GENERAL INFORMATION

GENERAL INFORMATION ON ROOF WINDOWS

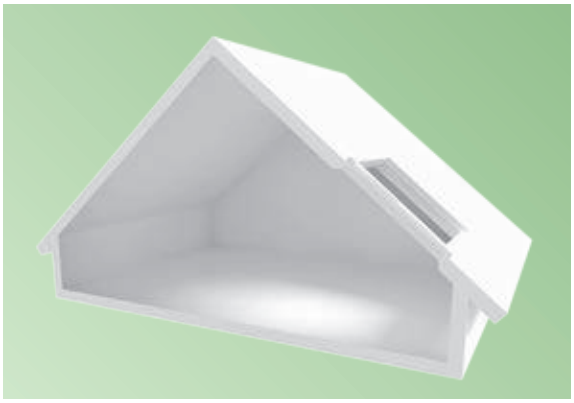
ROOF WINDOW VS DORMER

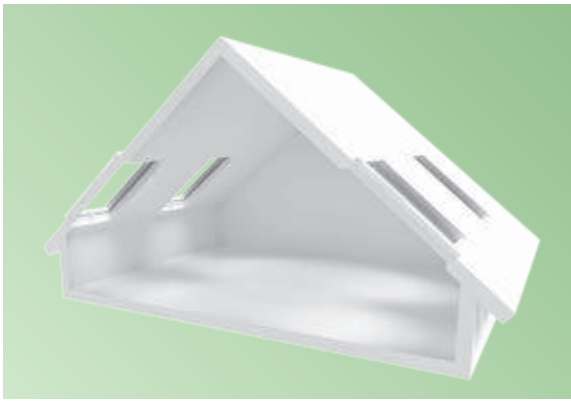
A roof window is a much more advantageous solution when compared with the dormer because:

- 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





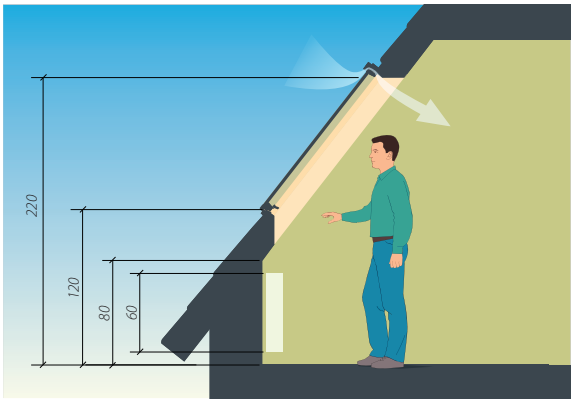
CHOOSING THE ROOF WINDOW

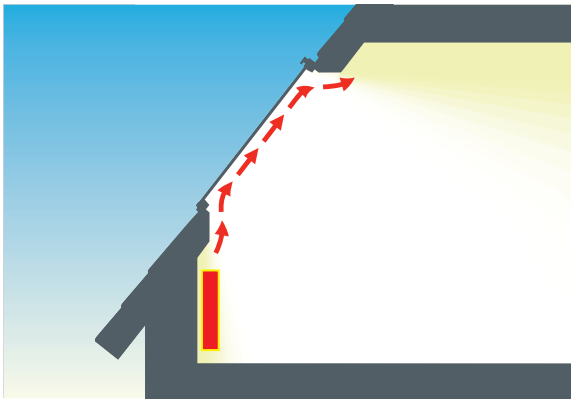
The choice of roof windows depends on:
- intended use, type and height of the room;
- pitch of the roof.

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



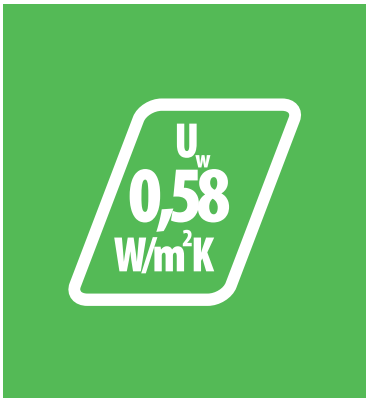


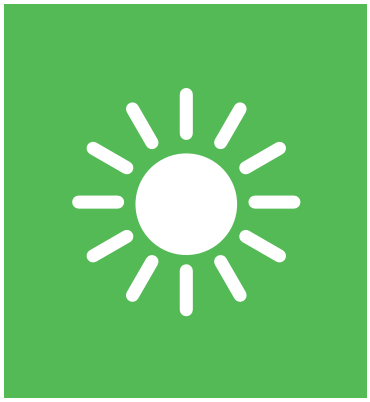
WINDOW INSTALLATION HEIGHT

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?

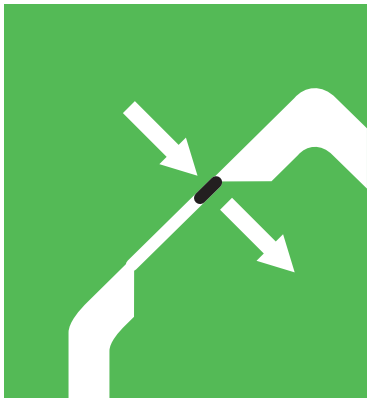
SAFETY
- HIGH SENSE OF SAFETY

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

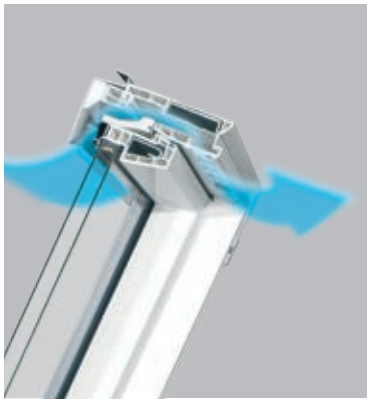
Pinewood coated with acrylic lacquer
The primary raw material used for the manufacture of roof windows is the highest quality pinewood glued in layers. The wood is vacuum impregnated and coated with ecological acrylic lacquer in natural colour.

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

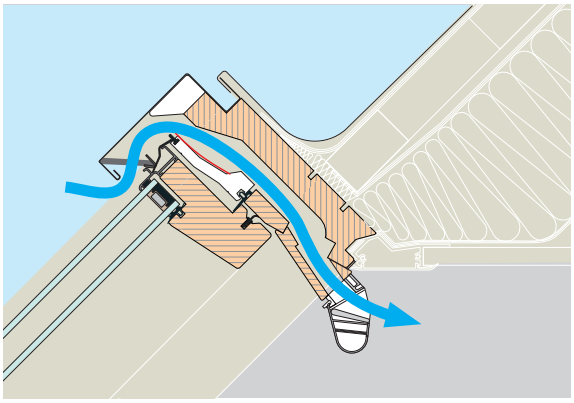
Air inlets in FAKRO windows are positioned in the top part of the frame. They ensure very good filtration properties and acoustic insulation as well as do not reduce glazing area.

