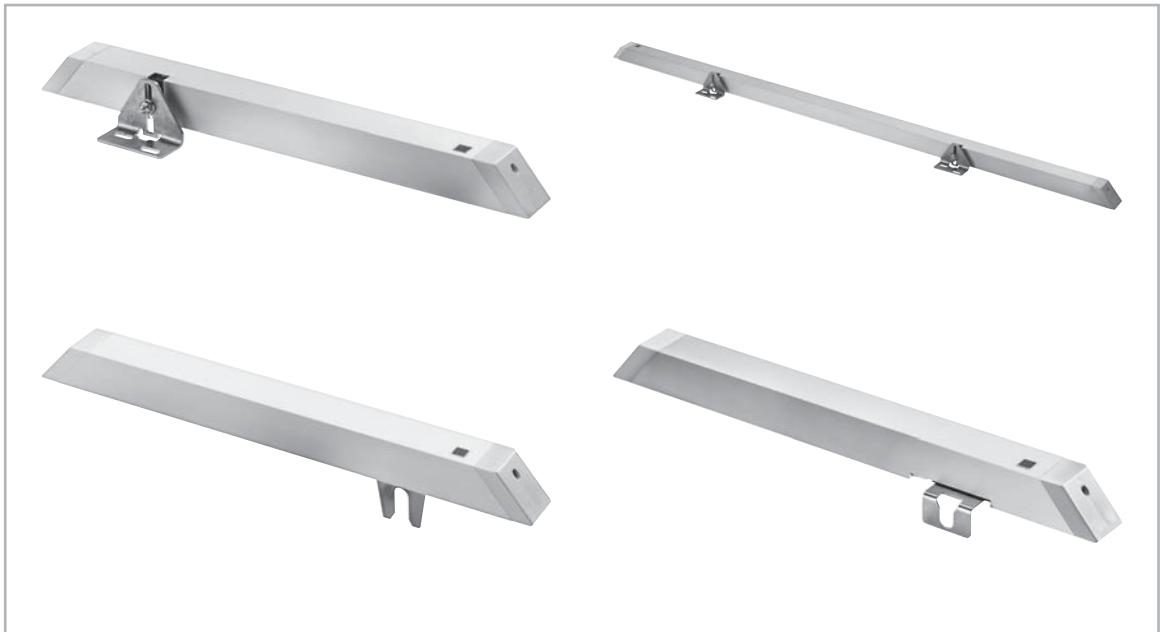


aumüller

Assembly and Commissioning Instructions

according to Machinery Directive 2006/42/EC (annex VI)



FV - FVR - FVB - LOCKING DRIVE FOR WINDOWS **CE**



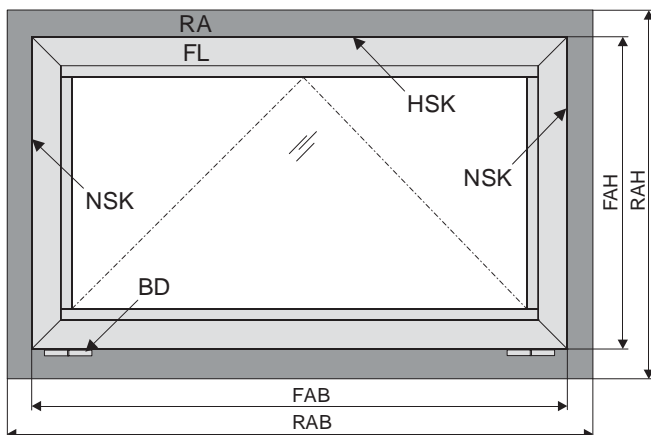
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ABBREVIATIONS

Index of abbreviations

These abbreviations are used consistently throughout these assembly & operating instructions. Unless stated differently, all dimensions indicated in this document are in mm. General tolerances in accordance with DIN ISO 2768-m.

A	drive
AK	connection cable / drive cable
AP	cover cap
BD	hinge
Fxxx	casement bracket
FAB	overall width of casement
FAH	overall height of casement
FG	casement weight
FL	casement
FÜ	casement overlap
HSK	main closing edge
Kxxx	frame bracket
L	construction length of drive
MB	central hinge
NSK	side closing edge
RA	frame
RAB	overall width of frame
RAH	overall height of frame
SL	snow load
→	opening direction



TARGET GROUP

These instructions are intended for trained personnel and operators of systems for natural smoke ventilation (NRA / SHEV) (natural smoke exhaust system / smoke and heat exhaust system) and natural ventilation via windows, who are knowledgeable of operating modes as well as the remaining risks of the system.

WARNING AND SAFETY SYMBOLS IN THESE INSTRUCTIONS:

The symbols used in the instructions shall be strictly observed and have the following meaning:



DANGER

Failure to comply with the warning notes results in irreversible injuries or death.



WARNING

Failure to comply with the warning notes can result in irreversible injuries or death.



CAUTION

Failure to comply with the warning notes can result in minor or moderate (reversible) injuries.



NOTE

Failure to comply with the warning notes can lead to damage to property.



Caution / Warning

Danger due to electric current.



Caution / Warning

Risk of crushing and entrapment during device operation (is provided as a sticker with the drive).



Attention / Warning

Risk of damage to / destruction of drives and / or windows.



WARNING

This device is not intended for use by persons (including children) with physical, sensory or mental limitations or lacking experience and / or knowledge, unless they are supervised by a person who is responsible for the safety or were instructed by him on the usage of this equipment. Children should be supervised to ensure that they are not playing with this device. Cleaning and operator's maintenance may not be performed by children without supervision.

INTENDED USE

Area of application / Scope of application

This drive is intended for the electromotive opening and closing of windows in facade and roof areas.

The prime task of this product, in combination with a window and a suitable external control unit, **is to evacuate hot smoke and combustion gases in case of fire**, to save human lives and protect material assets. Furthermore, combined with a suitable external control unit, the electromotive operated window ensures **fresh air supply for the natural ventilation** of the building.

NOTE

By attaching the drive to a movable element of the window a so-called "power-operated window" is created which, according to the Machinery Directive 2006 / 42 / EG, represents a machine.

Intended use according to the Declaration of Conformity

The drive is intended for stationary installation and electrical connection at the window as part of a building.

In accordance with the attached Declaration of Conformity the drive, in combination with an external Control Unit from AUMÜLLER, is released for its intended use at a power-operated window **without an additional on-site risk assessment** for the following use:

- Application for natural ventilation
 - with an installation height of the drive of at least 2,5 m above the floor, or
 - with an opening width at the HSK of the operated element of < 200 mm by a simultaneous speed of < 15 mm/s at the HSK in closing direction.
- Application as NSHEV (natural smoke and heat exhaust ventilators) for ventilation without dual function for ventilation in accordance with EN12101-2.

Attention must be paid to possible hazards when used with tilting or rotating windows, whose secondary closing edges are located at less than 2,5 m installation height above the floor, under consideration of the Control Unit and usage!

⚠ WARNING

We as manufacturers are well aware of our duties and responsibilities regarding the development, manufacturing and placing of safe window drives on the market and consistently implement them. Ultimately, however, we have no direct influence on the usage of our drives. Therefore, as a precaution, we point out the following:

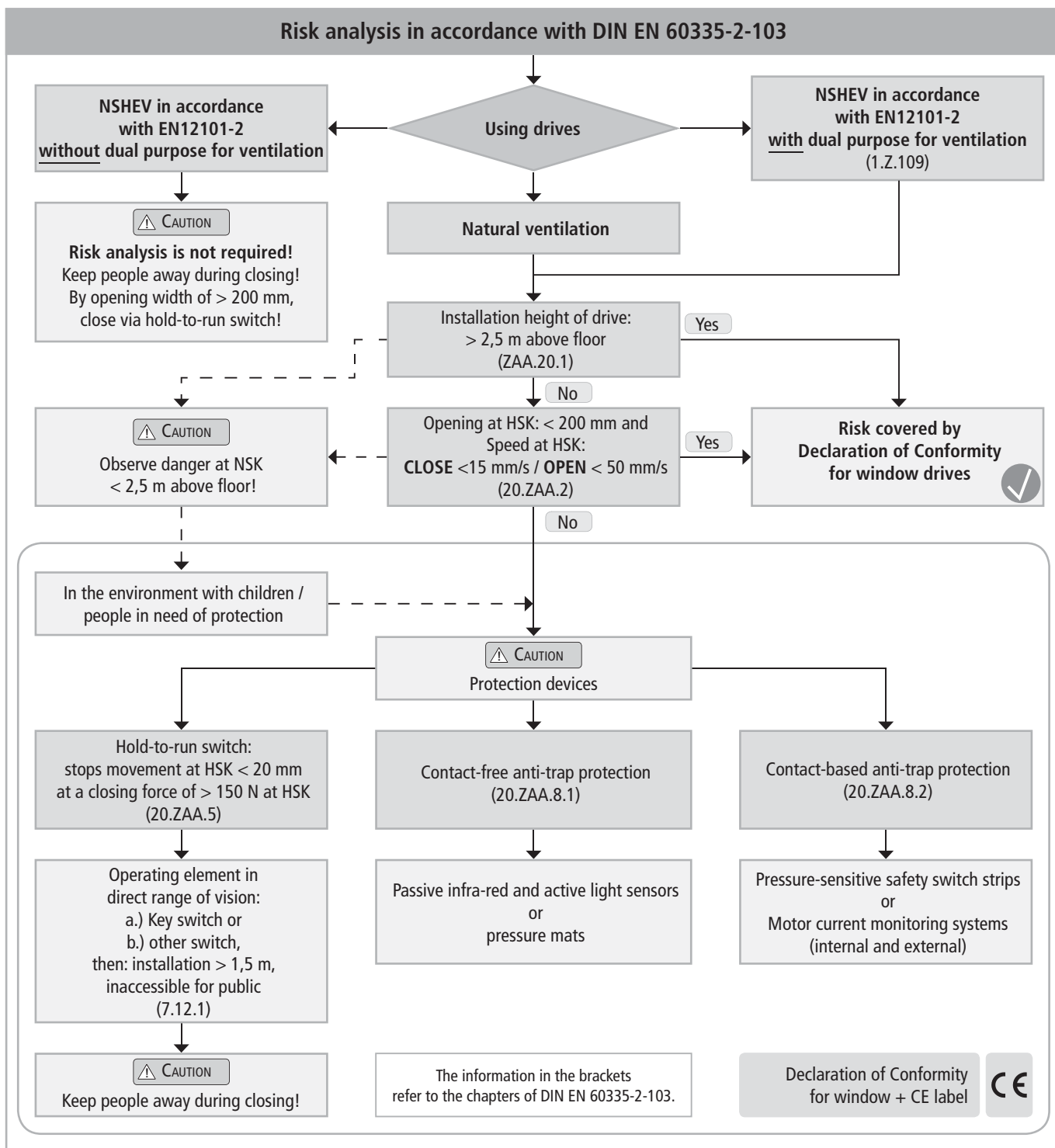
- The **constructor or his agent** (architect, specialist planner) **are obligated** by law **to evaluate the hazards to persons**, originating from the usage, installation position, opening parameters as well as the planned type of installation of the power operated window and the external Control Unit, **already in the planning phase and to establish necessary protective measures.**
- The **constructor / manufacturer** of the machine "power-operated window" **must implement** the planned **protective measures** at the installation site or, if not yet established, **determine them** by their own responsibility and detect or **minimize possible remaining risks.**

The need for a risk assessment at the installation site due to the reasonably foreseeable misuse.

A risk assessment in accordance with the Machinery Directive 2006 / 42 / EG for the usage of the power-operated window for natural ventilation is absolutely necessary under the following conditions:

- the installation height of the drive is < 2,5 m above the floor **and**
- the opening width at the HSK > 200 mm, **or**
- the closing speed at the HSK is > 15 mm/s, **or**
- the opening speed at the HSK is > 50 mm/s, **or**
- the closing force at the HSK is > 150 N

The following flow chart can be applied, which also includes the protective measures in accordance with EN 60335-2-103/2016-05.



Casement data

Facade: bottom-hung window, top-hung window, side-hung window.
 Dach: roof window / sky light.
 Opening direction: inward / outward opening.
 Profile material: aluminum, steel, plastic or wood.

NOTE

The casement measurements supplied are only for orientation purposes. It is imperative that the **force-path diagram** of the drives are observed.

