in natural colour.
- **FWU** - coated with three layers of polyurethane lacquer in white NCS-S0502-Y (similar to RAL 9010) which is homogeneous without a trace of wood grains. Suitable for rooms with periodically elevated humidity levels.
- Wide choice of flashings the same as for standard roof windows to enable connection with roof windows in one combination.

Features:
- Top hung design with intended use in heated rooms.
- The sash can be opened to 90°.
- Opening mechanism protects the sash against accidental closure.
- Universal design allows installation with any opening side (right or left).
- Factory delivered as right-opening version.
- Sizes 94x98 and 94x118 comply with technical conditions to be met by buildings and their location.
- Aluminium clad-plastic design.
- PVC profiles strengthened from the inside with galvanized steel available in white (RAL 9010.
- Suitable for rooms with periodically elevated humidity levels.
- Wide choice of flashings the same as for standard roof windows to enable connection with roof windows in one combination.

Features:
- **Side hung escape window designed for heated rooms.**
- Once unlocked, the sash can be opened to 90°.
- Special mechanism makes opening easier and protects the sash against accidental closure.
- **FWR** is opened to the right.
- **FWL** is opened to the left.
- Sizes 94x98 and 94x118 comply with technical conditions to be met by buildings and their location.
- Handle in the base of the sash.
- Manufactured in pine and vacuum impregnated.
- Coated twice with acrylic varnish.
- Installed with special flashings: ESW, EZW, EHW, ELW.

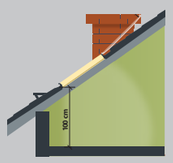
Features:
- Part of gravitational smoke ventilation system.
- **Used for extraction of smoke and heat emitted in a building during a fire.**
- Equipped with two electric actuators (24V) which open the sash.
- Maximum **sash opening pitch is 75° (in 51 seconds when fully loaded)**.
- **It does not act as an access roof light.**
- Available in five certified sizes.
- Manufactured in pine and vacuum impregnated.
- Installed with special flashings: ESS, EZS-P, EHS-P, EGS.
- Can be installed in flat roofs (EFS flat roof system).

Features:
- Part of gravitational smoke ventilation system.
- Used for extraction of smoke and heat emitted in a building during a fire.
- Equipped with two electric actuators (24V)
- **Maximum sash opening pitch is 90° in 60 seconds**
- meets the requirements of PN EN 12101-2
- can be used for smoke ventilation systems under the condition of calculating the smoke removal area in accordance with the standard VdS 2221:2001-08(01)
- mounting angle: 15°-90°
- a wide selection of flashings, same as for standard roof windows

PRODUCTS - TYPES

ACCESS ROOF LIGHTS

ACCESS ROOF LIGHTS



WLI	WSS WSZ WSH	WGT WGI
		
Features: **- Access roof light with a top hung structure designed for uninhabited lofts.** - Side-opening. - It can be installed in left or right opening version. **- Size 86/87 complies with technical conditions to be met by buildings and their location, enabling access to the roof.** - The sash made of powder coated aluminium profile. - Vacuum impregnated wooden frame.	**Features:** **- Access roof light with a top hung structure designed for uninhabited lofts.** - Side-opening. - It can be installed in left or right opening version. **- Size 86/87 complies with technical conditions to be met by buildings and their location, enabling access to the roof.** - The sash made of powder coated aluminium profile. - Vacuum impregnated wooden frame.	**Features:** **- Access roof light with a top hung structure designed for uninhabited lofts.** - The sash opens outwards. - **WGT** with single toughened glass 4H. - **WGI** with glazing unit 4H-9-4H (both panes are toughened, therefore they are characterized by increased resistance to hailstones). - A gas spring makes opening easier, holds the sash stable and protects it against accidental closure. - The sash made of powder coated aluminium profile. - Wooden frame.