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



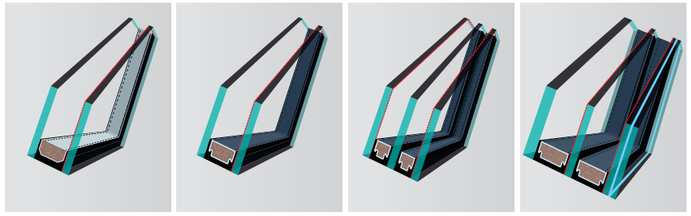
ADDITIONAL AIR INLET

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.

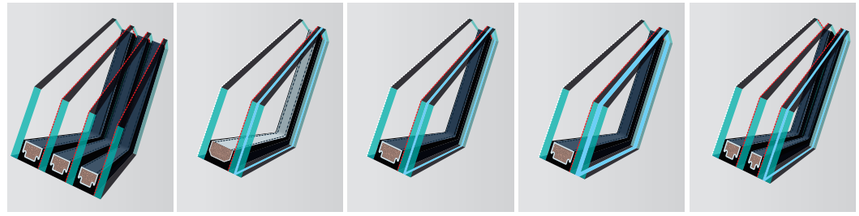
FAKRO air inlets feature a continuous adjustment facility with an option of complete air inlet closing. Once closed, the air inlet (automatic air inlet as well) does not work. Windows with the air inlet (e.g. FTP-V) when closed achieve air tightness Class III according to EN 12207.

ROOF WINDOW CONSTRUCTION

STANDARD GLAZING UNITS



GLAZING UNIT	U2	U3	U5	U6
TECHNICAL SPECIFICATION	Energy saving	Energy saving	Highly energy efficient	Highly energy efficient
Ug (as per EN 673)	1.1 W/m²K	1.0 W/m²K	0.5 W/m²K	0.5 W/m²K
GLAZING STRUCTURE	4H-16-4T	4H-16-4T	4HT-10-4H-10-4HT	6H-18-4HT-18-33.2T
GLAZING	SINGLE CHAMBER	SINGLE CHAMBER	DOUBLE CHAMBER	DOUBLE CHAMBER
TOUGHENED **OUTER PANE**	+	+	+	+
OUTER PANE WITH EASY MAINTENANCE LAYER	—	—	—	—
LAMINATED **INNER PANE**	—	—	—	+ (class P2A)
SPACER	STEEL	WARM TGI	WARM TGI	WARM TGI
INERT GAS	ARGON	ARGON	KRYPTON	ARGON
SUN RAYS TRANSMISSION (τ_v)	0.82	0.70	0.73	0.62
SUN ENERGY TRANSMISSION (SOLAR FACTOR g)	0.64	0.53	0.53	0.47
UV RAYS TRANSMISSION (τ_{UV})	0.37	0.26	0.28	0.01

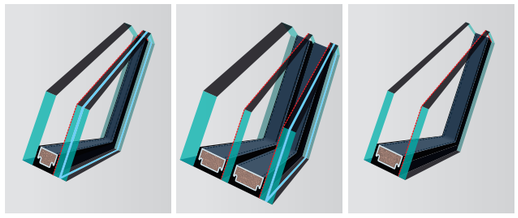


U8	P1	P2	P4	P5**
Passive glazing	Anti-burglary	Anti-burglary	Anti-burglary	Anti-burglary
0.3 W/m²K	1.1 W/m²K	1.0 W/m²K	1.0 W/m²K	0.5 W/m²K
4H-12-4HT-12-4HT-12-4HT	4HS-14-33.2T	4HS-15-33.2T	4HS-15-33.4T	4HS-10-4HT-8-33.2T
TRIPLE CHAMBER	SINGLE CHAMBER	SINGLE CHAMBER	SINGLE CHAMBER	DOUBLE CHAMBER
+	+	+	+	+
—	+	+	+	+
—	+ (class P2A)	+ (class P2A)	+ (class P4A) as per EN 356	+ (class P2A)
WARM TGI	STEEL	WARM TGI	WARM TGI	WARM TGI
KRYPTON	ARGON	ARGON	ARGON	KRYPTON
0.66	0.70	0.70	0.68	0.63
0.48	0.52	0.52	0.48	0.48
<0.01	0.01	0.01	—	0.01

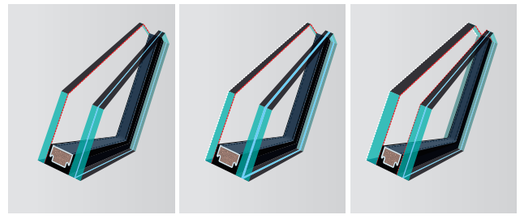
In P1, P2 and P5 glazing units, the external pane is toughened and coated with an easy maintenance layer which prevents the build-up of dirt on the glass and helps to keep the window clean. In the first stage, the coating absorbs ultra-violet light from the sun causing a reaction on the glass surface 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.

ROOF WINDOW CONSTRUCTION

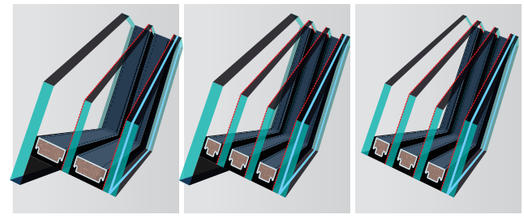
STANDARD GLAZING UNIT



GLAZING UNIT	R1	R3	Z6
TECHNICAL SPECIFICATION	Sound reducing	Sound reducing	Energy saving
Ug (as per EN 673)	1.0 W/m²K	0.5 W/m²K	1.1 W/m²K
GLAZING STRUCTURE	6H-12-33.2T	8H-16-4HT-18-33.2T	4H-16-4HT
GLAZING	SINGLE CHAMBER	DOUBLE CHAMBER	SINGLE CHAMBER
TOUGHENED OUTER PANE	+	+	+
OUTER PANE WITH EASY MAINTENANCE LAYER	—	—	—
LAMINATED INNER PANE	+ (class P2A)	+ (class P2A)	—
SPACER	WARM TGI	WARM TGI	WARM TGI
INERT GAS	KRYPTON	ARGON	ARGON
SUN RAYS TRANSMISSION (τ_v)	0.69	0.62	0.81
SUN ENERGY TRANSMISSION (SOLAR FACTOR g)	0.52	0.46	0.64
UV RAYS TRANSMISSION (τ_{UV})	0.01	0.01	0.43