When inspecting the drives for conformity with on-site requirements the following items must be observed:

- total weight of casement (glass + frame),
- additional loads: snow load / wind load (suction / pressure),
- casement size (FAB x FAH),
- side ratio FAB / FAH,
- installation / inclination angle,
- required opening area (geometric / aerodynamic),
- crosswind influences,
- driving force and stroke,
- mounting site at the window frame and casement frame.

SAFETY INSTRUCTIONS



It is important to follow these instructions for the safety of persons. These instructions shall be kept in a safe place for the entire service life of the products.

**Risk of crushing and entrapment!
Window can close automatically!**

The integrated load cut-off stops the drive during closing and opening when the drive is overloaded.

The compressive force is absolutely sufficient to crush fingers in case of carelessness.



Area of application

The drive shall only be used according to its intended use. For additional applications consult the manufacturer or his authorized dealer.

Do not misuse the drive for other lifting operations! Do not allow children to play with this drive or its regulating and / or control units, including the remote control!



Always check whether the system complies with current regulations. Special attention must be paid to the opening width, the opening area, the opening time and the opening speed of the window, the temperature range of the drives / external devices and cables as well as the cross section of the connecting cables as function of the cable length and power consumption.



All devices must be permanently protected from dirt and moisture, if the drive is not explicitly suitable for use in wet areas (see technical data).

Installation

These instructions address expert and safety-conscious electricians and / or qualified personnel knowledgeable in electrical and mechanical drive installation.

The safe operation, avoidance of injury to persons and damage to property, as well as risks, is only guaranteed by proper installation and setting according to these installation instructions.



All specifications for installation must be checked independently and, if necessary, adjusted at the installation site. The connection assignment, the electrical supply data (see machine plate) and performance limits (see technical data) as well as the mounting and installation instructions of the drive must be strictly observed and adhered to!



Never connect 24 V DC drives to 230 V AC mains voltage!
Danger to life!

Do not reach into the window rabbet or the operating element (chain or spindle) during installation and operation! Ensure that, based on the installation position and the opening movement of the casement, persons cannot be trapped between the driven part of the window and surrounding fixed components (e.g. wall).

Mounting material

The required mounting material must be modified to fit the drive and occurring load and, if necessary, supplemented.



Before installing the drive, check whether the casement is in good mechanical condition, the weight in balance and whether it opens and closes easily!

Danger spots by crush and shear points

<p>Side-hung</p>	<p>Bottom-hung</p>	<p>Roof windows / skylight domes</p>	<p>Louvre windows</p>
<p> Danger spots: crush and shear points according to DIN EN 60335-2-103</p>			

Crush and shear points

To avoid injuries, **crushing and shear points** between casement and frame must be secured **against entrapment up to an installation height of 2,5 meters above the floor** with appropriate measures. This can be achieved e.g. by using contact-based or contactless protective devices against entrapment, which stop the motion through contact or through interruption by a person. At a force higher than 150 N at the main closing edge the motion must stop within 20 mm. A warning symbol at the opening element must indicate this clearly.

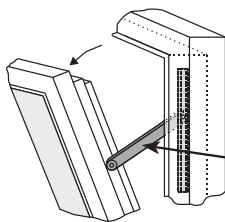
Unintentional or independent opening or falling

Casements are to be hinged or secured such way that in case one of the mounting elements fails it will not crash / slam down or move in an uncontrolled manner by e.g. using double suspensions, safety scissors, casement stays. Tilting windows shall be equipped with safety scissors or similar devices to avoid damages and risks of injury for persons through improper installation and operation. The safety scissors must be adjusted to the opening stroke of the drive (see technical data) to avoid blocking. The opening width of the safety scissors must be bigger than the drive stroke.



WARNING

The movable casement must be secured against unintentional or independent opening as well as falling down.



safety scissors

Routing cables and electrical connection

Routing or installing electrical lines and connections may be performed only by approved specialist companies. Never operate drives, control units, operating elements and sensors at operating voltages and connections contrary to the specifications of the manufacturer.

All relevant instructions shall be observed for the installation, specifically:

- VDE 0100 Setting up high-voltage systems up to 1000 V
- VDE 0815 Wiring cables
- Specimen Guideline on Conduits German designation (MLAR).



All-pole disconnecting devices shall be installed in the permanent electrical installation or external Control Unit for the drive.

The mains supply lines 230 V / 400 V AC shall be protected separately!



WARNING

Damaged mains supply lines of drives with plug connectors may only be replaced by the manufacturer or qualified service / maintenance personnel!

Power cables which are fixed to the drive casing cannot be replaced. If the cable is damaged the device must be scrapped!

The types of cable, cable lengths and cross-sections shall be selected in accordance with the manufacturer's technical data. If necessary, the cable types shall be coordinated with the competent local authorities and energy supply companies. Low-voltage lines (24 V DC) shall be routed separate from the high-voltage lines. Flexible cables may not be flush-mounted. Freely suspended cables shall be equipped with strain reliefs.



Cables must be laid such way that they cannot be sheared off, twisted or bent during operation. Drive cables laid into closed window profiles must be protected by insulating tubes with a sufficient temperature resistance. Through holes shall be equipped with cable sleeves!

Clamping points shall be checked for tightness of threaded connections and cable ends. Access to junction boxes, clamping points and external drive control systems shall be ensured for maintenance work.

Commissioning, operation and maintenance

After the installation and after each modification in the set up all functions shall be checked with a trial run. It shall be ensured that drive and casement are set correctly and that security systems, if available, are functioning properly. After the installation of the system is completed the end-user shall be introduced to all important operating steps. If necessary, he must be advised of all remaining risks / dangers.

The end-user shall be instructed in intended use of the drives and, if necessary, the safety instructions. The end-user shall be specifically instructed that no additional forces, except for the pressure and tension in the opening and closing direction of the casement, may be applied to the spindle, chain or lever of the drive.


NOTE Post warning signs!

During the proper assembly of drives with mounting elements at a window, and the connection to an external control unit, the interfaces resulting from mechanical and electrical performance characteristics of single elements shall be observed.

CAUTION Other persons must be kept away from the casement when a hold-to-run switch (pushbutton) is operated or when a window, which has been opened by a smoke and heat exhaust system, is closing!

CAUTION The operating element of hold-to-run switches must be installed within direct view from the window, but apart from moving elements. If the switch is not a key-operated switch it must be installed at a minimum height of 1,5 m and inaccessible to the public!

CAUTION Do not allow children to play with permanently mounted control devices and keep remote controls out of reach for children!

 During cleaning, maintenance work and while exchanging parts the drive must be completely disconnected from the power supply and secured against unintentional reactivation.

WARNING Do not use drive or casement when repair or re-setting work has to be performed!

Replacement parts, fasteners and controls

The drive shall only be operated with control devices from the same manufacturer. There is no liability, warranty or customer service if third-party parts are used. Exclusively original replacement parts of the manufacturer shall be used for mounting elements or expansions.

Ambient conditions

The product may not be subjected to impacts or falls, or to vibrations, moisture, aggressive vapors or other harmful environments, unless the manufacturer released it for one or more of these environmental conditions.

- **Operation:**
 Ambient temperature: -5 °C ... +75°C
 Relative humidity: < 90% less 20°C;
 < 50% less 40°C;
 no formation of condensation
- **Transport / Storage:**
 Storage temperature: -5°C ... +40°C
 Relative humidity: < 60%

Accident prevention regulations and workmen's compensation insurance guidelines

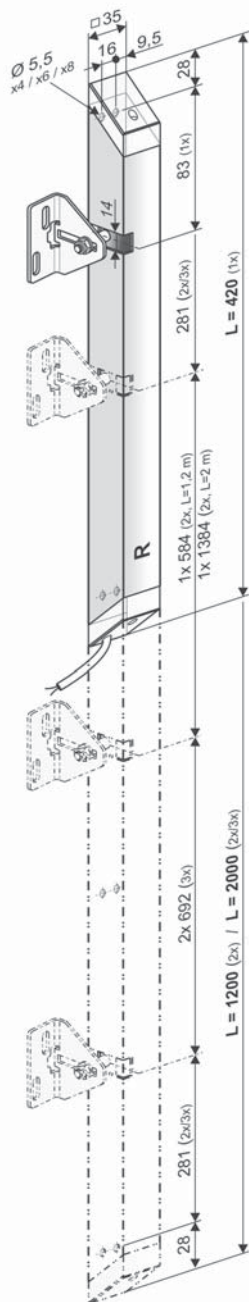
For work on or in a building or building part the provisions and instructions of the respective accident prevention regulations (UVV and workmen's compensation insurance guidelines (BGR /ASR) shall be observed and adhered to.

Declaration of Conformity

The drive is manufactured and inspected in accordance with European guidelines. The respective Declaration of Conformity is on hand.

In case the operation of the drive differs from the intended use, a risk evaluation for the complete power-operated window system shall be performed and a Declaration of Conformity according Machinery Directive 2006 / 42 / EG issued.

DATA SHEET FV1 / FV3 / FV4



- Application: natural ventilation, SHEV, ferralux®-NSHEV
- Surface mounting on the window frame/casement profiles of the main/side closing edge (HSK / NSK) of in-/outward opening windows. Locking bracket mounted on the casement.
- Required mounting space 35 mm
- Usable without locking bar

Options

- Mounting plate for installation on the window frame profile (RM) of outward opening windows or on the casement profile (FM) of inward opening windows
- Slim locking bracket 18 mm for small mounting space on the window frame profiles

FV1

- Without internal cut-off switch and sequence control, for use in RWA hardware systems with USKM module

FV3

- With internal load dependent cut-off switch and sequence control for drives PL6 S1 / PL10 S1 ($I_A = 0,8 \text{ A}$)

FV4

- M-COM suitable internal load dependent cut-off switch and sequence control for drives S3 / S12
- Star wiring
- Current of the drives does not run over FV4
- Sequence control via communication wire

TECHNICAL DATA

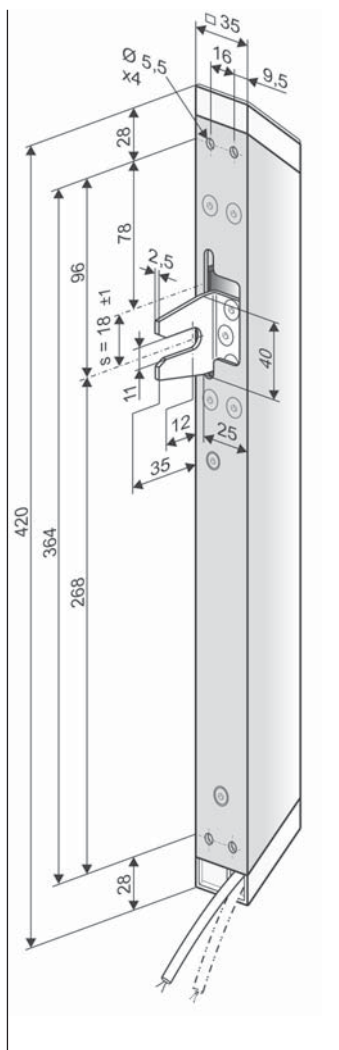
U_N	Rated voltage	24V DC ($\pm 20 \%$), max. 2 Vpp
I_N	Rated current	0,6 A
I_0	Cut-off current	$\sim 30 \text{ mA}$
P_N	Rated power	20 W
I_D	Current of connected drives	FV1: USKM FV3: 0,8 A (PL 6/10 S1) FV4: 3 A, S3 / S12 non relevant
ED	Duty cycle	30 % (ON: 3 min./OFF: 7 min.)
	Protection rating	IP 32
	Ambient temperature range	-5 °C ... + 75 °C
F	Pushing / Pulling force max.	$\sim 600 \text{ N}$
t	Runtime	$\sim 5,0 \text{ s}$
	Connecting cable	FV1: non-halogen, grey 2 x 0,75 mm ² , $\sim 3 \text{ m}$ FV3: non-halogen, grey 2 x 0,75 mm ² , $\sim 3 \text{ m}$ FV4: non-halogen, grey 3 x 0,50 mm ² , $\sim 3 \text{ m}$
	Housing	aluminium 35 x 35 mm
L	Length	see order data
	Versions	FV1: 1x R/L, 2x R, 3x R FV3: 1x R/L, 2x R, 3x R FV4: 1x R/L, 2x R
	Version name	1x = 1 locking point 2x = 2 locking points 3x = 3 locking points R = right hand version L = left hand version
	Sound pressure level A	$\leq 70 \text{ dB (A)}$