LIGHT TUNNELS

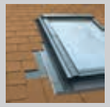
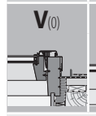
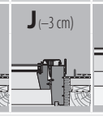
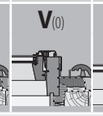
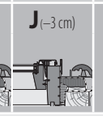
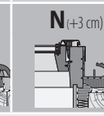
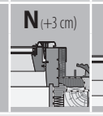
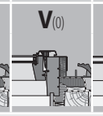
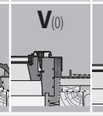
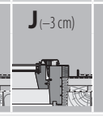
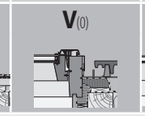
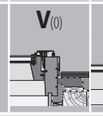
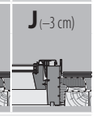
LIGHT TUNNELS WITH FLEXIBLE LIGHT TRANSMITTING TUBE

SFD z kopułą	SFD-_/L z kopułą z funkcją doświetlenia	SF_ płaskie	SF_-L płaskie z funkcją doświetlenia
			
Features: - The light tunnel provides natural light to all rooms in the building. - Even distribution of daylight in the room. - The light tunnel consists of light collecting element, flashing, light transmitting tube, diffuser and ceiling frame. **- The flexible light transmitting tube is ideal for installation in rooms with structural obstacles that have to be bypassed (reducing installation time).** **- The advised maximum tube length is 400 cm for the 350mm diameter and 600cm for the 550mm diameter** (for the lengths over 500cm hangers must be applied). • **SFD-_** - light tunnel with polycarbonate dome and equipped with integrated flashing. -**SFD-S** - flat roof coverings (2x5 mm) -**SFD-Z** - corrugated roof coverings (45 mm) -**SFD-H** - high profile roof coverings (120 mm) -**SFD-L** - flat plain tile roof coverings • **SFD-_/L** - light tunnel with dome with illumination function directly beneath it. - **SF_** flat light tunnel with integrated flashing. - **SFS** for flat roof coverings (2x5mm). - **SFZ** for corrugated roof coverings (45mm). - **SFH** for high-profile roof coverings (120mm). - **SFL** for non-interlocking slate roof coverings. - **SF_L** flat light tunnel with **illumination function directly below it.** • Option to use SLO light kit.			

LIGHT TUNNELS WITH RIGID LIGHT TRANSMITTING TUBE

SRD z kopułą	SRD-_/L z kopułą z funkcją doświetlenia	SR_ płaskie	SR_-L płaskie z funkcją doświetlenia
			
Features: - Due to minimum heat loss **recommended for buildings in which natural light is transmitted over long distances (12m).** - The light tunnel consists of light collecting element, flashing, light transmitting tube, elbow, diffuser and ceiling frame. **- Reflective layer (using pure silver) applied in the production of elements of the light transmitting tube is characterized by light reflective factors of 98%.** **- The advised maximum tube length is 1200 cm** (for the lengths over 400cm hangers must be applied). • **SRD-_** - light tunnel with polycarbonate dome and equipped with integrated flashing. -**SRD-S** - flat roof coverings (2x5 mm) -**SRD-Z** - corrugated roof coverings (45 mm) -**SRD-H** - high profile roof coverings (120 mm) -**SRD-L** - flat plain tile roof coverings • **SFD-_/L** - light tunnel with dome with illumination function directly beneath it. - **SR_** flat light tunnel with integrated flashing. - **SRS** for flat roof coverings (2x5mm). - **SRZ** for corrugated roof coverings (45mm). - **SRH** for high-profile roof coverings (120mm). - **SRL** for non-interlocking slate roof coverings. - **SR_L** flat light tunnel with **illumination function directly below it.** • Option to use SLO light kit.			

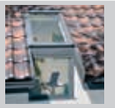
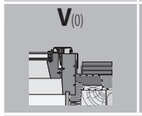
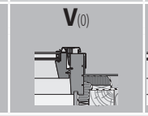
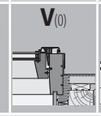
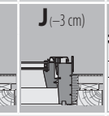
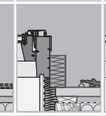
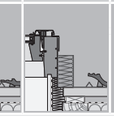
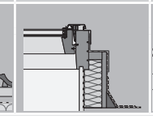
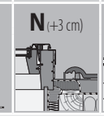
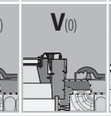
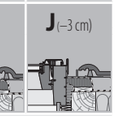
PRODUCTS - TYPES

FLASHINGS													
STANDARD FLASHINGS						ADDITIONAL FLASHINGS							
ES		**EZ**			**EH**	**EH_-AT Thermo**		**ES_-T Thermo**		**EZV-F**	**EL**		
													