G2	G4	G6
Solar control	Solar control	Solar control
1.0 W/m²K	1.1 W/m²K	1.0 W/m²K
4HT-15-33.1T	4HST-14-33.2T	6HST-12-33.1T
SINGLE CHAMBER	SINGLE CHAMBER	SINGLE CHAMBER
+	+	+
—	+	+
+	+ (class P2A)	+
WARM TGI	WARM TGI	WARM TGI
ARGON	ARGON	KRYPTON
0.40	0.62	0.60
0.23	0.30	0.31
0.01	0.01	0.01

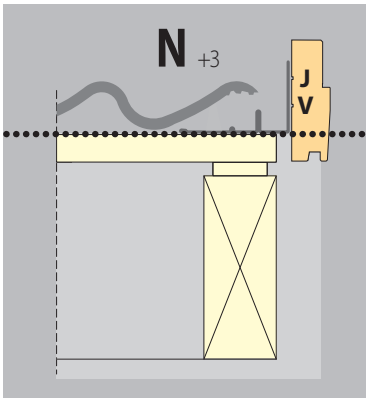


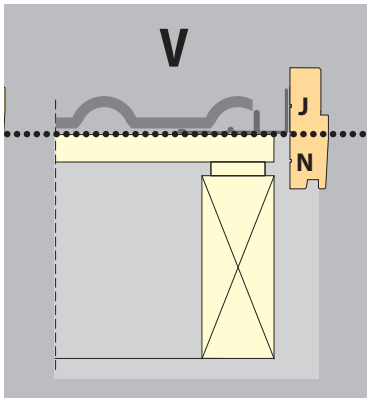
DU6*	DU8	U8 VSG
Highly energy efficient	Passive glazing	Passive glazing
0.5 W/m²K	0.3 W/m²K	0.3 W/m²K
6H-18-4HT-18-44.2T** 6H-16-4HT-18-55.2T**	6H-10-4HT-12-4HT-12-33.2T** 6H-10-4HT-10-4HT-12-44.2T**	4H-10-4HT -12-4HT-12-33.2T
DOUBLE CHAMBER	TRIPLE CHAMBER	TRIPLE CHAMBER
+	+	+
—	—	—
+ (class P2A)	+ (class P2A)	+ (class P2A)
WARM TGI	WARM TGI	WARM TGI
ARGON	KRYPTON	KRYPTON
0.52	0.40	0.57
0.40	0.30	0.43
npd	npd	npd

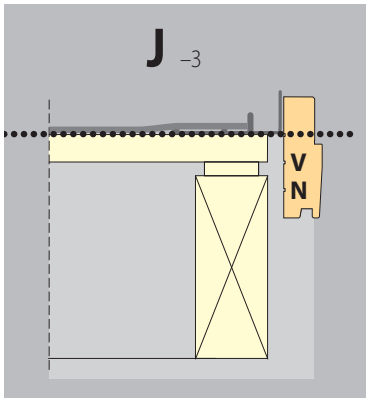
* outer reflective pane

** glazing unit depending on the size

UNIVERSAL INSTALLATION SYSTEM





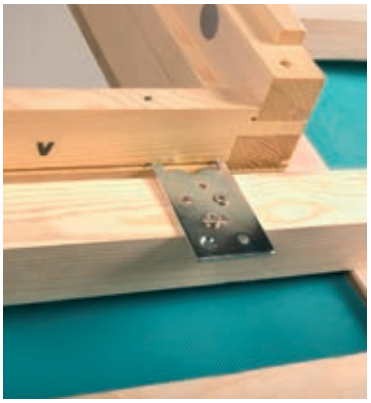


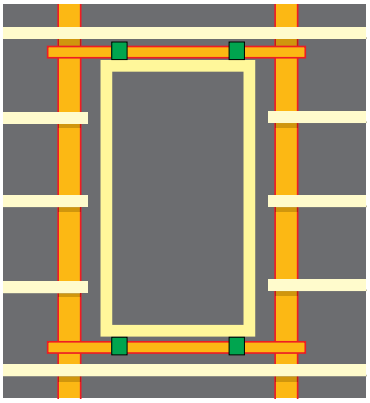
BRACKETS

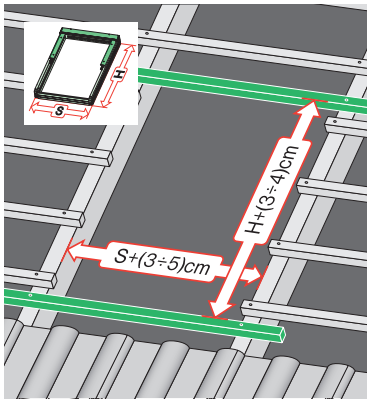
FAKRO roof windows are equipped with universal brackets, which allow installation either on battens or on rafters. Depending on the roof covering type, FAKRO roof windows can be mounted at three installation depths:

- 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







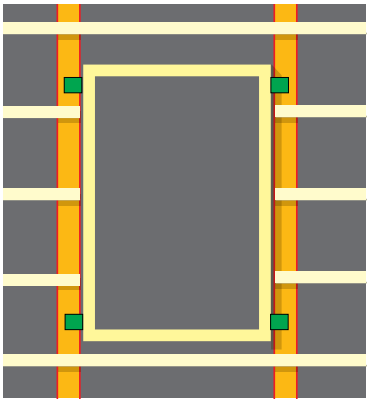
INSTALLATION ON BATTENS

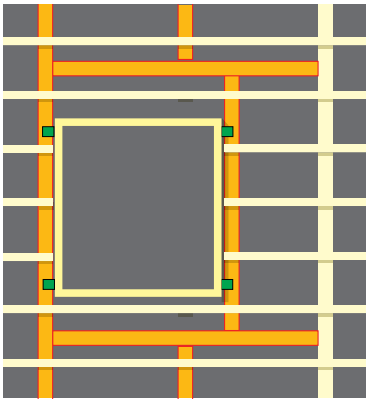
Installation type depends on the window size and roof structure. The roof window is installed on battens when the rafter spacing is bigger than the window width.