ORDER DATA

Type	L [mm]	Version	Finish	PU / pcs.	Part.-No.			
Single right hand	420	FV1 R (1x)	E6/C-0	1	515103			
		FV3 R (1x)		1	515102			
		FV4 R (1x)		1	515129			
Single left hand	420	FV1 L (1x)	E6/C-0	1	515106			
		FV3 L (1x)		1	515105			
		FV4 L (1x)		1	515130			
Double right hand	1200	FV1 R (2x)	E6/C-0	1	515111			
		FV3 R (2x)		1	515110			
		FV4 R (2x)		1	515131			
Double right hand	2000	FV1 R (2x)	E6/C-0	1	515113			
		FV3 R (2x)		1	515112			
		FV4 R (2x)		1	515132			
Triple right hand	2000	FV1 R (3x)	E6/C-0	1	515116			
		FV3 R (3x)		1	515114			
		FV4 R (3x)		1	515136			

Special model	PU / pcs.	Part.-No.			
Drive housing painted/powder coated in other RAL colours					
Lump sum for coating		516030			
Specify at order stage:	1 – 20	516004			
	21 – 50	516004			
	51 – 100	516004			
	up 101	516004			
Extra length connecting cable:					
5 m – non-halogen grey – 2 x 0,75 mm ²		501024			
10 m – non-halogen, grey – 2 x 0,75 mm ²		501026			
5 m – non-halogen, grey – 3 x 0,50 mm ²		501034			
10 m – non-halogen, grey – 3 x 0,50 mm ²		501036			
Microprocessor programming S12					
Programming drives 24V / 230V S12		524180			
Optional accessories	PU / pcs.	Part.-No.			
M-COM Configuration module for synchronised multi-drive systems (for FV4)	1	524177			

DATA SHEET FVR



- Application: natural ventilation, SHEV, ferralux®-NSHEV
- Surface mounting on the main/side closing edge of the window frame profiles (RM) of outward or on the casement profiles (FM) of inward opening windows
- Required mounting space 35 mm
- Locking drive: locking bar is on site available

Options

- Locking plate customizable for project-/profile-specific demands

FVR3

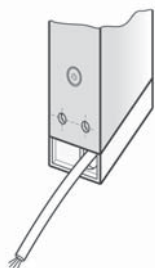
- With internal load dependent cut-off switch and sequence control for drives PL6 S1 / PL10 S1 (I = 0,8 A)

FVR4

- M-COM suitable internal load dependent cut-off switch and sequence control for drives S3 /S12
- Star wiring
- Current of the drives does not run over FVR4
- Sequence control via communication wire

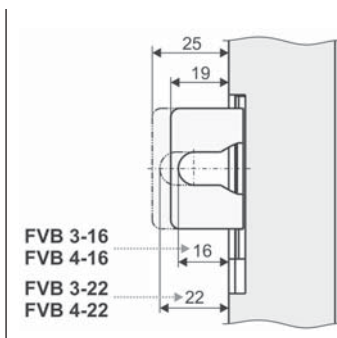
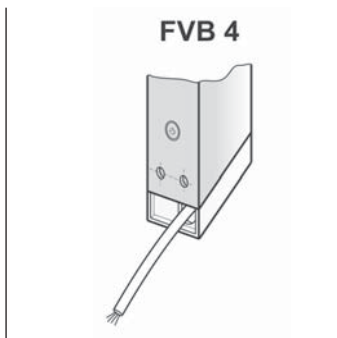
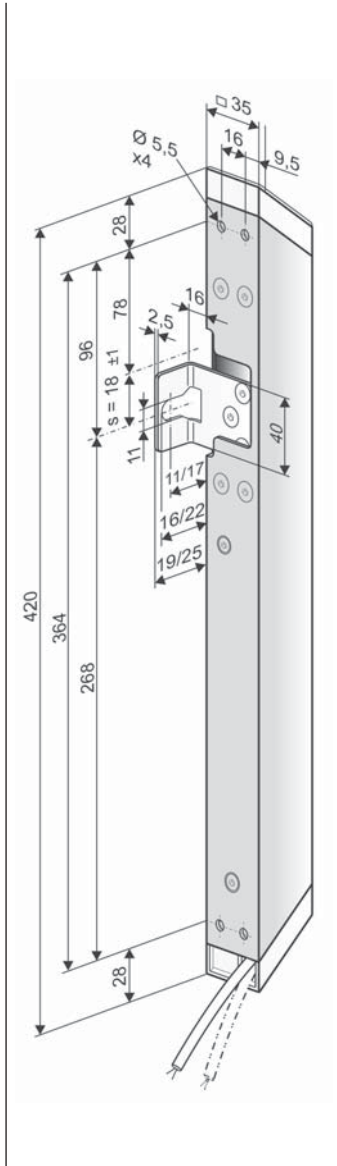
TECHNICAL DATA

U_N	Rated voltage	24V DC ($\pm 20\%$), max. 2 Vpp
I_N	Rated current	0,6 A
I_0	Cut-off current	~ 30 mA
P_N	Rated power	20 W
I_D	Current of connected drives	FVR3: 0,8 A (PL 6/10 S1) FVR4: 3 A, S3 / S12 non relevant
ED	Duty cycle	30 % (ON: 3 min./OFF: 7 min.)
	Protection rating	IP 32
	Ambient temperature range	-5 °C ... +75 °C
F	Pushing / Pulling force max max.	~ 600 N
t	Runtime	$\sim 5,0$ s
s	Stroke	~ 18 mm (± 1)
	Connecting cable	FVR3: non-halogen, grey 2 x 0,75 mm ² , ~ 3 m FVR4: non-halogen, grey 3 x 0,50 mm ² , ~ 3 m
	Coupling adapter	stainless steel
	Housing	aluminium (E6/C-O), 420 x 35 x 35 mm
L	Length	420 mm
	Sound pressure level A	≤ 70 dB (A)

FVR 4**ORDER DATA**

s [mm]	L [mm]	Version	Finish	PU / pcs.	Part.-No.			
16	420	FVR3 16	E6/C-0	1	514003			
16	420	FVR4 16	E6/C-0	1	514029			

DATA SHEET FVB



- Application: natural ventilation, SHEV, ferralux®-NSHEV
- Surface mounting on the main/side closing edge of the window frame profiles (RM) of outward or on the casement profiles (FM) of inward opening windows
- Required mounting space 35 mm
- Locking drive: locking bar is on site available

Options

- Locking plate customizable for project-/profile-specific demands

FVB3

- With internal load dependent cut-off switch and sequence control for drives PL6 S1 / PL10 S1 (I = 0,8 A)

FVB4

- M-COM suitable internal load dependent cut-off switch and sequence control for drives S3 /S12
- Star wiring
- Current of the drives does not run over FVB4
- Sequence control via communication wire

TECHNICAL DATA

U_N	Rated voltage	24V DC ($\pm 20\%$), max. 2 Vpp
I_N	Rated current	0,6 A
I_0	Cut-off current	~ 30 mA
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I_D	Current of connected drives	FVB3: 0,8 A (PL 6/10 S1) FVB4: 3 A, S3 / S12 non relevant
ED	Duty cycle	30 % (ON: 3 min./OFF: 7 min.)
	Protection rating	IP 32
	Ambient temperature range	-5 °C ... +75 °C
F	Pushing / Pulling force max max.	~ 600 N
t	Runtime	~ 5,0 s
s	Stroke	~ 18 mm (± 1)
	Connecting cable	FVB3: non-halogen, grey 2 x 0,75 mm ² , ~ 3 m FVB4: non-halogen, grey 3 x 0,50 mm ² , ~ 3 m
	Coupling adapter	stainless steel
	Housing	aluminium (E6/C-O), 420 x 35 x 35 mm
L	Length	420 mm
	Versions	FVB 3 / FVB 4 – 16: Coupling adapter length 19 mm FVB 3 / FVB 4 – 22: Coupling adapter length 25 mm
	Sound pressure level A	≤ 70 dB (A)

ORDER DATA						
s [mm]	L [mm]	Version	Finish	PU / pcs.	Part.-No.	
16	420	FVB3 16	E6/C-0	1	513921	
22	420	FVB3 22	E6/C-0	1	513923	
16	420	FVB4 16	E6/C-0	1	513930	
22	420	FVB4 22	E6/C-0	1	513934	

OPTIONEN			
Special model	PU / pcs.	Part.-No.	
Drive housing painted/powder coated in other RAL colours			
Lump sum for coating		516030	
Specify at order stage:	1 – 20	516004	
	21 – 50	516004	
	51 – 100	516004	
	up 101	516004	
Extra length connecting cable:			
5 m – non-halogen, grey – 2 x 0,75 mm ²		501024	
10 m – non-halogen, grey – 2 x 0,75 mm ²		501026	
5 m – non-halogen, grey – 3 x 0,50 mm ²		501034	
10 m – non-halogen, grey – 3 x 0,50 mm ²		501036	
Microprocessor programming S12			
Programming drives 24V / 230V S12		524180	
Optional accessories			
M-COM Configuration module for synchronised multi-drive systems (for FV4)	1	524177	

EXPLANATIONS ON THE PRODUCT LABEL

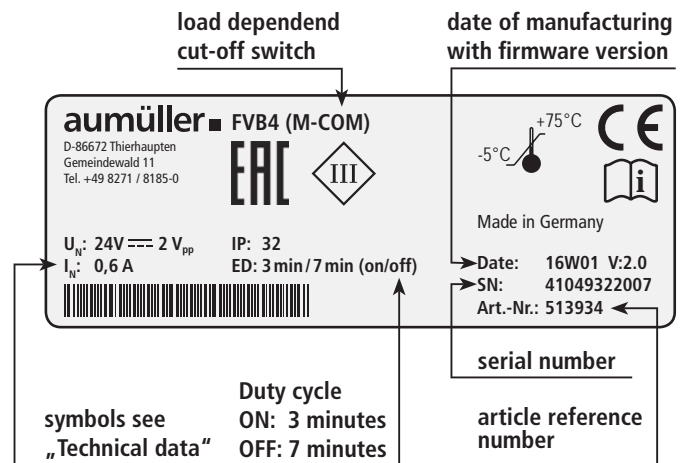
The product label provides information about:

- manufacturer,
- article reference number and name,
- technical characteristics,
- date of manufacturing with firmware version,
- serial number.

NOTE

Never install and operate damaged products.

In the event of any complaints, please indicate the product serial number (SN) (see product label).



DETERMINATION OF LOCKING POINTS

The number of locking points depends on:

- object-specific requirements
- processing guidelines and authorized ranges of application of the manufacturer
- EN 12102-2 NRWG (depending of profile group A, B, C and wind load classification WL)
- EN12207(8) Air permeability of joints
- EN 12210 Resistance to wind load
- EN 1627 Burglar resistance
- EN 14351-1 Window or door standard
- DIN 1055-4 Wind loads on buildings



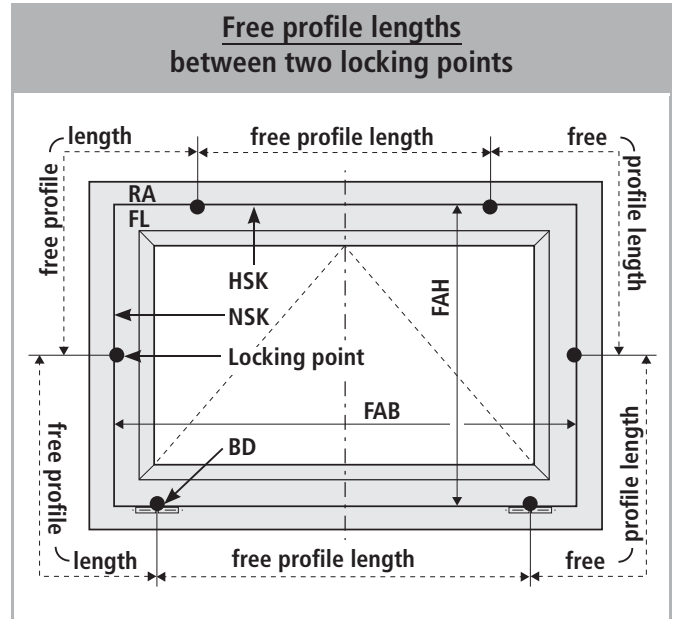
Only the worst case with secured values and application ranges must serve as a basis.