Flat roof coverings up to 10mm: roofing felt, shingles, flat metal panel sheet, slates		Profiled roof coverings up to 45mm: tiles, profiled metal sheeting			High profiled roof coverings up to 90mm: tiles, profiled metal sheeting	High profiled roof coverings up to 90mm: tiles, profiled metal sheeting		Flat roof coverings up to 10mm: roofing felt, shingles, flat metal panel sheet, slates		Roof coverings up to 45mm: flat tiles	Roof coverings up to 45mm: shingles, slates		
ESV	**ESJ**	**EZN**	**EZV**	**EZJ**	**EHN**	**EHN-AT Thermo**	**EHV-AT Thermo**	**ESV-T Thermo**	**ESJ-T Thermo**	**EZV-F**	**ELV**	**ELJ**	
													

Features:
- Flashings are manufactured in polyester powder coated aluminium.
- The standard colour is RAL 7022.
- Flashings in any RAL colour are available to individual order.
- Flashings can be manufactured from titanium-zinc or copper (as standard for EE_ flashings).
- There are also available flashings with additional insulation to improve thermal insulation performance of windows.
- Wide range of FAKRO flashings ensures installation of the window in virtually all types of roof coverings.

Covering type:
- **S** – Flat roof coverings up to 10mm: roofing felt, shingles, flat metal panel sheet, slates
- **Z** – Profiled roof coverings up to 45mm: tiles, profiled metal sheeting
- **H** – High profiled roof coverings up to 90mm: tiles, profiled metal sheeting
- **L** – Roof coverings up to 45mm: shingles, slates

*** Thermo flashing provides the window with additional insulation as it enhances its U value up to 15%.**

FLASHINGS												
ADDITIONAL FLASHINGS				SPECIAL APPLICATION FLASHINGS								
EG	**EB**	**EE**		**E_A**			**EFW**	**EU**				
												
Slate roof coverings up to 32mm: plain tiles	Flat roof coverings: panel sheet metal	Flat roof coverings: flat sheet metal		Used depending on the roof covering material			Flat Roof System	For profiled roof coverings, used depending on the installation depth				
				Flat roof coverings	Profiled roof coverings	High profiled roof coverings						
EGV	**EBV-P**	**EEV**	**EEJ**	**ESA**	**EZA**	**EHA**	**EFW**	**EUN/B**	**EUV/B**	**EUJ/B**		
												

Covering type:
- **G** – Slate roof coverings up to 32mm: plain tiles
- **B** – Flat roof coverings: panel sheet metal
- **E** – Flat roof coverings: flat sheet metal

Window installation depth
- **J** (-3 cm)
- **V** (0 cm)
- **N** (+3cm)

Flexible apron material (A, P), Thermo version (T)*/other, less popular roof coverings (F, P)
- **A** – Aluminium clad - plastic apron
- **P** – Lead apron
- **F** – Flat tile

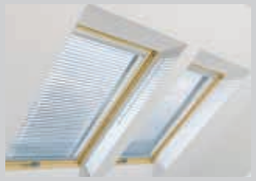
Features:
- Flashings are manufactured in polyester powder coated aluminium.
- The standard colour is RAL 7022.
- Flashings in any RAL colour are available to individual order.
- Flashings can be manufactured from titanium-zinc or copper (as standard for EE_ flashings).

Special application flashings:
- **E_A** – Flashings for changing window installation angle
  - ESA - Flashing for flat roof coverings
  - EZA - Flashing for profiled roof coverings
  - EHA - Flashing for high profiled roof coverings
- **EFW** – Flashing for roofs with pitches below 15°
- **EU_/B** – Flashing for L-shaped combinations

PRODUCTS – TYPES

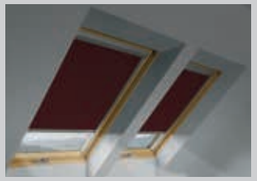
ACCESSORIES FOR ROOF WINDOWS

INTERNAL ACCESSORIES

VENETIAN BLINDS	ROLLER BLINDS	
AJP, AJP Z-Wave	**ARS**	**ARP, ARP Z-Wave**
		
Features: - Possibility of directing the stream of light. - Adjustment of slats to change the amount of light entering the room. - Window can be partially covered. - Reduction of heat gain in the room. - Provision of privacy.	**Features:** - Gradual reduction of incoming light. - Possibility to lock the blind in one of three positions. - Effective protection from the sun. - Wide range of colours. - Provision of privacy.	**Features:** - Gradual reduction of incoming light. - Partial protection against heat of the sun. - Protection against UV radiation. - Lockable in any position thanks to the side guides. - Wide range of colours. - Provision of privacy.
Control mode: - **AJP** - manual operation. - **AJP Z-Wave** - the electric drive controls the angle of slats. Operated by a remote control or wall switch; powered from the mains. The operation is possible only when the window is closed.	**Control mode:** • **ARS** - manual operation.	**Control mode:** - **ARP** - manual operation. - **ARP Z-Wave** - equipped with 15V electric drive to enable operation using remote control or wall switch. The operation is possible only when the window is closed.
Available fabric groups: Group I (1 colour), Group II(25 colours).	**Available fabric groups:** Group I (43 colours), Group II (10 colours).	**Available fabric groups:** Group I (43 colours), Group II (2 colours), Group III (11 colours).