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

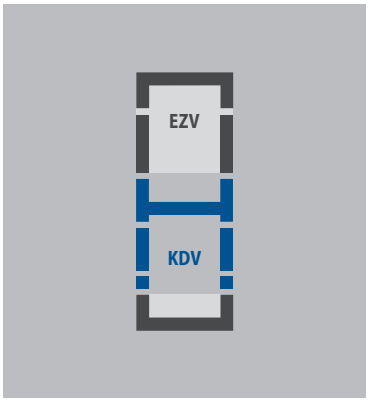
Combination flashing are ready made flashing systems for joining windows in groups:
- horizontal
- vertical
- block.

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.

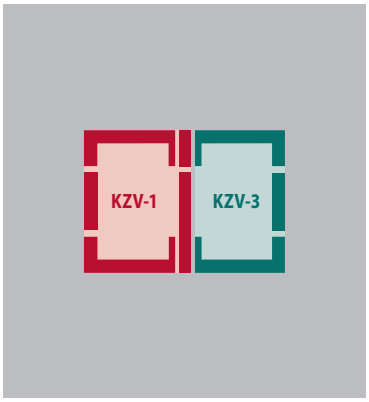
The FAKRO combination system enables to install all types of FAKRO roof windows: top hung and pivot windows as well as centre pivot. With uniform design of external cladding, windows featuring different structures can be combined into groups.

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.

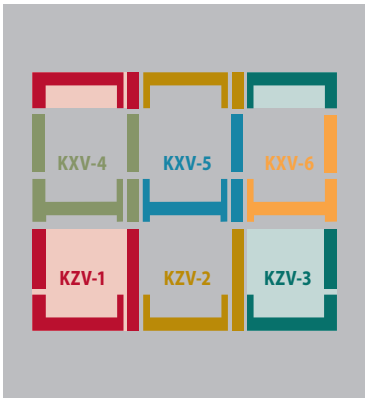
UNIVERSAL INSTALLATION SYSTEM



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
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, 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.

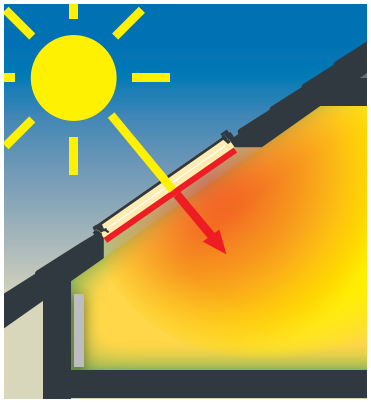
Protection from UV rays - AJP, ARS, ARP, ARF, APS, AMZ, ARZ
Internal and external accessories reduce penetration of UV radiation into the room. They protect materials and furniture placed in the room from fading.

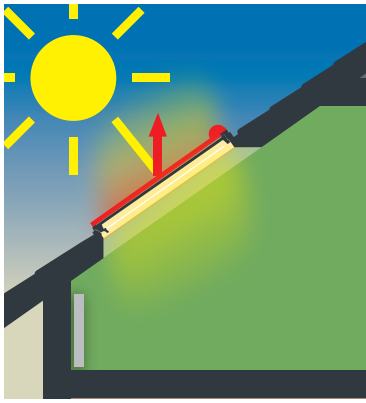
Protection of privacy - AJP, ARS, ARP, ARF, APS, AMZ, ARZ
Accessories for roof windows protect your house interior against viewers and ensure a feeling of privacy.

Easy installation - AJP, ARS, ARP, ARF, APS, 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





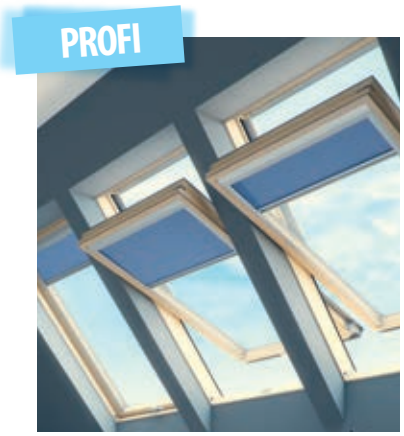
PROTECTION FROM OVERHEATING

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.

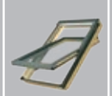
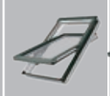
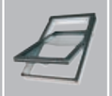
ROOF WINDOWS – LUX

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.

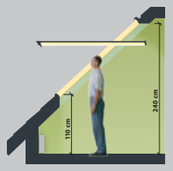
PRODUCTS – TYPES

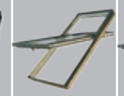
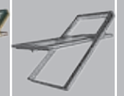
ROOF WINDOWS

PIVOT

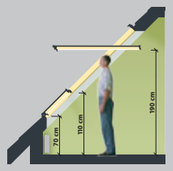
FTS	FTS-V	FTP-V	FTU-V	FTT	PTP	PTP-V
						
Pivot windows are the basic type of roof windows ensuring a flow of fresh air and allowing light into the room. These windows open only in a centre pivot method and can be rotated through 180° to clean the outer pane from within the loft and operate the awning blind. Centre pivot windows can be equipped with both external and internal accessories.						

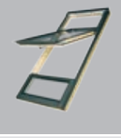
WITH RAISED AXIS OF ROTATION



FYP-V proSky	PYP-V proSky
	
The axis of rotation is situated above the centre of the window, so even a tall person can easily walk up to the window edge. Window ensures a very good illumination, ventilation and provides a wide view to the outside. The lower part of the sash fulfils a top hung window function and the upper part of the sash is an additional source of daylight. The only roof windows on the market when installed in roofs with pitches 39°- 43° satisfy the requirements of DIN 5034-1 standard, according to which the bottom window edge has to be situated 95cm above the floor level and the top minimum 220 cm. Window with raised axis of rotation opens in centre pivot method and can be locked for cleaning at 160°. Windows can be equipped with both external and internal accessories.	

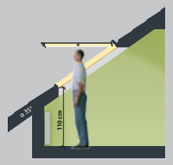
WITH RAISED AXIS OF ROTATION WITH LOWER TRANSOM

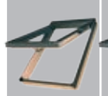


FDY-V U3 Duet proSky

There are two sashes placed in one frame of FDY-V window. The upper sash is opened like a pivot window but its axis of rotation is situated above the centre of the window. The lower sash is non-opening with internal pane laminated. This window structure eliminates the need for traditional vertical combinations, hence offering a very good illumination, ventilation and a very wide view to the outside.