Locking points are centers / axes of the following components: casement hinges / stays (**BD**), sealing points of the locking system, application points of directly actuating drives (force transmission axes at 90° to the casement profile, with closed window).

Drives used in SHEV mounting devices such as: RWA 1000, RWA 1050, RWA 1100 are not included in the locking points.

Free profile lengths are effective distances between two locking points. Corner and edge distances shall be calculated as straight lines.

FV FVR FVB



		Free profile length for profil group:		
		Profile groups allocated according Ix ⁴ -values		
		„A“ 20-34 cm ⁴	„B“ 35-50 cm ⁴	„C“ 51-55 cm ⁴
Static wind slipstream loads on the SHEV - according to EN 12101-2.	WL 1000	1450 mm	1650 mm	1950 mm
	WL 1500	1300 mm	1500 mm	1750 mm
	WL 2000	1120 mm	1280 mm	1460 mm
	WL 2500	950 mm	1050 mm	1160 mm
	WL 3000	820 mm	900 mm	990 mm

Values apply only for **AUMÜLLER ferralux NRWG.**

Tools required

- marker,
- grains,
- hammer,
- knife,
- screwdriver (cross, Torx),
- hexagonal wrench,
- torque wrench,
- power drill,
- threadlock adhesive,
- possibly a tool for blind rivet nuts.

INSTALLATION STEP 1: INSPECTION BEFORE THE INSTALLATION

FV **FVR** **FVB**

⚠ WARNING

Important instructions for a safe installation. Observe all instructions, wrong installation may result in serious injury!

Storage of drives at the construction site

Protective measures against damages, dust, moisture or contamination shall be taken. Store drives intermediately only in dry and well ventilated rooms.

Inspection of drives before installation

Check drives and window before installation for good mechanical condition and completeness. The chains / spindles of the drives must be extendable or retractable easily. The casement must run smoothly and the weight must be in balance.

NOTE

We recommend the use of our test kit for the inspection of drives with the rated voltage 24V= / 230V~ (see table below). Damaged products may not be operated under any circumstance.

Test kit for drives

Order number:	533981
Application:	Test kit to check running direction and communication of drives 24V DC or 230V AC (including batteries)
Supply voltage:	230V AC
Drive types:	24V DC / 230V AC
Drive current:	max. 3 A
Display:	drive current, battery charge
Ambient temperature:	-5 °C ... + 75 °C
Plastic housing:	250 x 220 x 210 mm
Weight:	approx. 3,6 kg
Feature / equipment:	Control elements: 2 switches + 1 button



The test procedure of drives may only be performed on a non-slip and secured mat or a test fixture. During the test run the test element must not be interfered with. The test may only be conducted by or under the supervision of expert personnel.

For testing chain drives the chain must be extended and retracted at an angle of approx. 90°. The spindle tubes of spindle drives in round housing tubes must be secured against independent spinning before starting the test to avoid deviations in the position encoder.

Inspection of the intended use

The planned use of the drive must be checked for compliance with its intended use. If used otherwise the liability and warranty claim expires.

Predictable misuse

It is imperative that foreseeable misuse of drives is avoided! Here are a few examples:

- do not connect 24 V DC drives to a 230 V AC mains voltage,
- observe synchronous run and sequence control by drives with multiple interconnection,
- use drives only indoors,
- avoid additional force influences, e.g. transverse forces.

Testing mechanical requirements

Prior to the start of the installation check whether :

- the support surface and the profile static for the load transmission is sufficient,
- a support construction for the secure fastening of the drives is required,
- cold bridges (thermal separation) are avoidable at action points,
- there is sufficient space for the swivel movement of the drive.

If not, counter measures must be taken!



The support surface of the frame brackets or casement brackets must rest completely on the window or frame profile. There must be no tilting of the fastening elements during extension and retraction of the drives. A safe and solid fastening must be ensured at the window profile.

⚠ CAUTION

It is imperative that the sufficiently mechanical stiffness of the fastener type as well as of the swivel range of the drive is observed.

If this is not guaranteed another type of fastening or another type of drive must be selected.

INSTALLATION STEP 2: INSTALLATION PREREQUISITE AND INSTALLATION PREPARATION

The following conditions must be fulfilled for the installation of the drives so they can be properly assembled with other parts and constructed to a complete machine at the window without impairing the safety and health of persons:

1. The design of the drive must fulfill the requirements.
2. The fastening accessories (casement brackets or frame brackets) must fit the window profile; the profile-dependent hole lay-out must be complied with.
3. The space required for the installation of the drive on the frame and casement profile must be sufficient.
4. The window must be in perfect mechanical condition before the installation. It should open and close easily.
5. The fastening material for the installation of the drive must fit the window material (see table).

Wood windows	<p>wood screws: i.e. DIN 96, DIN 7996, DIN 571</p> <p>with head-type: round head with slot, round head with cross, hex head, special type</p>	
steel, stainless steel, aluminum windows	<p>self-tapping screws, thread screws, sheet-metal screws i.e. ISO 4762, ISO 4017, ISO 7049, ISO 7085, DIN 7500</p> <p>with head-type: cylinder head with hex socket, internal serration (Torx), Phillips head or external hex head</p> <p>blind rivet nut</p>	
plastic windows	<p>screws for plastic i.e. DIN 95606, DIN 95607, ISO 7049, ISO 7085, DIN 7500</p> <p>with head-type: round head with cross, external hex head, Torx</p>	Recommendation: if possible, screw through two cavity webs

Check window data on site

- Measure FAB and FAH.
- Check / calculate weight of casement.
If unknown, it can be determined approximately with the following formula:

$$G \text{ (Casement weight) [kg]} = \frac{\text{FAB [m]} \cdot \text{FAH [m]} \cdot \text{Glass thickness [mm]} \cdot 2,5 \cdot 1,1}{\text{glass-density} \cdot \text{frame-share}}$$

- Check / calculate the required drive force and compare with drive data. If unknown, it can be determined approximately with the following formula:

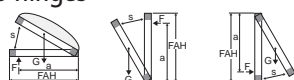
$$F \text{ [N]} = \frac{5,4 \cdot G \text{ [kg]} \cdot s \text{ [m]}}{a \text{ [m]}}$$

Facade

$$F \text{ [N]} = \frac{5,4 \cdot G \text{ [kg]} \cdot \text{FAH [m]}}{a \text{ [m]}}$$

Roof

- a = Distance of action point to hinges
- F = Drive force
- s = Stroke



Scope of delivery:

Prior to assembly, check that delivered products are complete.

Accessories for locking drive	
	Assembly and Commissioning Instructions
	FV Locking angle is not mounted
	Warning sign sticker „Risk of entrapment“ (1x)

INSTALLATION STEP 3: ASSEMBLY OPENING DRIVE

- Mount opening drive (see separate „Assembly and Commissioning Instructions“ for each window-drive).
- Make the connection for the control voltage to the opening drive (see chapter: „ELECTRIC CONNECTION“).

FV1

DIP switches in the USKM set in accordance with the electronic cut-off switch.

- Without internal cut-off switch and sequence control, for use in RWA hardware systems with USKM module.
- For drives with software S1.

FV3 / FVR3 / FVB3

The opening drives **must not have** an integrated disconnection and / or an electronic overload disconnection.

- With internal load dependent cut-off switch and sequence control for drives PL6 S1 / PL10 S1 (I_A= 0,8 A).
- For drives with software S1.

FV4 / FVR4 / FVB4

The opening drives **must have** an integrated disconnection and / or an electronic overload disconnection.

- M-COM suitable internal load dependent cut-off switch and sequence control. For drives with internal load dependent cut-off switch S3 / S12.
- Star wiring. Sequence control via communication wire. Current of the drives does not run over FV4 / FVR4 / FVB4.

INSTALLATION STEP 4A: TEST RUN BEFORE ASSEMBLY ASSEMBLY WITH M-COM

FV4 FVR4 FVB4

The opening drive and the not mounted locking drive **FV4 / FVR4 / FVB4** must be tested **separately**.

Test run: Opening drive

- **Switch on the control voltage** at the opening drive.
- Move opening drive in **CLOSE** direction.
- Move opening drive in **OPEN** direction and ensure the ease of movement of casement.

- Unhinge the opening drive.
- **Switch off the control voltage** from the opening drive.

Test run: locking drive

- Make the connection for the control voltage to the not mounted locking drive **FV4 / FVR4 / FVB4** (see chapter: „ELECTRIC CONNECTION - INSTALLATION STEP 12A“).



During **start-up** of locking drives **FV4 / FVR4 / FVB4** the 24 V-control voltage may be switched on only:

- with opened casement
- unhinged opening drive

- **Switch on the control voltage** at locking drive **FV4 / FVR4 / FVB4** - in **CLOSE** direction.
- Check whether the traverse path of the locking drive **FVR4 / FVB4** with the traverse path of the on-site locking bar moves synchronously.
- If necessary, correct the locking stroke - with the **DIP** switches (see chapter: „CONNECTING CABLE AND DIP SWITCH“).
- Move locking drive **FV4 / FVR4 / FVB4** in **OPEN** direction.
- **Switch off the control voltage** from the locking drive **FV4 / FVR4 / FVB4**.
- Assembly the locking drives **FV4 / FVR4 / FVB4** - according to installation step 5 - 10.

INSTALLATION STEP 4B: TEST RUN BEFORE ASSEMBLY ASSEMBLY OF A PREPROGRAMMED SET

FV3 FVR3 FVB3

The opening drive and the not mounted locking drive **FV3 / FVR3 / FVB3** must be tested **together**.

NOTE

Drives from the factory preprogrammed sets do not work individually!

- Unhinge the opening drive and open the casement manually.

Test run: locking drive

- Make the connection for the control voltage to the not mounted locking drive **FV3 / FVR3 / FVB3** (see chapter: „ELECTRIC CONNECTION - INSTALLATION STEP 12B“).



During **start-up** of locking drives **FV3 / FVR3 / FVB3** the 24 V-control voltage may be switched on only:

- with opened casement
- unhinged opening drive

- **Switch on the control voltage** at locking drive **FV3 / FVR3 / FVB3** and at the opening drive - in **CLOSE** direction.
First the opening drive moves in **CLOSE** direction, then the locking drive **FV3 / FVR3 / FVB3** begins to start.
- Check whether the traverse path of the locking drive **FVR3 / FVB3** with the traverse path of the on-site locking bar moves synchronously.
- If necessary, correct the locking stroke - with the **DIP** switches (see chapter: „CONNECTING CABLE AND DIP SWITCH“).
- Move locking drive **FV3 / FVR3 / FVB3** and the opening drive in **OPEN** direction.
- **Switch off the control voltage** from the locking drive **FV3 / FVR3 / FVB3** and form the opening drive.
- Assembly the locking drives **FV3 / FVR3 / FVB4** - according to installation step 5 - 10.