ACCESSORIES FOR ROOF WINDOWS

INTERNAL ACCESSORIES

BLACKOUT BLINDS	PLEATED BLINDS		INSECT SCREEN
ARF, ARF Z-Wave	**APS**	**APF**	**AMS**
			
Features: - Variable reduction of incoming light. - Protection against heat of the sun. - Reduction of heat loss from the room in winter. - Lockable in any position thanks to the side guides. - Provision of privacy.	**Features:** - Diffused lighting effect and harmony of colours. - Variable reduction of incoming light. - Partial protection against heat gain. - Lockable in any position thanks to the side guides. - Top-down system - easy operation by means of an upper and lower bar.	**Features:** - Variable reduction of incoming light. - Partial protection against heat gain. - Lockable in any position thanks to the side guides. - Top-down system - easy operation by means of an upper and lower bar. - Provision of privacy. - Fabric with a honeycomb structure and an internal aluminium coating provides blackout and good thermal performance.	**Features:** - Protection of the room against insects with the window left open. - Minimal reduction of incoming light. - Mesh made of fibre glass coated with PVC. - Aluminium guides in silver or white colour. The only accessory mounted onto the face of the window reveal, not the window.
Control mode: - **ARF** - manual operation. - **ARF Z-Wave** - equipped with 15V electric drive to enable operation using remote control or wall switch. The operation is possible only when the window is closed.	**Control mode:** • **APS** - manual operation.	**Wersje sterowania:** • **APF** - manual operation.	**Wersje sterowania:** • **AMS** - manual operation.
Available fabric groups: Group I (2 colours), Group II (22 colours), Group III (6 colours)	**Available fabric groups:** Group I (12 colours), Group II (12 colours).	**Available fabric groups:** Group I (1 colour), Group II (12 colours).	

PRODUCTS – TYPES

ACCESSORIES FOR ROOF WINDOWS

EXTERNAL ACCESSORIES

AWNING BLINDS

AMZ, AMZ Z-Wave, AMZ Solar

Application:
AMZ, AMZ Z-Wave, AMZ Solar
- Pivot windows.
- Top hung and pivot windows.

AME
- FEP panoramic windows

Features:
- The best protection against tiresome heat (8 times more effective when compared with internal blinds).
- Protection against UV radiation.
- Improved Uw parameter.
- Reduction of heat loss from the room in winter.
- Protection against light reflection on computer and TV screen.
- Effective shading without restricting views to the outside.
I

Control mode:
- **AMZ** - manual operation (operated by means of control rod)
- **AMZ Z-Wave** - operated by remote control or wall switch; powered from the mains (15V).
- **AMZ Solar** - operated by remote control; powered by solar battery pack.
- **AMZ Electro 230** - operated by wall switch; powered from the mains.
- **AMZ Electro 12** - operated by wall switch; powered from the mains (15V).
- **AMZ Electro Solar** - operated by wall switch; powered by solar battery pack.

Fabric type	Value depending on the glazing unit								
	P5			R3			U3		
	g_t	$\tau_{v,t}$	F_c	g_t	$\tau_{v,t}$	F_c	g_t	$\tau_{v,t}$	F_c
AMZ-088	0.094	0.168	0.195	0.091	0.166	0.198	0.125	0.185	0.236
AMZ-089	0.118	0.070	0.247	0.115	0.069	0.250	0.157	0.078	0.296
AMZ-090	0.087	0.064	0.182	0.085	0.063	0.185	0.122	0.071	0.230
AMZ-091	0.141	0.166	0.293	0.136	0.165	0.296	0.168	0.182	0.317
AMZ-092	0.054	0.019	0.113	0.053	0.019	0.115	0.086	0.021	0.162
AMZ-093	0.090	0.085	0.189	0.088	0.084	0.191	0.114	0.093	0.215
AMZ-094	0.172	0.199	0.358	0.166	0.197	0.361	0.203	0.219	0.383
AMZ-097	0.098	0.077	0.204	0.096	0.076	0.209	0.134	0.085	0.253

ROLLER SHUTTERS

ARZ-H, ARZ Z-Wave, ARZ Solar

Application:
ARZ-H
-Wooden pivot windows.
- Wooden top hung and pivot windows.
ARZ Z-Wave, ARZ Solar
- Pivot windows.
- Top hung and pivot windows.