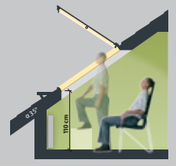
ROOF WINDOWS

TOP HUNG AND PIVOT



FPP-V preSelect	FPU-V preSelect	PPP-V preSelect
		
Top hung and pivot windows allow light and fresh air into the room, ensure unobstructed access to the window and a wide view to the outside through the open window. They can be opened in two ways: - the outward opening function from 0° to 35° enables an easy approach to the window and a wide view - the centre pivot function is used for cleaning the window and operating the awning blind Top hung ad pivot windows can be equipped with external and internal accessories.		

PANORAMIC



FEP

Panoramic windows are distinguished with large dimensions allowing light and fresh air into the room. The window opens to a wide angle and allows for access to the roof. These windows can be opened: - outward opening function opens to 40°, enabling easy approach to the window and offering an unrestricted view - outward opening function to 68°. The large dimensions of these windows and a big sash-opening angle enable you to easily access the roof as well as meet all emergency escape regulations. - the centre pivot function is used for cleaning the window and operating the awning blind. Panoramic windows can be equipped with external and internal accessories.

BALCONY

FGH-V Galeria

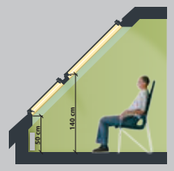
Balcony windows are innovative, large roof windows whose sashes when opened create a balcony. The upper sash opens without steps up to 45°. The lower sash can be tilted forward. In order to close the window, locks located by the rails of the frame have to be released. Side safety barriers are integrated into the bottom sash and slide out during opening. When closing the lower sash, balcony rails are hidden inside the window and are not visible above the roof surface. The window is operated by the handle located at the bottom of the upper sash. The window features a multi-point locking system, without a traditional locking assembly. After turning the handle, the sash is locked at two sides of the frame.

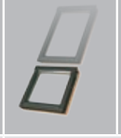
WINDOWS FOR COMBINATION

L-SHAPED COMBINATION WINDOW

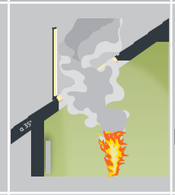
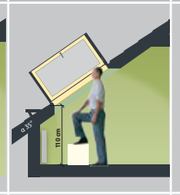
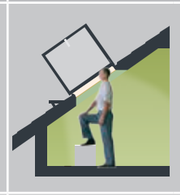
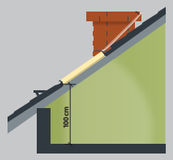
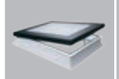
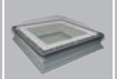
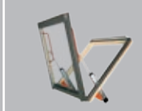
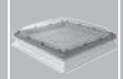
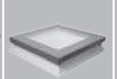
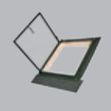
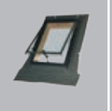
BDL, BDR BVP L3 BXP L3

The L-shaped combination windows are installed in a vertical wall in combination with roof windows. This results in the amount of light entering the room, good ventilation and the field of view being greatly increased. The L-shaped combination windows can be opened in tilt and turn (BD_) and in tilt (BVP) mode. BXL is non-opening window. The L-shaped windows can be equipped with internal accessories.



FTP/D FTU/D	FXP FXU
	
The FT_/D windows for combinations are centre pivot opening. They are typically installed beneath a standard roof window of any design or mounted above the roof window. They are available in natural colour (FTP/D) and white (FTU/D). The FX_ windows for combinations are non-opening windows mounted only beneath a standard roof window. They are available in natural colour (FXP) and white (FXU). Windows for combinations ensure better illumination of the room and enhance the field of view.	

PRODUCTS – TYPES

ROOF WINDOWS						ACCESS ROOF LIGHTS		
FOR FLAT ROOFS		SMOKE VENTILATION	ROOF ACCESS	INSULATED FLAT ROOF ACCESS WINDOWS		ACCESS ROOF LIGHTS		
								
DXF DMF DEF	**DXC DMC DEC**	**FSP**	**FWR FWL**	**DRF**	**DRC**	**WLI**	**WSS WSZ WSH**	**WGT WGI**
								
FAKRO flat roof windows illuminate the interiors with natural light, provide ventilation of the room and combine high functionality with excellent thermal insulation parameters. Now any room under the flat roof can be warm and abundant in daylight. Flat roof windows are available in domed (D_C) and non-domed version (D_F).		The window is a part of a natural smoke ventilation system and is used to discharge excessive smoke and heat generated during a fire. Additionally, the system enables daily ventilation and allows light into the room. The FSP smoke ventilation window has been manufactured and certified according to harmonised standard EN 12101-2:2005. This window is usually applied in stairways.	Insulated roof access windows enable safe and easy access to the roof from habitable rooms. They also provide illumination and ventilation of the room. Windows feature a side hung structure, which opens through 90° to the right (FWR) or right side (FWL). Insulated roof access windows can be equipped with the same internal accessories as for roof windows.	Insulated roof access windows DR_ are another products designed for flat roofs. In addition to illumination function, they ensure safe and easy access to a flat roof. Hinges applied in the window enable the sash to be opened up to 80°. Gas springs facilitate operation of the sash. Anti-slip covers are used on the window profiles. Roof access windows are available in the following versions: DRC - with a dome and DRF - without a dome.		FAKRO standard access roof lights are intended for uninhabited rooms where the inside and outside temperatures are similar. Access roof lights enable safe and easy access to the roof in order to perform chimney, installation or maintenance work.		

LIGHT TUNNELS						SOLAR COLLECTORS	
LIGHT TUNNELS WITH FLEXIBLE LIGHT TRANSMITTING TUBE			LIGHT TUNNELS WITH RIGID LIGHT TRANSMITTING TUBE			SOLAR COLLECTORS	
							
SLT with the dome	**SF_** flat	**SF_-L** flat with illumination function	**SRT** with the dome	**SR_** flat	**SR_-L** flat with illumination function	**SKC**	**SKW**
							