INSTALLATION STEP 5A: HOLE LAYOUTS FOR FV

FV

Application examples

Bottom-hung inward opening Frame assembly		Bottom-hung inward opening Frame assembly	
<p>A</p> <p>View on aluminium window</p>	<p>A</p> <p>View on wood window</p>		
Bottom-hung inward opening Casement assembly		Bottom-hung inward opening Casement assembly	
<p>A</p> <p>View on aluminium window</p>	<p>A</p> <p>View on aluminium window</p>		
Top-hung outward opening Frame assembly	Top-hung outward opening Frame assembly	Top-hung outward opening Frame assembly	
<p>B</p> <p>View on PVC window</p>	<p>B</p> <p>View on aluminium window</p>	<p>B</p> <p>View on aluminium window</p>	

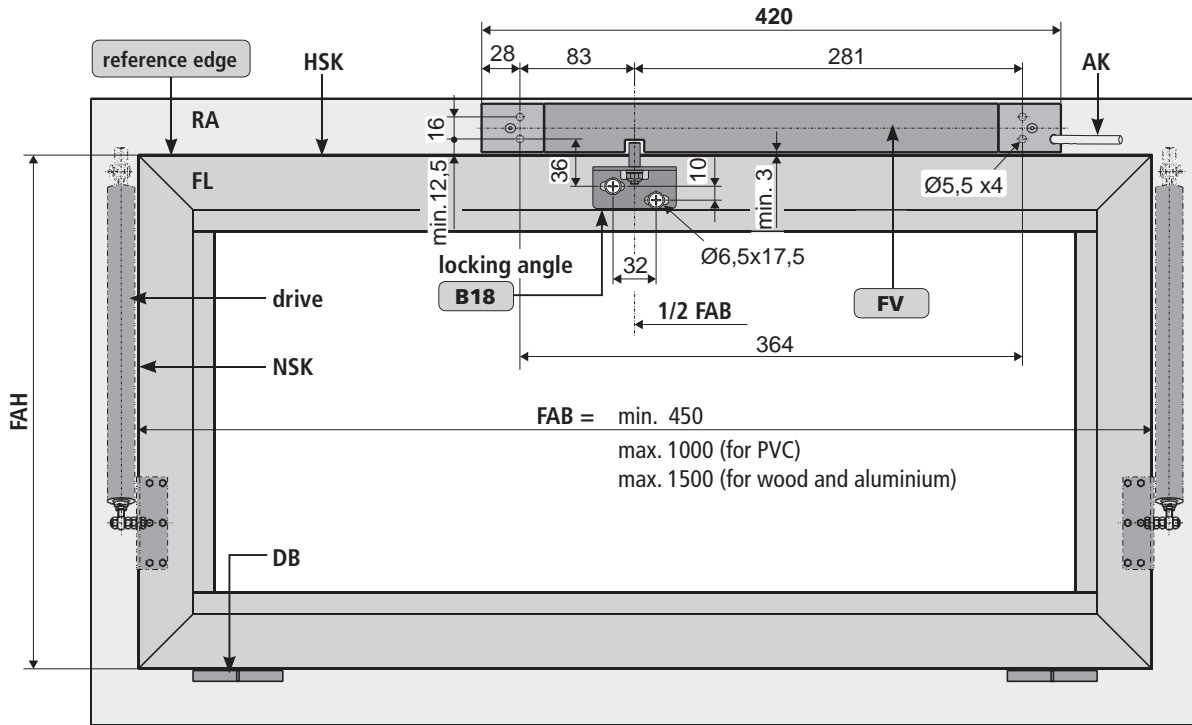
INSTALLATION STEP 5A: HOLE LAYOUTS FOR LOCKING DRIVE FV

FV

Frame assembly - inward opening windows - hole layout FV1 / FV3 / FV4 - single, right-hand, length = 420 mm

A See: **INSTALLATION STEP 8A**

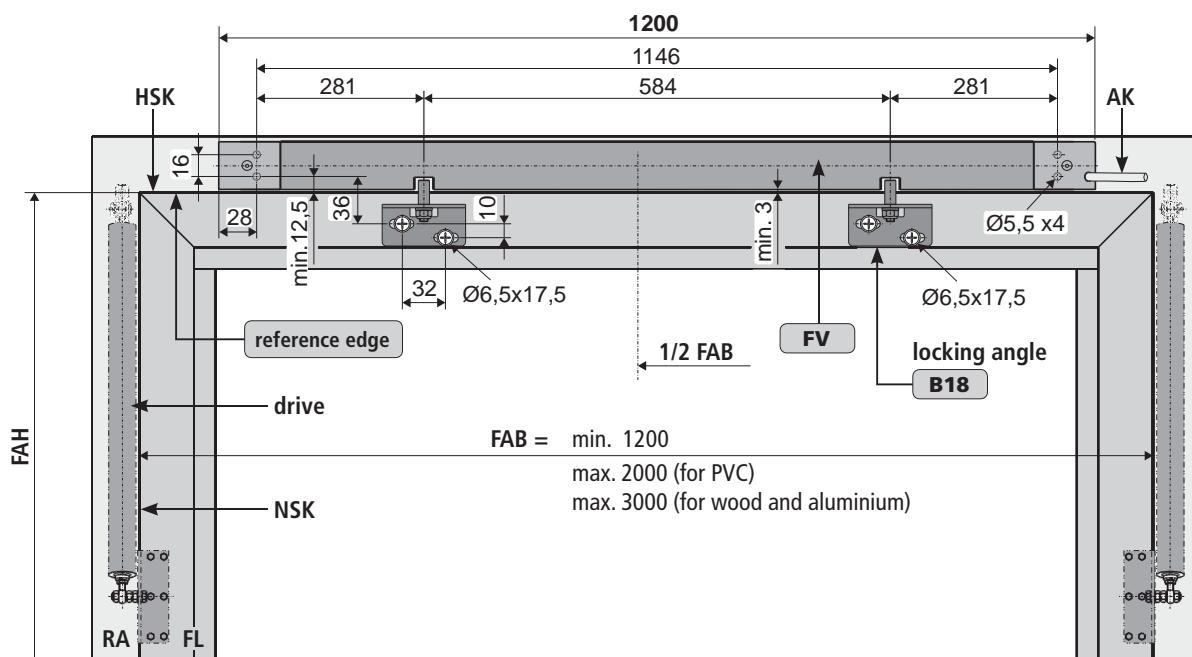
Window versions	Bottom-hung	Top-hung	Side-hung	
	- inward opening	- inward opening	- inward opening	Horizontal + vertical pivot



Frame assembly - inward opening windows - hole layout FV1 / FV3 / FV4 - double, length = 1200 mm

A See: **INSTALLATION STEP 8A**

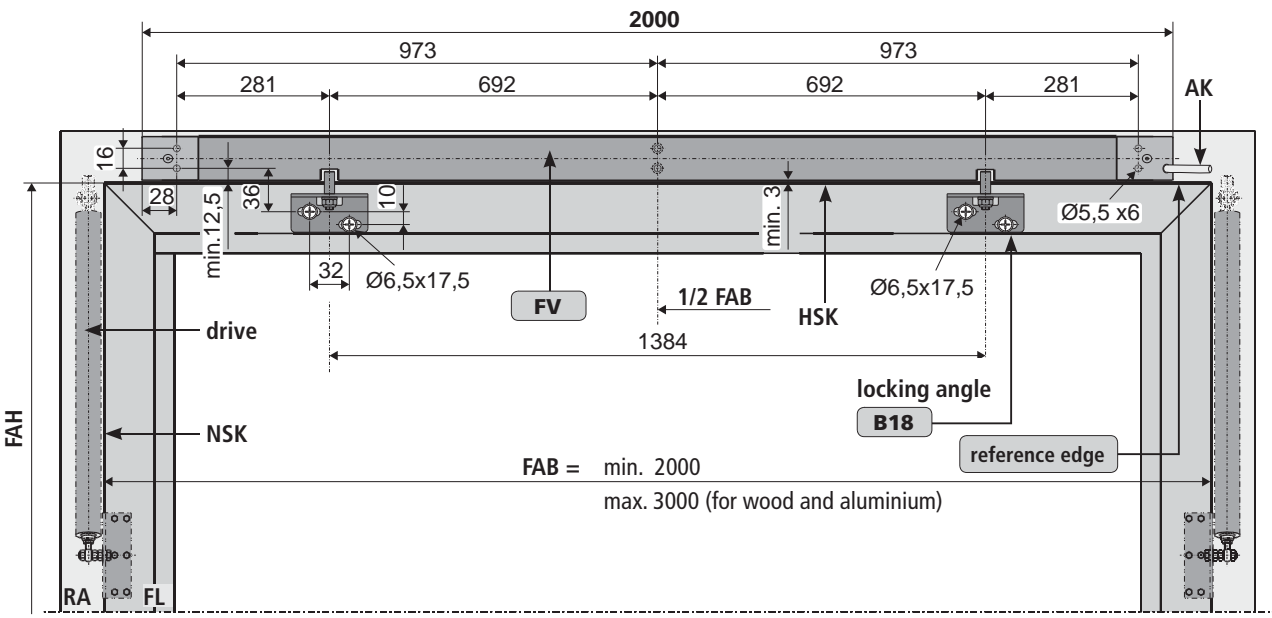
Window versions	Bottom-hung	Top-hung	Side-hung	
	- inward opening	- inward opening	- inward opening	Horizontal + vertical pivot



Frame assembly - inward opening windows - hole layout FV1 / FV3 / FV4 - double, length = 2000 mm

A See: **INSTALLATION STEP 8A**

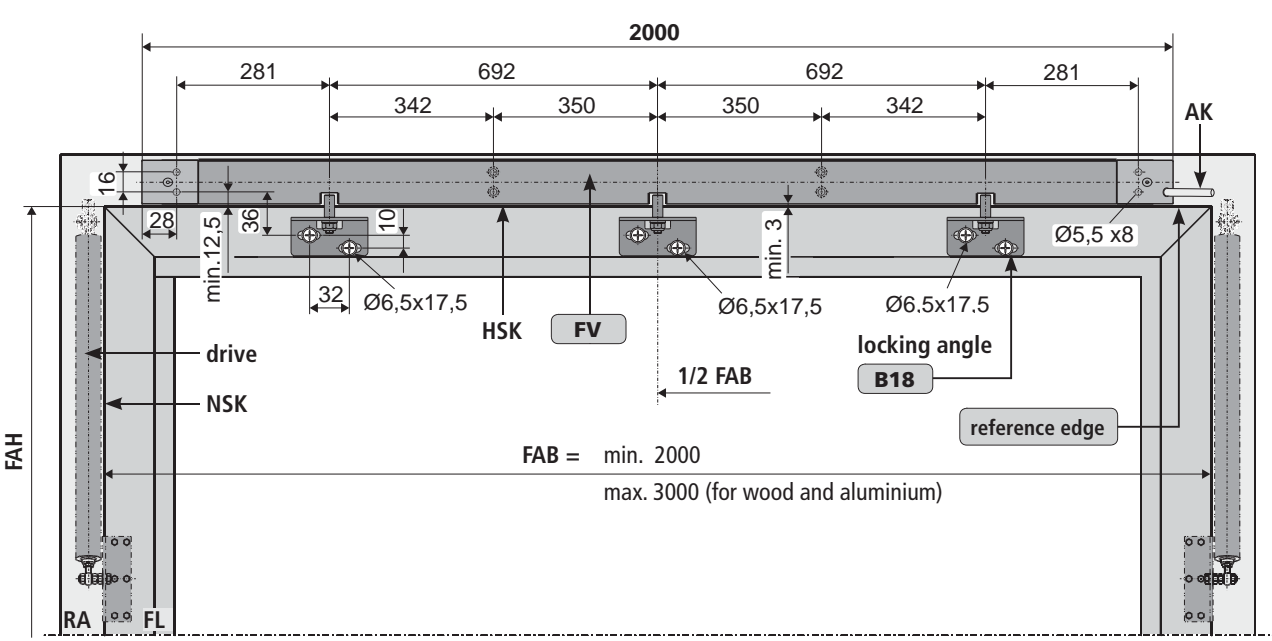
Window versions	Bottom-hung	- inward opening	Horizontal + vertical pivot
	Top-hung	- inward opening	
	Side-hung	- inward opening	



Frame assembly - inward opening windows - hole layout FV1 / FV3 - triple, length = 2000 mm

A See: **INSTALLATION STEP 8A**

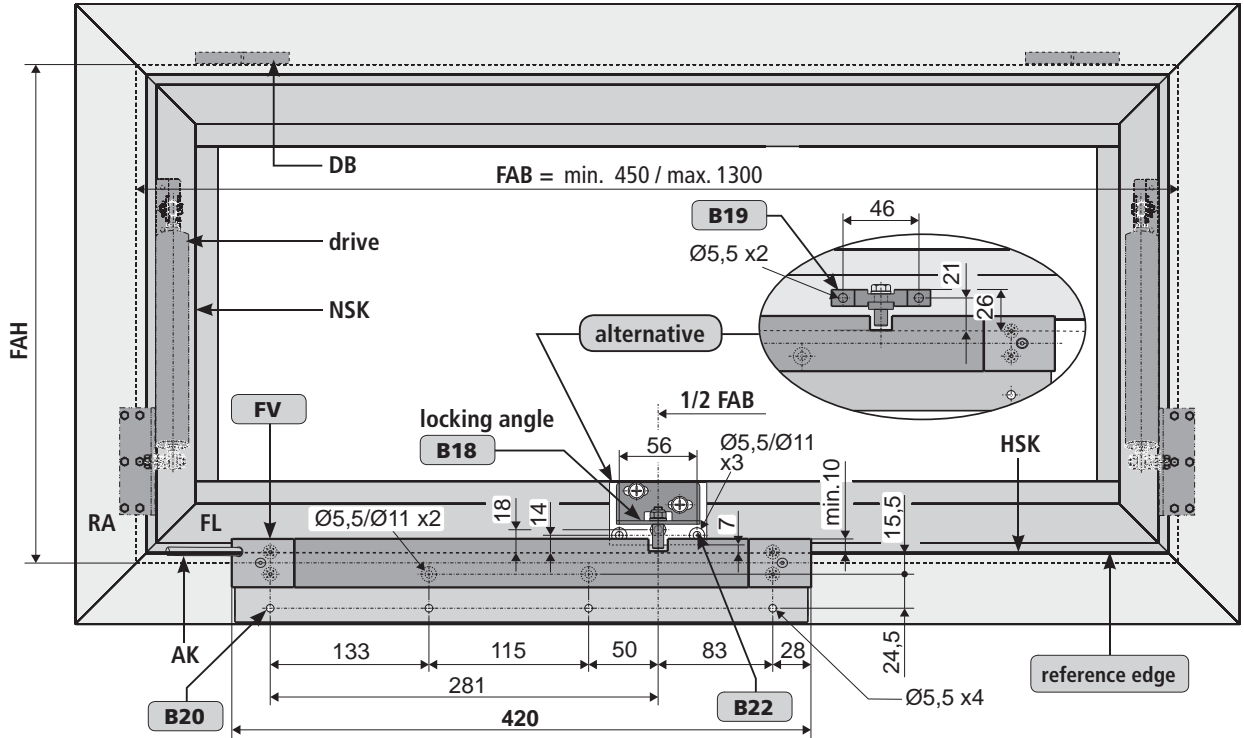
Window versions	Bottom-hung	- inward opening	Horizontal + vertical pivot
	Top-hung	- inward opening	
	Side-hung	- inward opening	