Can be installed on windows in vertical combinations with a distance of minimum 20cm between windows and in horizontal combinations maintaining 10cm between windows.

Features:
• Protection from tiresome heat.
- Protection against UV radiation.
- Reduction of heat loss from the room in winter.
- Darkening of the interior.
- Burglary protection

Control mode:
• **ARZ-H** - manual operation (operated by means of crank)
• **ARZ Z Wave** - operated by remote control or wall switch; powered from the mains (15V).
• **ARZ Solar** - operated by remote control; powered by solar battery pack.

Fabric type	Value depending on the glazing unit								
	P5			R3			U3		
	g_t	$\tau_{v,t}$	F_c	g_t	$\tau_{v,t}$	F_c	g_t	$\tau_{v,t}$	F_c
ARZ-101	0.013	0.000	0.027	0.013	0.000	0.028	0.023	0.000	0.043
ARZ-102	0.030	0.000	0.063	0.030	0.000	0.065	0.054	0.000	0.102

g_t - coefficient of the total solar energy transmittance through glazing along with a sun screening device (Solar Factor).
F_C - coefficient describing effectiveness of sun screening device against solar radiation energy.
$\tau_{v,t}$ - coefficient of glazing light transmission with sun screening device.

Parametry g_t, $\tau_{v,t}$, parameters calculated according to PN-EN 13363-1+A1 standard (FAKRO internal calculations).

ACCESSORIES FOR WINDOWS

EXTERNAL ACCESSORIES

AWNING BLINDS

VMZ, VMZ Z-Wave, VMZ Solar

Application:
- Vertical windows (aluminium, PVC, wood).
- External side (windows, balcony doors).

Features:
- Effective protection against tiresome heat (8 times more effective when compared with internal blinds).
- Protection against UV radiation.
- Improved Uw parameter.
- Reduction of heat loss from the room in winter.
- Even distribution of light.
- Shading of the room.
- Provision of privacy.
- Ingress of natural light and view to the outside.
- Protection against insects as VMZ blinds act as insect screens.

Control mode:
• **VMZ** - manual operation (operated by means of control rod)
• **VMZ Z-Wave** - operated by remote control or wall switch; powered from the mains (15V).
• **VMZ Solar** - operated by remote control; powered by solar battery pack.
It is equipped with solar insolation sensor and can be operated in one of three control modes:
- Automatic (automatically unrolls and rolls up depending on the insolation level).
- Semi-automatic (automatically unrolls, it is rolled up using a remote control).
- Operated by means of included remote control.
• **VMZ Electro 230** - operated by wall switch; powered from the mains.
• **VMZ Electro 12** - operated by wall switch; powered from the mains (15V).
• **VMZ Electro Solar** - operated by wall switch; powered by solar battery pack.

Available price groups:
Group I (6 colours; 10% relative open area),
Group II (2 colours; 1% relative open area),
Group III (8 colours; 6% relative open area).

ROLL-UP AWNINGS

VMB Z-Wave, VMB Solar

Application:
- Vertical windows (aluminium, PVC, wood).
- External side (windows, balcony doors).

Features:
- Effective protection against tiresome heat (8 times more effective when compared with internal blinds).
- Protection against UV radiation.
- Improved Uw parameter.
- Reduction of heat loss from the room in winter.
- Even distribution of light.
- Shading of the room.
- Provision of privacy.
- Ingress of natural light and view to the outside.

Control mode:
• **VMB Z-Wave** - operated by remote control or wall switch; powered from the mains (15V).
• **VMB Solar** - operated by remote control; powered by solar battery pack.
It is equipped with solar insolation sensor and can be operated in one of three control modes:
- Automatic (automatically unrolls and rolls up depending on the insolation level).
- Semi-automatic (automatically unrolls, it is rolled up using a remote control).
- Operated by means of included remote control.
• **VMB Electro 230** - operated by wall switch; powered from the mains.
• **VMB Electro 12** - operated by wall switch; powered from the mains (15V).
• **VMB Electro Solar** - operated by wall switch; powered by solar battery pack.