Light tunnels allow illumination of the rooms located in the central part of the building with natural light, even those which cannot be fitted with roof windows or vertical windows. Application of light tunnels allows natural light to enter the building and illuminate interiors as well as saves electricity. The light tunnel conveys daylight via the light transmitting tube. Sunlight is reflected from the walls of the highly reflective tube and is directed downwards to the diffuser. The diffuser which is fitted in the ceiling evenly distributes natural light, illuminating the room. Light tunnel types: - with flexible light transmitting tube - with rigid light transmitting tube The light tunnel with flexible light transmitting tube is available in versions: - **SLT** - the light tunnel with the dome to which an appropriate flashing must be chosen. - **SF_** - flat light tunnel with integrated flashing. It is also available in **SF_-L** version which illuminates with natural light the space directly below the installation of light tunnel's outer element e.g. attic or loft. The light tunnel with rigid light transmitting tube is available in versions: - **SRT** - the light tunnel with the dome to which an appropriate flashing must be chosen. - **SR_** - flat light tunnel with integrated flashing. It is also available in **SR_-L** version which illuminates with natural light the space directly below the installation of light tunnel's outer element e.g. attic or loft.						Solar radiation is an infinite source of free energy which thanks to application of solar collectors can be easily used. Heat obtained in this way is used, among others, for heating usable water, thus reducing the use of energy from conventional sources. Therefore, it contributes not only to environmental protection, but also to lower energy bills. Solar collectors are available in two versions: SKC – for installation in combinations collector-collector SKW – for combinations with roof windows	

PRODUCTS – TYPES

FLASHINGS

STANDARD FLASHINGS

ES

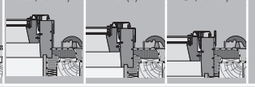
Flat roof coverings up to 10mm: roofing felt, bitumen, flat sheet metal, slate

ESV	ESJ
V (0)	**J** (–3 cm)

EZ

Profiled roof coverings up to 45mm: roof tiles, profiled sheet metal

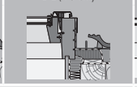
EZN	EZV	EZJ
N (+3 cm)	**V** (0)	**J** (–3 cm)



EH

High profiled roof coverings up to 90mm: roof tiles, profiled sheet metal

EHN
N (+3 cm)

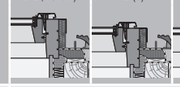


ADDITIONAL FLASHINGS

EH_-AT Thermo

High profiled roof coverings up to 90mm: roof tiles, profiled sheet metal

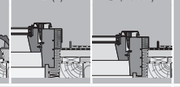
EHN-AT Thermo	EHV-AT Thermo
N (+3 cm)	**V** (0)



ESV-T Thermo

Flat roof coverings up to 10mm: roofing felt, bitumen, flat sheet metal, slate

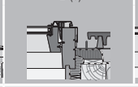
ESV-T Thermo	ESJ-T Thermo
V (0)	**J** (–3 cm)



EZV-F

Roof coverings up to 45mm: flat roof tiles

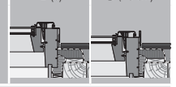
EZV-F
V (0)



EL

Flat roof coverings up to 10mm: bitumen, slate

ELV	ELJ
V (0)	**J** (–3 cm)



Flashings are manufactured using aluminium sheet metal as standard, permanently protected by polyester characterized with high durability and resistant to weather phenomena. The standard colour is grey and brown RAL 7022, which makes the window perfectly match with standard colours of roof coverings.
Due to the variety of roof coverings, FAKRO roof window flashings are categorised according to roof materials and application. Roof windows can be installed in the roof structure at three different levels: N (+3cm), V (0cm) and J (– 3cm).
Accordingly, standard flashings are divided into types. The last third letter of the flashing type code indicates the depth at which the roof window can be fitted. Flashing symbol has been extended to the fourth letter which denotes the type of material from which the apron is made: P – lead apron, A – aluminium-plastic apron.
For example EZV-P flashing means:
E – flashing,
Z – type of the roofing material,
V – installation level,
P – lead apron

The EH_-AT Thermo and ES_ -T Thermo flashings features additional thermal insulation.

FAKRO product range includes additional flashings for less popular roof coverings such as: flat roof tiles – EZV-F flashing, plain roof coverings – EL flashings.

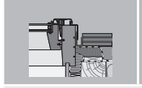
FLASHINGS

ADDITIONAL FLASHINGS

EG

Plain roof coverings up to 32mm: plain tiles

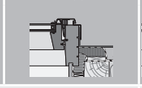
EGV
V (0)



EB

Flat roof coverings: panel sheet metal

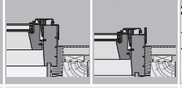
EBV-P
V (0)



EE

Flat roof coverings: flat sheet metal

EEV	EEJ
V (0)	**J** (–3 cm)

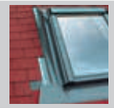


FAKRO product range includes additional flashings for less popular roof coverings such as: thick plain roof coverings – EG flashings, panel sheet metal – EBV-P flashing.

EE flashings are designed for installation of the window in roofs coated with flat sheet metal. They are made from copper sheet metal – EEV/CU or titanium-zinc (bare rolled, shining) – EEV/TC.

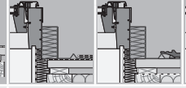
SPECIAL FLASHINGS

EA



Used depending on the roof covering

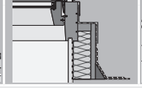
Flat roof coverings	Profiled roof coverings	High profiled roof coverings
ESA	EZA	EHA



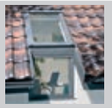
EFW

Flat Roof System for flat roof coverings

EFW

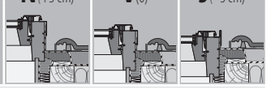


EU



Used depending on the roof covering and installation level

EUN/B	EUV/B	EUJ/B
N (+3 cm)	**V** (0)	**J** (–3 cm)



The last group includes flashings for specials applications such as: flashings for changing installation angle – E_A flashing. The EFW system makes it possible to install windows in roofs with pitches below 15°.

The EU_/B flashings are intended to be used with L-shaped combination B___ windows. Flashings enable a tight connection of any type of roof window with the L-shaped combination window installed in a vertical wall.

PRODUCTS – TYPES

ACCESSORIES FOR ROOF WINDOWS

INTERNAL ACCESSORIES

VENETIAN BLINDS

AJP, AJP Z-Wave

The AJP Venetian blind is available in two versions:
- The AJP Venetian blind manually operated
- The AJP Z-Wave Venetian blinds provide the electrical control of the slats angle. These blinds are controlled by a remote control or a wall switch. The operation of the AJP Z-Wave Venetian blind is only possible with the window closed.

Features:
- Possibility of directing the stream of daylight
- Possibility of adjustment of incoming daylight by changing the angle of the slats
- Window can be partially covered by the blind
- Reduction of excessive heat in the room
- Hiding the interior from outside observers without significant reduction of natural light

Venetian blinds come in two price categories:
Group I – available in 1 colour,
Group II – available in 29 colours.

ROLLER BLINDS

ARS

The ARS roller blind is manually operated and fits all types of FAKRO roof windows.