Frame assembly - outward opening windows - hole layout FV1 / FV3 / FV4 - single, right-hand, length = 420 mm

B See: **INSTALLATION STEP 8B**

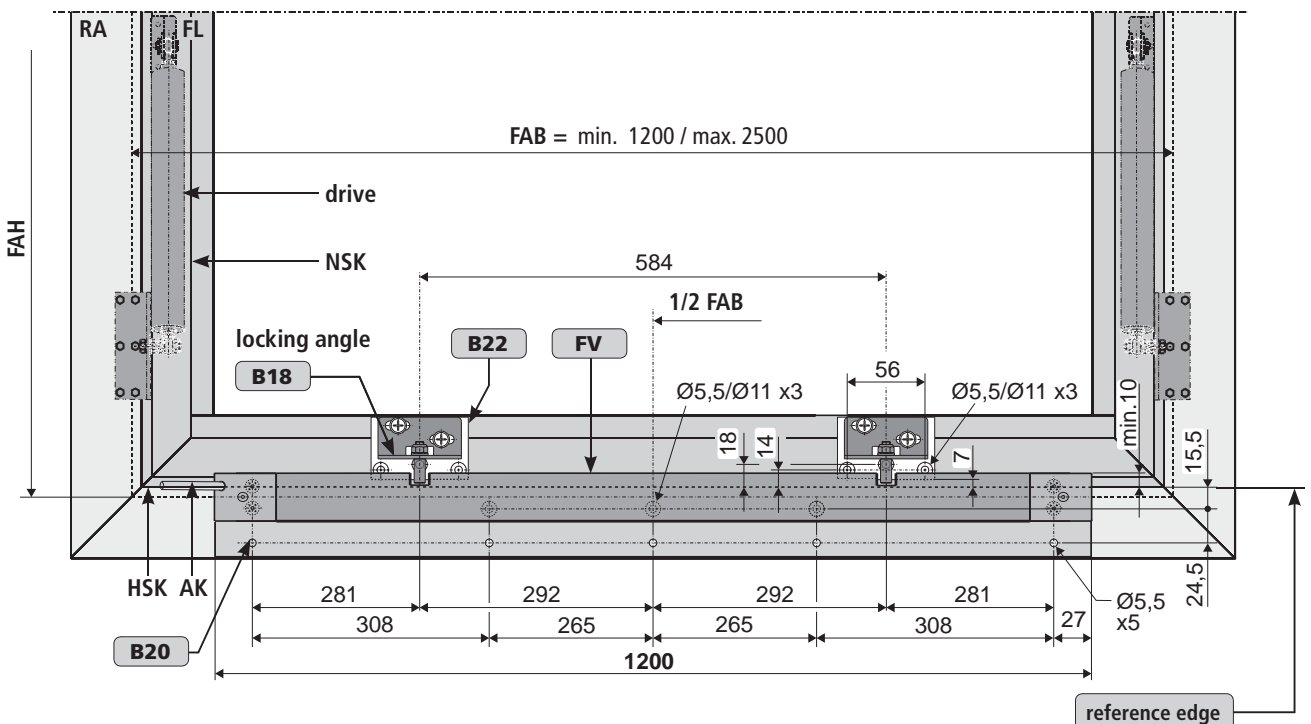
Window versions	Bottom-hung	- outward opening	Horizontal + vertical pivot
	Top-hung	- outward opening	
	Side-hung	- outward opening	



Frame assembly - outward opening windows - hole layout FV1 / FV3 / FV4 - double, length = 1200 mm

B See: **INSTALLATION STEP 8B**

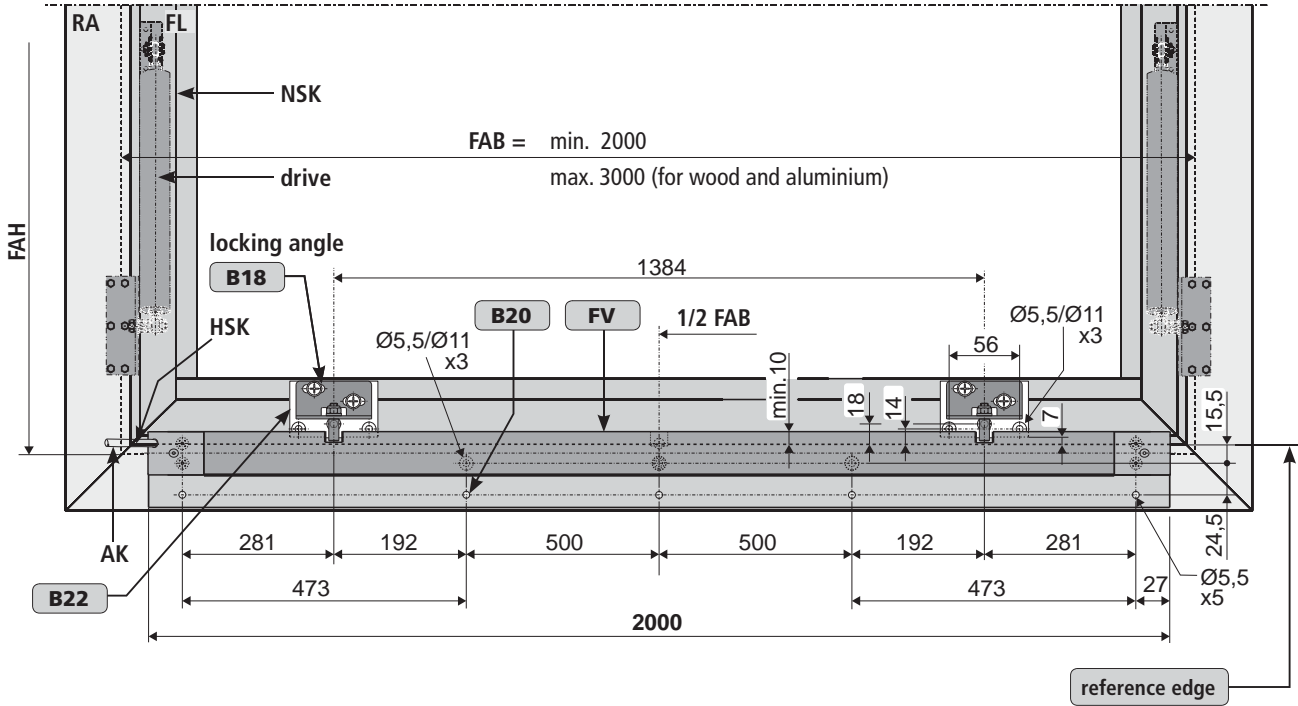
Window versions	Bottom-hung	- outward opening	Horizontal + vertical pivot
	Top-hung	- outward opening	
	Side-hung	- outward opening	



Frame assembly - outward opening windows - hole layout FV1 / FV3 / FV4 - double, length = 2000 mm

B See: **INSTALLATION STEP 8B**

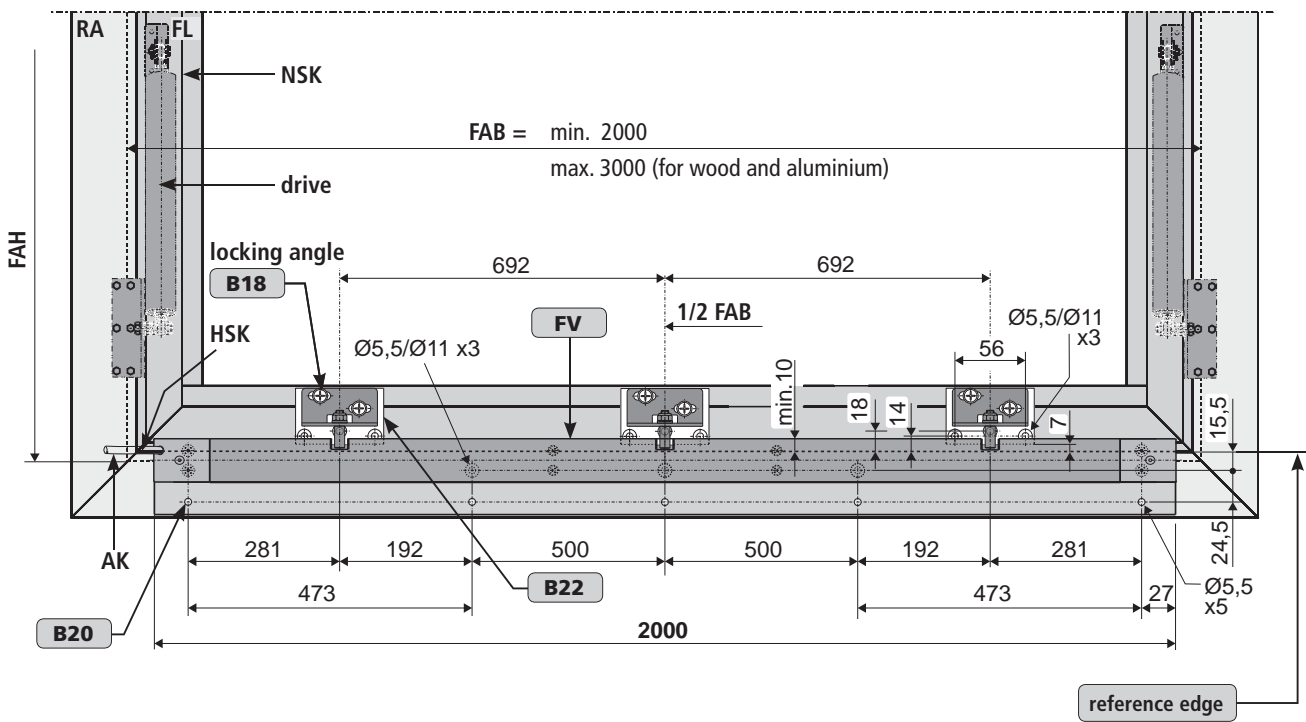
Window versions	Bottom-hung	- outward opening	Horizontal + vertical pivot
	Top-hung	- outward opening	
	Side-hung	- outward opening	



Frame assembly - outward opening windows - hole layout FV1 / FV3 - triple, length = 2000 mm