Available price groups:
Group I (6 colours; 10% relative open area),
Group II (2 colours; 1% relative open area),
Group III (8 colours; 6% relative open area),
Group IV (20 colours; 0% relative open area, transparent fabric).

NON-STANDARD SOLUTIONS

Curved window

Window with a mullion bar

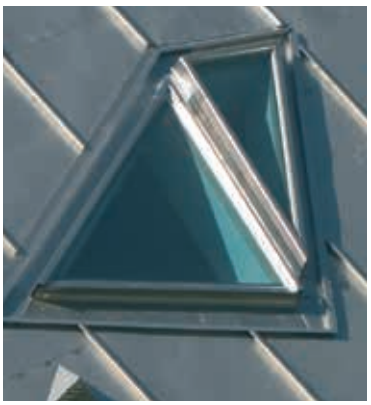
Among non-standard solutions we offer unusual shapes, sizes and colours of windows, a full range of glazing that meets the diverse needs of the user as well as solutions allowing for the unique application of roof windows.

CURVED WINDOW

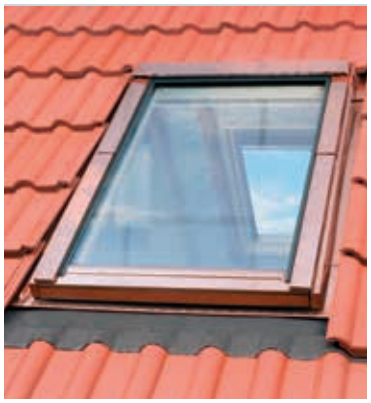
The curved window is a special structure with a curved frame, sash and glazing unit. The steel covering profiles are also adjusted to the window's shape. It is a pivot type window with a handle situated on the lower part of the sash. The curved window is a non-standard product designed and manufactured to individual order.

WINDOW WITH A MULLION BAR

The FAKRO window with a mullion bar is designed for historic or stylised buildings. Its characteristic feature is black vertical mullion bar in the middle of the glazing, cladding and flashing (colour RAL 9005) which suits traditional construction.
By using FAKRO windows with a mullion bar we can keep the unique, historic character of the building from the outside and create a comfortable and modern interior. Windows with a mullion bar feature all advantages of FAKRO roof windows. They are available in standard sizes in the following versions: pivot windows, top hung and pivot windows and roof access windows.
The windows are manufactured to individual order.



Various window shapes



Window in copper CU flashing

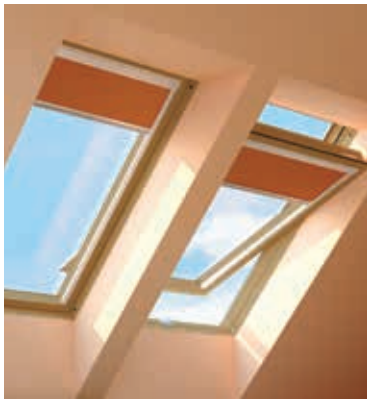
Window in titanium-zinc TC flashing

VARIOUS WINDOW SHAPES

FAKRO windows can be manufactured in any shape required. The glazing combination consists of a toughened outer and inner pane with a low emission coating on the inner pane 4H-16-4HT. These types of windows are all non-opening. When ordering non-standard windows, please indicate the roof pitch and type of roof covering. A drawing of the window will be needed with all dimensions and internal angles. Any order should also indicate whether the window is to be installed on its own or in combination with other windows.

COPPER AND TITANIUM-ZINC CLADDING

The outer cladding of the window and flashing can be made not only of aluminium but to suit specific customer needs can be made of copper CU or titanium zinc TC as well (bare rolled as standard, other available to individual order).



COLOUR PALETTE

Wooden elements – RAL palette
To suit customer preference, wooden elements of the window can be painted in any colour chosen from the RAL palette. It ensures excellent interior finish and décor.

Wooden elements coated with Lazure lacquer
The window sash and frame can be also coated with Lazure lacquer in any of five chosen colours: mahogany, walnut, light oak, teak, afromosia. The samples are available in FAKRO swatches.
On request, FAKRO will send samples for acceptance.