Features:
- Gradual reduction of incoming light
- Possibility to lock the blind in one of three positions
- Elegant aluminium fascia covering the roller
- Ensures complete privacy by covering the whole window
- Protection against the heat from the sun
- Wide range of colours to satisfy individual tastes

The ARS roller blind comes in two price categories:
Group I – available in 44 colours,
Group II – available in 9 colours.

ARP, ARP Z-Wave

The ARP roller blind is available in two versions:
- the ARP roller blind manually operated
- the ARP Z-Wave roller blind electrically operated after connecting to a FAKRO operating device. The ARP Z-Wave roller blind can be operated only with the window closed.

Features:
- Gradual reduction of incoming light
- Wide range of colours to satisfy individual tastes
- Possibility to lock the blind in any position thanks to the side guides
- Provides complete privacy by covering the whole window
- Partial protection against the heat from the sun
- Protection against UV radiation

The ARP roller blind comes in two price categories:
Group I – available in 44 colours,
Group II – available in 5 colours.

ACCESSORIES FOR ROOF WINDOWS

INTERNAL ACCESSORIES

BLACKOUT BLINDS

ARF, ARF Z-Wave

The ARF blackout blind is available in two versions:
- the ARF blackout blind manually operated
- the ARF Z-Wave blackout blind with built in 15V electric drive which enables operation by a remote control or a wall switch. The ARF Z-Wave blackout blind can be operated only with the window closed.

Features:
- Gradual reduction of incoming light up to blackout
- Possibility to lock the blind in any position thanks to the side guides
- Elegant aluminium fascia hiding the roller
- Provides complete privacy by covering the whole window
- Protection against the heat from the sun
- Reduction of heat loss from the room in winter
- Suitable for cleaning with a damp cloth or sponge
- Resistant to dampness

The ARF blackout blind comes in three price categories:
Group I – available in 2 colours,
Group II – available in 23 colours,
Group III – available in 9 colours, including 3 made of flame resistant fabric (N255, N53, N55).

PLEATED BLIND

APS

The APS pleated blind fits all types of FAKRO roof windows. The blind is manually operated.

Features:
- Provides a soft, diffused light effect harmonious with interior design
- Enables regulation of incoming light
- Partial reduction of excessive heat in the room
- Possibility to lock the blind in any position thanks to the side guides
- Provides complete privacy by covering the whole window

INSECT SCREEN

AMS

The AMS insect screen is the only accessory that is mounted onto the lining and not the window. The insect screen fits all types of opening roof windows.

Features:
- Mesh made of fiber glass coated with PVC
- Equipped with aluminum runners in white or silver
- Protection of the room against mosquitoes and other insects with window left open
- Minimum reduction of incoming light

PRODUCTS – TYPES

ACCESSORIES FOR ROOF WINDOWS

EXTERNAL ACCESSORIES

AWNING BLINDS

AMZ, AMZ Z-Wave, AMZ Solar

The AMZ awning blind can be installed in centre pivot and top hung and pivot preSelect windows in standard and non-standard sizes. The AMZ awning blind is intended for the FE panoramic windows. Awning blinds absorb solar radiation before it reaches the glazing and emit the heat to the outside of the room, hence they constitute much better protection form tiresome heat on the sunny days. The awning blinds are recommended by FAKRO as the most optimal protection against room overheating. According to tests carried out by FAKRO, the awning blind offers up to 8 times more effective protection against overheating when compared with internal blackout blinds.

The awning blind is available in two versions:
- AMZ – the awning blind operated by means of included control rod
- AMZ Z-Wave – powered from the mains (15V power supply) and controlled by means of a remote control or a wall switch in wireless Z-Wave system
- AMZ Solar – powered by a solar battery pack and controlled by means of a remote control in wireless Z-Wave system (remote control included).

There are also available:
- AMZ Electro 230 – connected to the mains and controlled by means of a wall switch
- AMZ Electro 12 – connected to the mains by 15V power supply and controlled by means of a wall switch
- AMZ Electro Solar – powered by a solar batteries and controlled by means of a wall switch

Features:
- Protection from tiresome heat and excessive sunlight
- Protection from harmful UV radiation
- Protection of eyes from harmful effects of reflections, especially uncomfortable when working on the computer
- Installed awning blind does not reduce the window glazed area
- Effective shading of the interior even when the window is left open thanks to application of wider fabric
- Pulled down in the rain, it reduces the noise of falling droplets

Fabric type	Value depending on the glazing type								
	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	0.090	0.167	0.200	0.095	0.184	0.194	0.125	0.196	0.236
AMZ-089	0.114	0.066	0.253	0.120	0.074	0.245	0.157	0.078	0.296
AMZ-090	0.085	0.060	0.189	0.088	0.068	0.180	0.122	0.071	0.230
AMZ-091	0.134	0.156	0.298	0.143	0.017	0.292	0.168	0.182	0.317
AMZ-092	0.053	0.018	0.118	0.054	0.020	0.110	0.086	0.021	0.162
AMZ-093	0.087	0.080	0.193	0.092	0.088	0.188	0.114	0.093	0.215
AMZ-094	0.163	0.186	0.362	0.175	0.205	0.357	0.203	0.219	0.383

ROLLER SHUTTERS

ARZ-H, ARZ Z-Wave, ARZ Solar

The ARZ-H roller shutter is designed for wooden centre pivot as well as top hung and pivot windows. Universal ARZ Z-Wave and ARZ Solar roller shutters are intended for FT_ and PT_ centre pivot windows and FP_ and PPP-V preSelect top hung and pivot windows. Roller shutters can be mounted on windows installed in combinations (assuming that the minimum space between windows joined vertically is 20 cm and 10 cm when installed horizontally).

The roller shutter is available in the following versions:
- ARZ-H – operated by means of included crank
- ARZ Z-Wave – powered from the mains (15V power supply) and controlled by means of a remote control or a wall switch in wireless Z-Wave system
- ARZ Solar - powered by a solar battery pack and controlled by means of a remote control in wireless Z-Wave system (remote control included).

Features:
- Effective protection from tiresome heat
- Reduces heat loss in the winter
- Complete blackout
- Protection against UV radiation
- Provides a sense of privacy
- Reduces risk of burglary

Armour of the roller shutter is available in two colours: light grey and dark grey.