B See: **INSTALLATION STEP 8B**

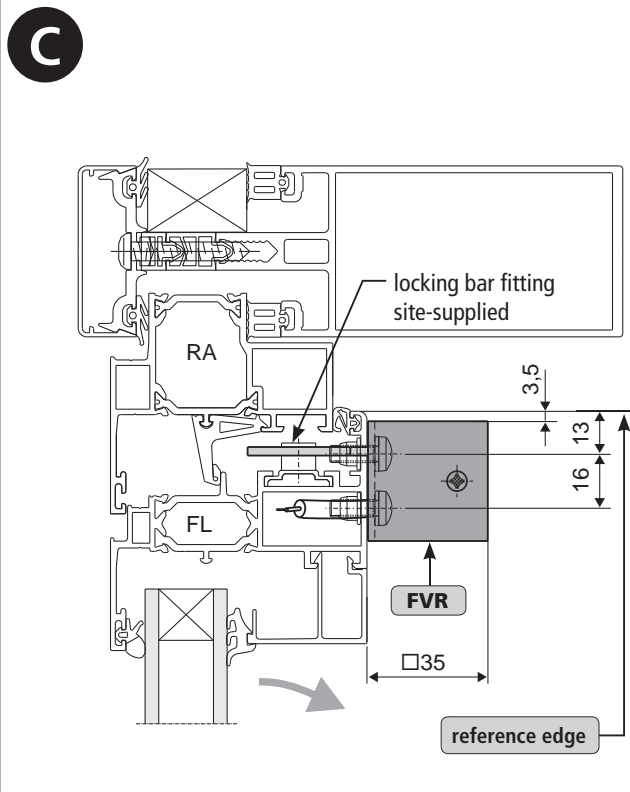
Window versions	Bottom-hung	- outward opening	Horizontal + vertical pivot
	Top-hung	- outward opening	
	Side-hung	- outward opening	



INSTALLATION STEP 5B: HOLE LAYOUTS FOR FVR

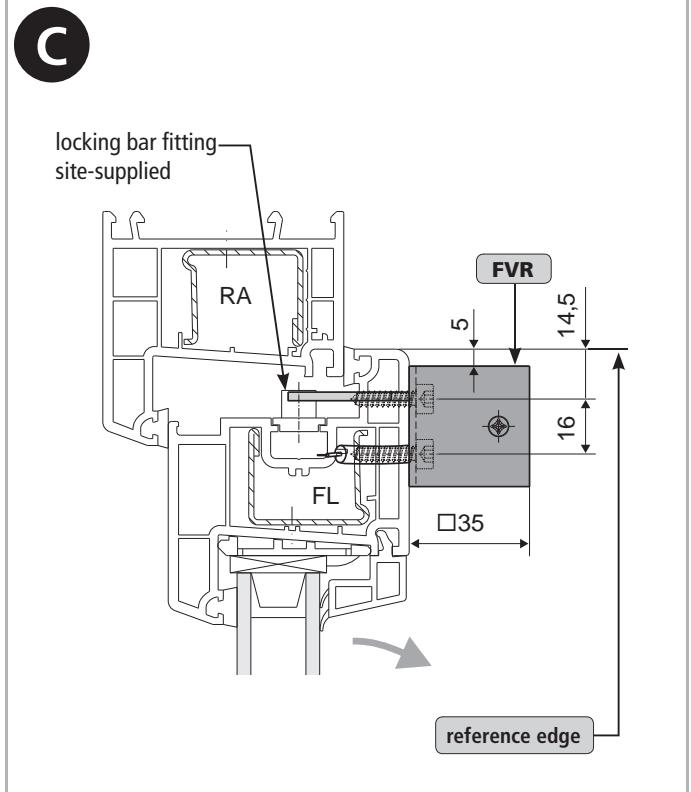
Application examples

Bottom-hung inward opening Casement assembly



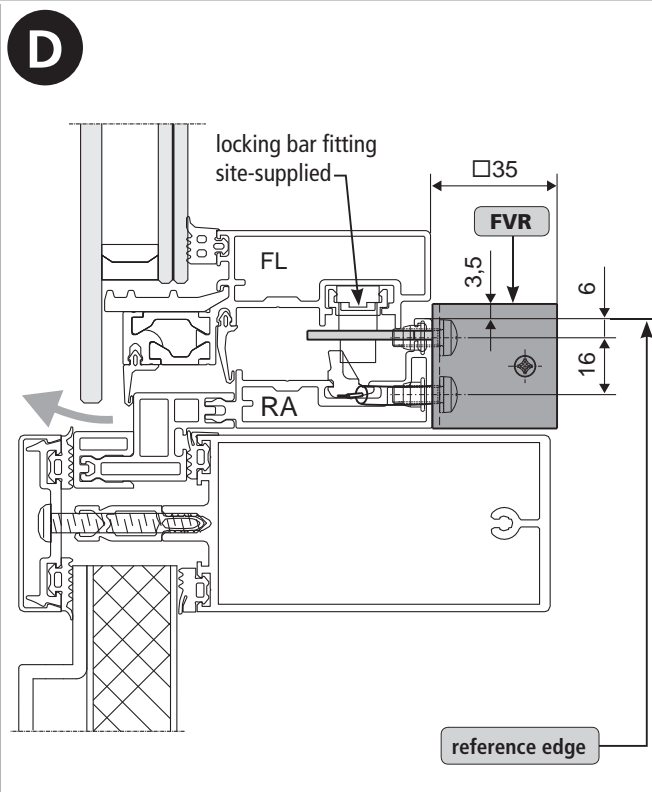
View on aluminium window

Bottom-hung inward opening Casement assembly



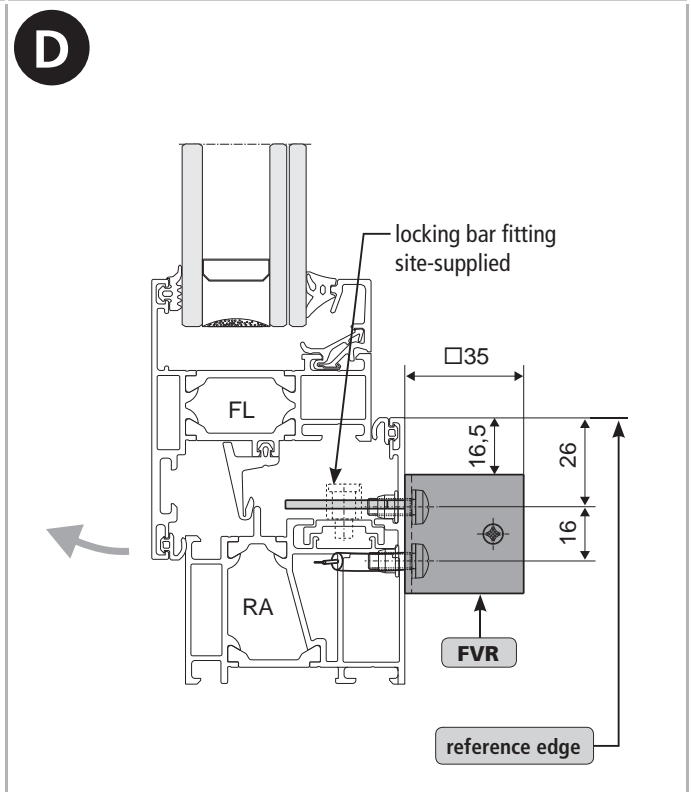
View on PVC window

Friction hinged outward opening Frame assembly



View on aluminium window

Top-hung outward opening Frame assembly



View on aluminium window

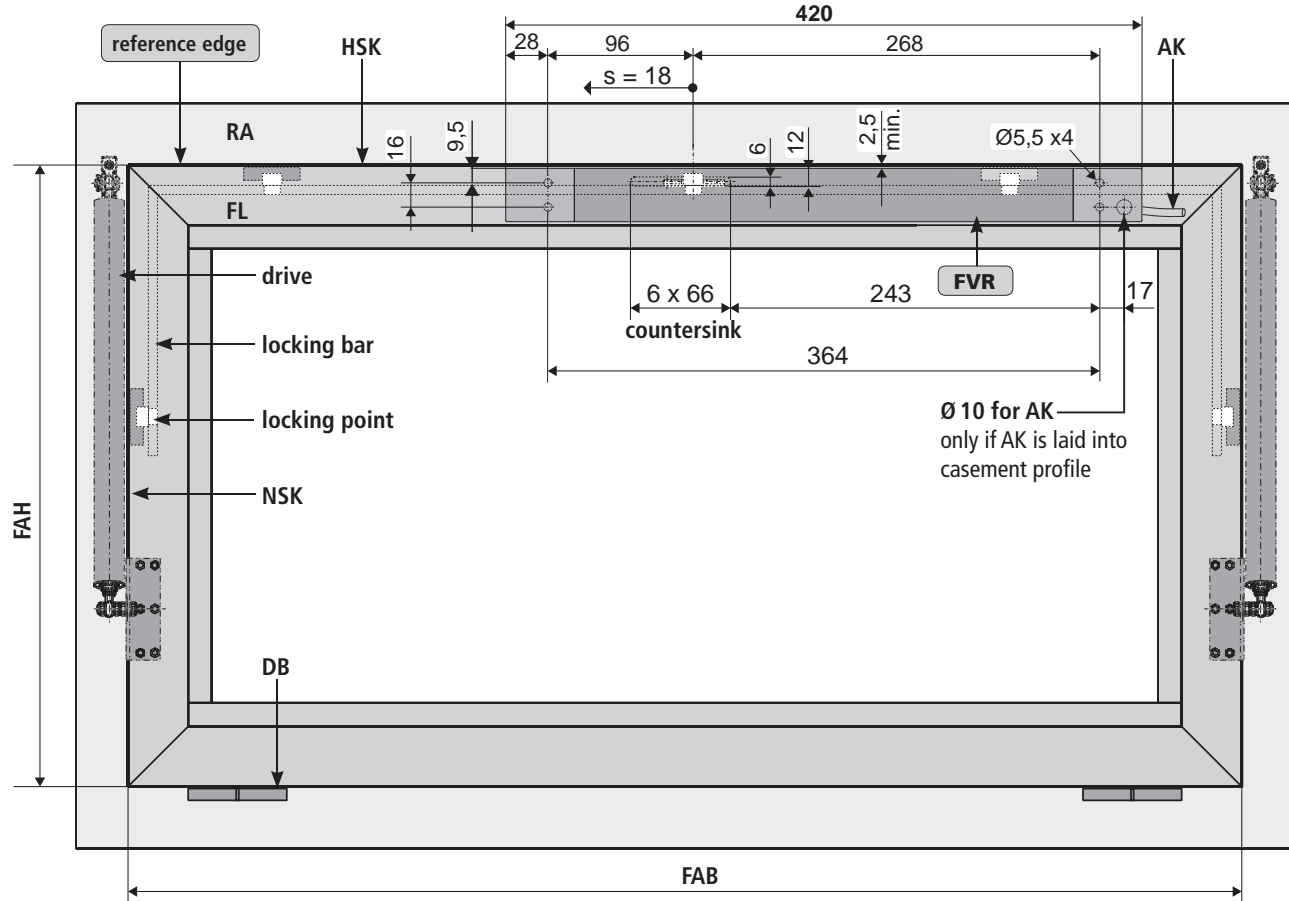
INSTALLATION STEP 5B: HOLE LAYOUTS FOR LOCKING DRIVE FVR

FVR

Casement assembly - hole layout FVR3 / FVR4 - inward opening windows

C See: INSTALLATION STEP 8C

Window versions	Bottom-hung	- inward opening	Horizontal + vertical pivot
	Top-hung	- inward opening	
	Side-hung	- inward opening	

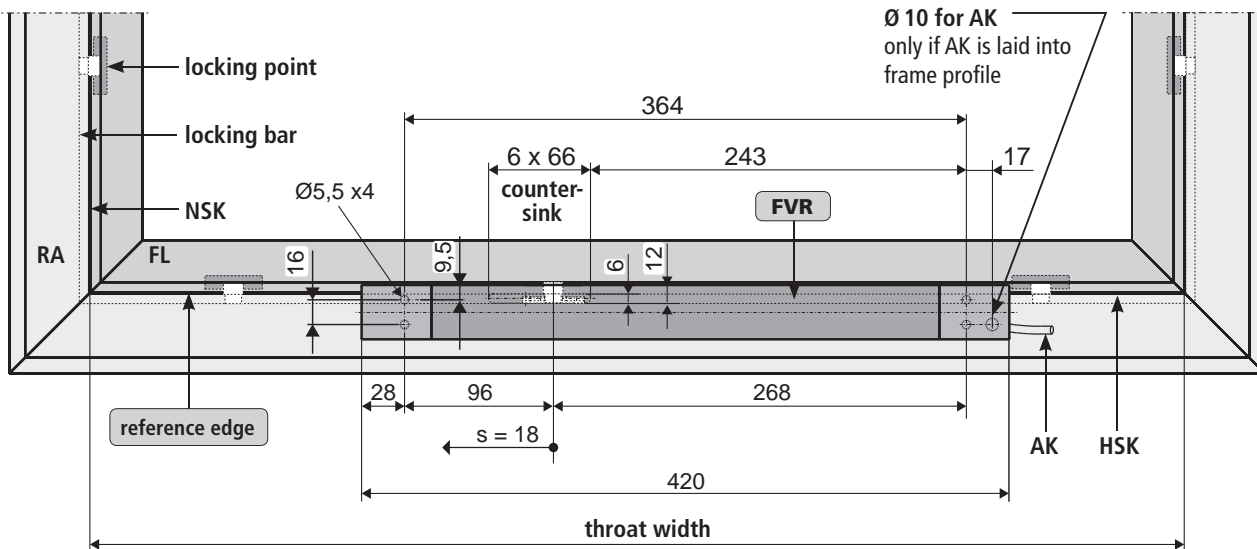


05

Frame assembly - hole layout FVR3 / FVR4 - outward opening windows

D See: INSTALLATION STEP 8C

Window versions	Bottom-hung	- outward opening
	Top-hung	- outward opening
	Side-hung	- outward opening
	Friction hinged	- outward opening