Non-standard colours of the flashing
To suit customer preference, FAKRO offers exterior metal coverings for windows and flashings in any colour chosen from the RAL palette. All flashings and exterior metal coverings can be matched exactly to the most unusual roof colours.

Tinted glazing

Obscure glass

GLAZING UNITS

Tinted glazing – W

It limits penetration of sun into the room. This glass is available in a range of colours: blue, brown, grey and green. Tinted glass is toughened and placed on the outer pane of the double-glazing. The inside pane features a low emission coating.

W1	Blue	4H – Tg16Ar – 4T	$\tau_V = 54\%$	$\tau_{UV} = 17\%$	g = 36%
W2		4H – Tg14Ar – 33.1T	$\tau_V = 54\%$	$\tau_{UV} = 1\%$	g = 36%
W3	Brown	4H – Tg16Ar – 4T	$\tau_V = 52\%$	$\tau_{UV} = 11\%$	g = 41%
W4		4H – Tg14Ar – 33.1T	$\tau_V = 52\%$	$\tau_{UV} = 0\%$	g = 41%
W5	Graphite	4H – Tg16Ar – 4T	$\tau_V = 48\%$	$\tau_{UV} = 12\%$	g = 39%
W6		4H – Tg14Ar – 33.1T	$\tau_V = 48\%$	$\tau_{UV} = 0\%$	g = 39%
W7	Green	4H – Tg16Ar – 4T	$\tau_V = 67\%$	$\tau_{UV} = 12\%$	g = 41%
W8		4H – Tg14Ar – 33.1T	$\tau_V = 66\%$	$\tau_{UV} = 0\%$	g = 41%

Obscure glass – O

O1, O2 - One side of the window is smooth, while the other side has regular or irregular patterns with different motifs. The patterned surface is on the outside of the window with smooth glass on the inside for ease of cleaning. Obscure glass is toughened and is used on the outer pane of the double-glazing. The inside pane features a low emission coating.

O4 - single chamber glazing unit equipped with satin (milky) toughened outer pane.

O5 - single chamber glazing unit equipped with opaque (milky) laminated inner pane class P2A (according to EN 356).

01	4HO–Tg16Ar–4T	$\tau_V = 88\%$	$\tau_{UV} = bd$	g = 49%
02	4HO–Tg14Ar–33.1T	$\tau_V = 67\%$	$\tau_{UV} = bd$	g = 49%
04	4H(satyna)–Tg16Ar–4T	$\tau_V = 76\%$	$\tau_{UV} = 24\%$	g = 55%
05	4HT–Tg15(14)Ar–33.2(mat)	$\tau_V = 44\%$	$\tau_{UV} = bd$	g = 48%

τ_V – sun's rays transmission

τ_{UV} – UV rays transmission

g – total transmission of solar energy (solar factor)

Reflective glass

Stained glass

GLAZING UNITS

Reflective glass – H

It reflects solar radiation, acting from the outside like a mirror. Available in the following colours: blue, brown, graphite and green. It is also available as reflective glass in a clear version. Reflective glass is toughened and is used on the outer pane of the double glazing. The inside pane features a low emission coating.

H0	Blue	6RH – Tg14Ar – 4T3	$\tau_V = 35\%$	$\tau_{UV} = 8\%$	g = 24%
H1		6RH – Tg12Kr – 33.1T3	$\tau_V = 34\%$	$\tau_{UV} = 0\%$	g = 24%
H2	Brown	4RH – Tg16Ar – 4T3	$\tau_V = 23\%$	$\tau_{UV} = 4\%$	g = 23%
H3		4RH – Tg14Ar – 33.1T3	$\tau_V = 23\%$	$\tau_{UV} = 0\%$	g = 23%
H4	Graphite	4RH – Tg16Ar – 4T3	$\tau_V = 21\%$	$\tau_{UV} = 4\%$	g = 22%
H5		4RH – Tg14Ar – 33.1T3	$\tau_V = 21\%$	$\tau_{UV} = 0\%$	g = 22%
H6	Green	4RH – Tg16Ar – 4T3	$\tau_V = 29\%$	$\tau_{UV} = 4\%$	g = 21%
H7		4RH – Tg14Ar – 33.1T3	$\tau_V = 29\%$	$\tau_{UV} = 0\%$	g = 21%
H8	Clear	4RH – Tg16Ar – 4T3	$\tau_V = 33\%$	$\tau_{UV} = 8\%$	g = 30%
H9		4RH – Tg14Ar – 33.1T3	$\tau_V = 54\%$	$\tau_{UV} = 0\%$	g = 42%

Stained-glass pane

The stained-glass pane is a type of glazing unit with an individual and permanent pattern. It is obtained through super-imposition of a resin outline onto the pane's surface. The space between the lines is filled with coloured resin.