Fabric type	Value depending on the glazing type								
	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	0.029	0.013	0.000	0.027	0.023	0.000	0.043
ARZ-102	0.030	0.000	0.067	0.030	0.000	0.061	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

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

ACCESSORIES FOR ROOF WINDOWS

EXTERNAL ACCESSORIES

AWNING BLINDS

VMZ, VMZ Z-Wave, VMZ Solar

ROLL-UP AWNINGS

VMB Z-Wave, VMB Solar

The VMZ awning blinds and VMB roll-up awnings are intended for vertical windows. The roll-up awning has a movable, deflectable bar. As a result, once the roll-up awning is unrolled, the user has access to external sill. Their installation takes place on the outside of the building on windows and doors (terrace and balcony) made of PVC, aluminium or wood. The awning blind effectively protects the room from the heat and allows for even distribution of light intensity inside, hence improving occupant comfort. The AMZ awning blind acts as a mosquito screen.

Features:
- Effective protection from heat and UV radiation – absorbs solar radiation before it reaches the glazing and emits the heat to the outside of the room
- Energy-efficiency – reduces energy consumption of air conditioning units
- Reduces heat loss in the winter
- Provides ingress of natural light and view to the outside
- Protection of eyes from harmful effects of reflections, especially uncomfortable when working on the computer
- Provides a sense of privacy
- Protection against insects – when pulled down over the open window acts as a mosquito screen

The VMZ awning blinds and the VMB roll-up awnings are available in 7 colours in 2 price groups:
- Group I – available in 5 colours (fabric with 10% open area)
- Group II – available in 2 colours (fabric with 1% open area)

The awning blind is available in the following versions:
- VMZ - the awning blind operated manually or by means of included control rod (rod purchased separately)
- VMZ Z-Wave - powered from the mains (15V power supply) and controlled by means of a remote control or a wall switch in wireless Z-Wave system
- VMZ Solar – an awning blind equipped with a insolation sensor and 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 control rod

The Solar type awning blind is powered from a 12VDC power pack built into the awning cassette. The batteries are recharged by a solar panel.

Electric awning blind is also available in the following versions:
- VMZ Electro 230 – connected to the mains and operated by means of a wall switch
- VMZ Electro 12 – connected to the mains with the use of 15V power supply and operated by means of a wall switch
- VMZ Electro Solar – powered by solar panels and operated by means of a wall switch

The roll-up awning is available in the following version:
- VMB Z-Wave – powered from the mains (15V power supply) and controlled by means of a remote control or a wall switch in wireless Z-Wave system
- VMB Solar – equipped with the insolation sensor and 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

The Solar type roll-up awning is powered from a 12VDC power pack built into its cassette. The batteries are recharged by a solar panel.

Electric roll-up awning is also available in the following versions:
- VMB Electro 230 – connected to the mains and operated by means of a wall switch
- VMB Electro 12 – connected to the mains with the use of 15V power supply and operated by means of a wall switch
- VMB Electro Solar – powered by solar panels and operated by means of a wall switch

PRODUCTS – TYPES

LOFT LADDERS

FOLDING WOODEN SECTION LOFT LADDERS							SLIDING SECTION LOFT LADDER
INSULATED				HIGHLY INSULATED		FIRE-RESISTANT	INSULATED
U=1.1 W/m²K				U=0.76 W/m²K	U=0.51 W/m²K	EI_1/EI_2=45min U=0.6 W/m²K	U=1.1 W/m²K
LWS Smart	**LWK Komfort**	**LWZ**	**LWL Lux**	**LTK Thermo**	**LWT**	**LWF 45**	**LDK**

Loft ladders provide safe and easy access to non-habitable loft spaces without the need for installation of expensive stairs.
They meet all technical and safety requirements as well as ensure improved comfort of the user.

Loft ladders are manufactured from high quality pinewood. The ladder can consist of three or four sections, it can also be sliding. The design of the ladder makes for ease of use and materials used in its construction ensure high durability. The grooves in the tread surface protect the foot from slipping while climbing up and down the ladder. The special design of the ladder box allows for easy installation and reduces the time needed to set the loft ladder in the ceiling.
It also allows quick application of finishing trims.
The peripheral seal fitted in the box provides appropriate tightness of fit of the loft ladder. The sandwich construction of the hatch provides improved insulation or fire-resistant. Applied thermal insulation prevents heat loss, while in fire-resistant loft ladders also protects against significant increase in temperature during a fire. The outer surface of the hatch is smooth and when installed in the ceiling, loft ladders perfectly match with any interior design.

LOFT LADDERS

FOLDING METAL SECTION LOFT LADDERS				SCISSOR LOFT LADDERS		
INSULATED			FIRE-RESISTANT	INSULATED		FIRE-RESISTANT
U=1.1 W/m²K			EI_2=120min	U=1.1 W/m²K		EI_2=60min
LMS Smart	**LMK Komfort**	**LML Lux**	**LMF**	**LST**	**LSZ**	**LSF**

Exceptional design of the metal ladder and double connection of hinges ensure high durability of the loft ladder. Ladder elements are powder coated with lacquer in grey RAL 7022 or silver RAL 9006 resistant to abrasion.
The last two treads of some metal ladders are removable and have retractable stile ends. It enables quick fitting of the ladder length to the room height without the need for cutting. Plastic stile ends protect the floor surface from scratches and stabilize the ladder. The loft ladder box can be made of wood, metal or a metal framework integrated within a wooden box. The special design of the box allows for easy installation of finishing trims or is already equipped with these trims as standard. This in connection with the quick installation system reduces the time needed to set the loft ladder in the ceiling. Peripheral seal fitted in the box provides appropriate tightness of fit of the loft ladder. The sandwich construction of the hatch provides improved insulation or fire-resistant. Applied thermal insulation prevents heat loss, while in fire-resistant loft ladders also protects against significant increase in temperature during a fire. The outer surface of the hatch is smooth and when installed in the ceiling, loft ladders perfectly match with any interior design.

The scissor ladder design enables quick fitting of the ladder length to the room height without the need for cutting. What is more, the ladder can be folded to a small size, thus providing the opportunity to install in small loft apertures (the smallest loft ladder size is 50 x 70cm). The "S" shaped stringers give the ladder a modern look and facilitate its use by acting as handrails. The grooves in the tread surface protect from slipping when ascending or descending the ladder. The loft ladder box can be made of wood, metal or a metal framework integrated within a wooden box. It is equipped with peripheral seal and finishing trims as standard. The box design helps to level and fix the ladder in the ceiling opening quickly. The scissors loft ladders are equipped as standard with a white insulated or fire-resistant hatch made of wood or wood and metal. The outer surface of the hatch is smooth and once installed in the ceiling perfectly matches with any interior design.

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]