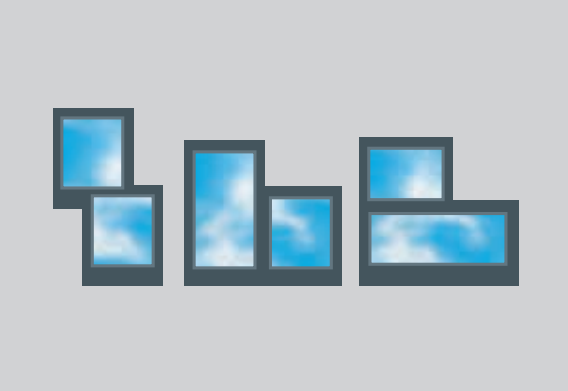
The resin outline is not transparent. The coloured space between the lines is partly transparent depending on the dye intensity. It is also possible to leave the sole outline on the pane. The stained-glass pattern for cleaning reasons and visual effects is placed on the inside of the glazing unit. It is possible to lay down on the pane any one of 200 patterns or to design a new one, suiting the Customer's taste.

Pictures of possible stained glass patterns are to be found at www.**fakro**.com

τ_V – *sun's rays transmission*

τ_{UV} – *UV rays transmission*

g – total transmission of solar energy (solar factor)



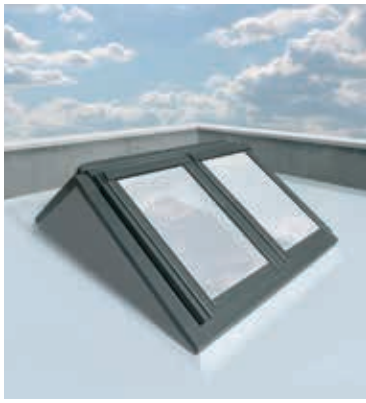
FLASHINGS

Non-standard combinations
In cases where the installation of windows side by side does not allow the use of typical flashing solutions, special non-standard combinations are manufactured to customer request. Such combinations are designed and made individually bearing in mind all the relevant window size details. The price of non-standard flashings is calculated individually.
Order processing time – 30 days.

When ordering, a drawing of the window (view from outside) is required.

Ridge combination

Mansard combination



Flat Roof Gable System

FLASHINGS

Flashings ESV DUO, EZV-A DUO
DUO flashings offer special solution that allows for horizontal combination of two roof windows. The E_V 18 DUO flashing enables the installation of windows with a minimum distance between them (18 mm) in horizontal combination using the XR_ 18 auxiliary rafter. If external roller shutters are used, the E_V 40 DUO flashing should be applied, in which the window spacing width is 40 mm. The XR_ 40 auxiliary rafter is used for connecting windows from the inside.

Ridge combination ERN-H, ERV-S, ERV-Z, ERV-L
These flashings enable roof windows on opposite sides of the ridge to be joined. Windows are linked together by the top element of the flashing. Windows joined at the ridge are fitted in roofs with pitches between 15° and 55°, though the internal roof angle should be between 70° and 150°. Ridge combination flashings can be manufactured from aluminium, copper or titanium-zinc.

Mansard combination KMV, KMV-L
Modules for mansard combination are used for fitting roof windows in mansard roofs. Windows are positioned one above the other and joined with the mansard module.
The top window is installed at angles between 15° and 60°, while the lower window between 45° and 90°. The internal angle of the mansard roof should be between 105° and 150°.
The mansard module can be manufactured in aluminium, copper or titanium-zinc.

Flat Roof Gable System EFR
The flat roof gable system enables installation of roof windows in one combination in roofs with pitches between 0° and 15°. The gabled, wooden structure with a complete set of flashings reduces to minimum the time required to create an aesthetic solution that effectively illuminates the room. The distance between adjacent windows is 40mm. The flashing is manufactured in aluminium.

ACTUAL DIMENSIONS OF WINDOWS

Window dimensions [cm]
actual wooden window frame external dimensions [mm]
actual aluminium clad - plastic window frame external dimensions [mm]
() actual L-shaped window frame external dimensions [mm]
[] actual non-opening window frame external dimensions [mm]