INSTALLATION STEP 5c: HOLE LAYOUTS FOR FVB

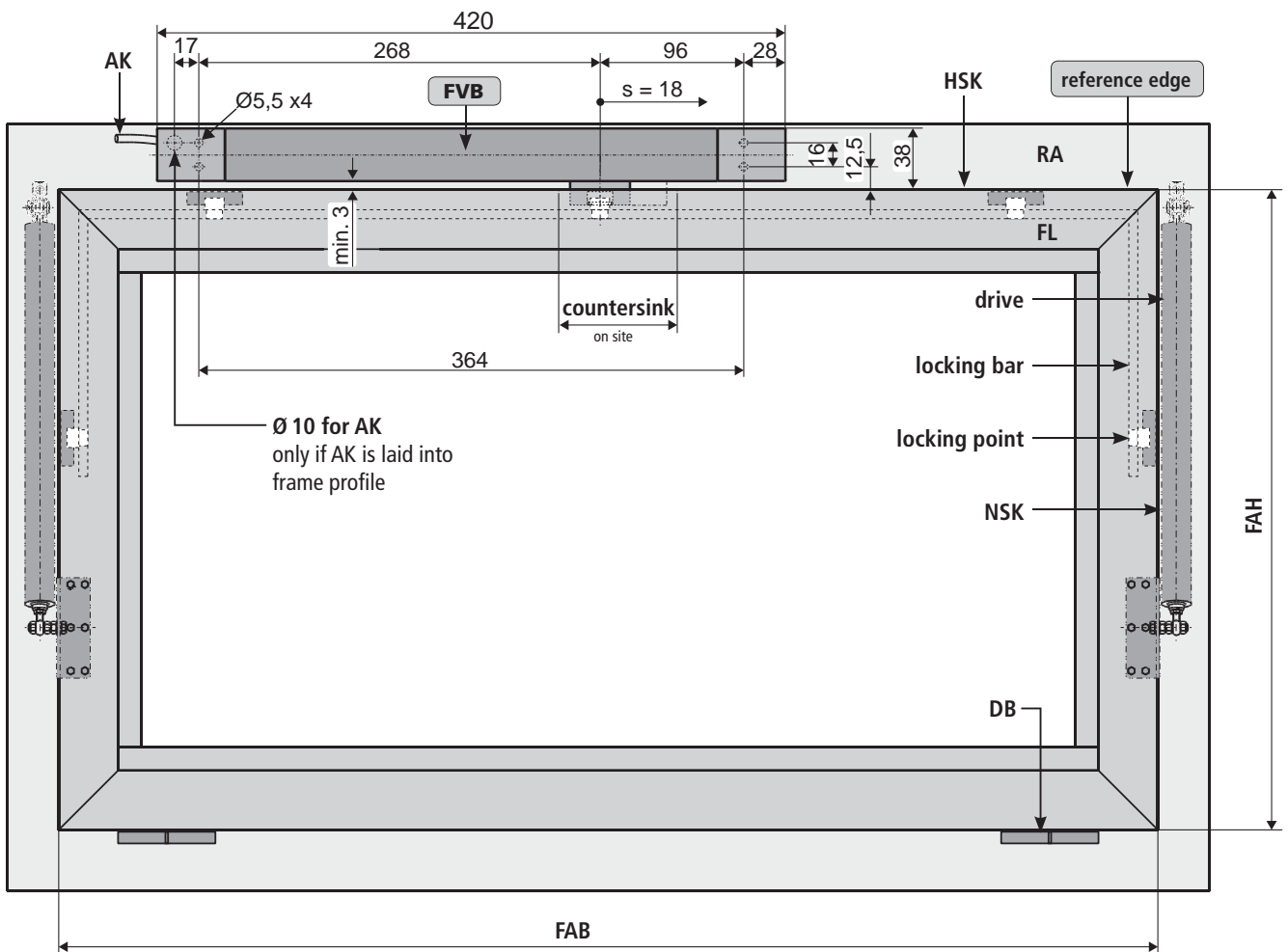
Application examples

Bottom-hung inward opening Frame assembly	Bottom-hung inward opening Frame assembly	Bottom-hung inward opening Frame assembly
View on aluminium window	View on PVC window	View on wood window

Frame assembly - hole layout FVB3 / FVB4 - inward opening windows

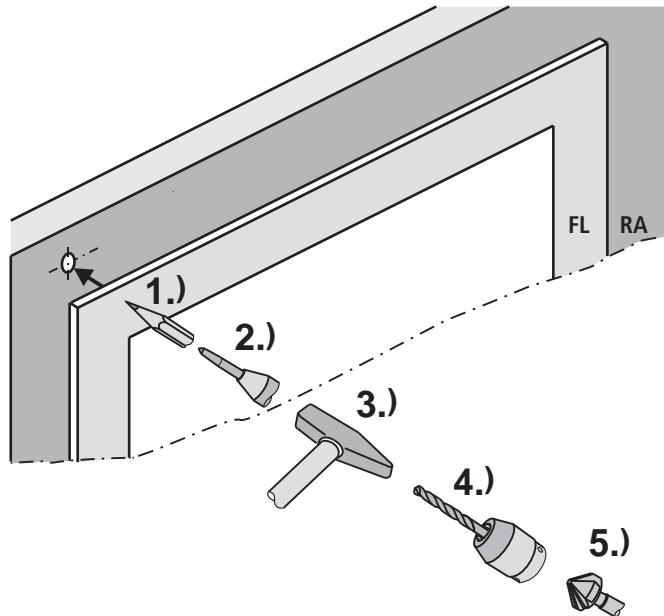
E See: **INSTALLATION STEP 8D**

Window versions	Bottom-hung	Top-hung	Side-hung	
	- inward opening	- inward opening	- inward opening	Horizontal + vertical pivot

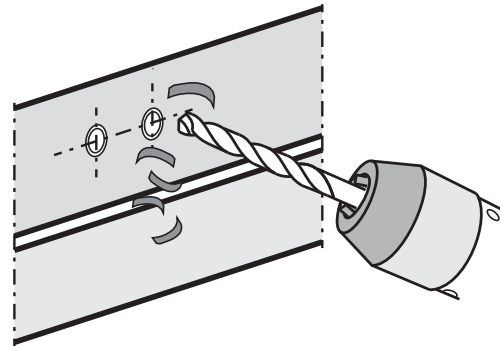


INSTALLATION STEP 6: DRILL HOLES ACCORDING TO MOUNTING VARIANTS **FV** **FVR** **FVB**

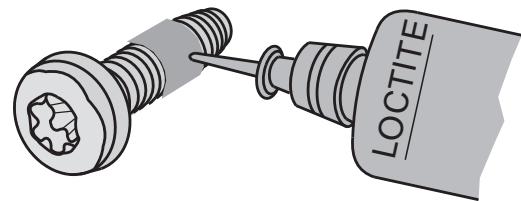
- Determine fastenings.
- Produce drill holes with appropriate cross-section. For the mounting dimensions please refer to the above-mentioned hole layout drawings (see chapter „INSTALLATION STEPE 5“ or project-specific documents and drawings).



Carefully clear away drilling swarfs to prevent seals from being damaged. Avoid surface scratches, for example by using masking tape.

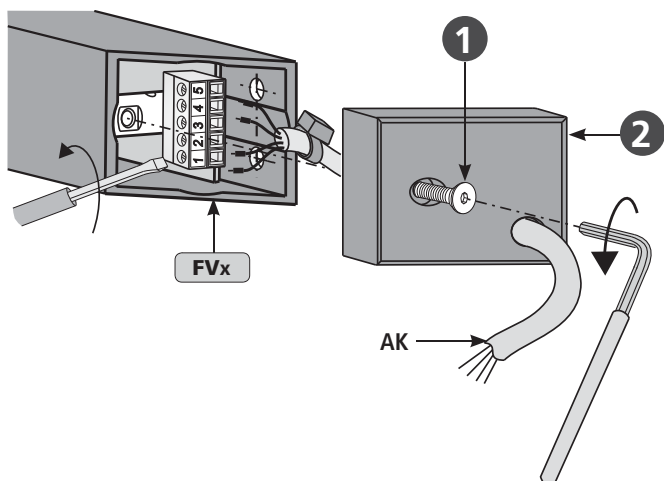


- Secure fasteners against loosening; e.g. by applying removable thread-locking compound such as "Loctite".

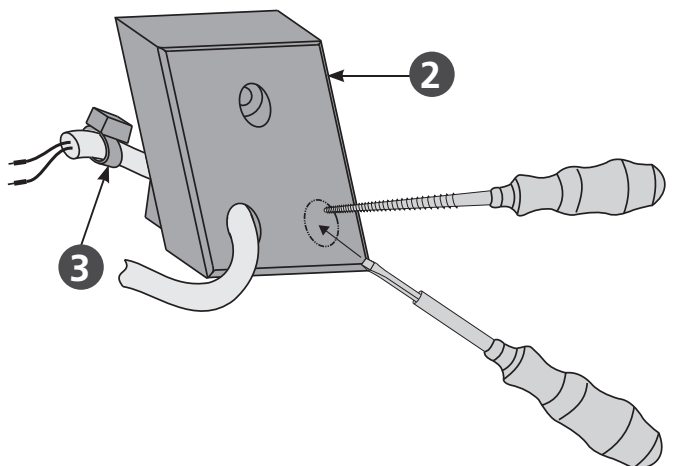


INSTALLATION STEP 7: REMOVE THE END CAPS FROM THE LOCKING DRIVE **FV** **FVR** **FVB**

- Loosen the screws ① and remove the end caps ② from the locking drive **FVx** / **FVRx** / **FVBx**. Remove connection cable (**AK**) for easier handling.



- If necessary, prepare end cap ② for another cable. Use screwdriver to pierce the closed drill hole. Remove the burrs. Possibly slightly enlarge drill hole.
- Feeding the cable through the new hole carefully. Provide strain relief ③.

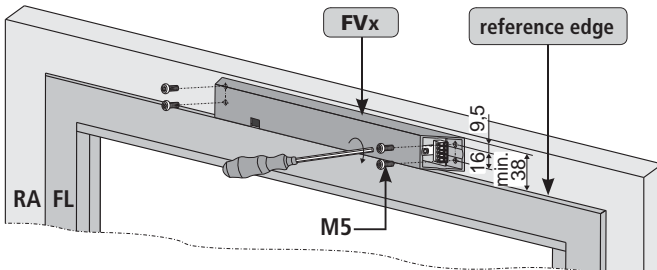


INSTALLATION STEP 8A: FV1/FV3/FV4 FRAME ASSEMBLY - INWARD OPENING WINDOWS **FV**

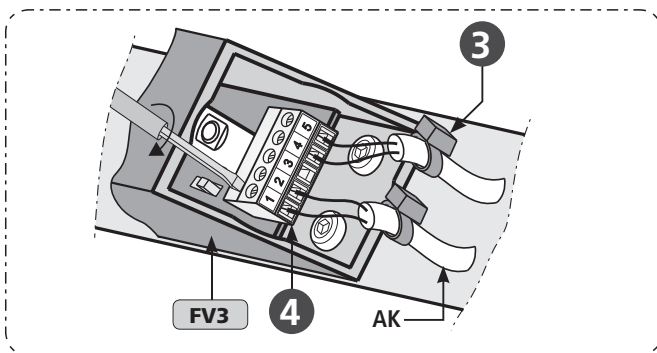
- Screw locking drive **FVx** onto casement frame (**M5**) - if necessary with base plate.



Make sure they are parallel to casement edge. The drive body must lie completely flush on the window frame surface.

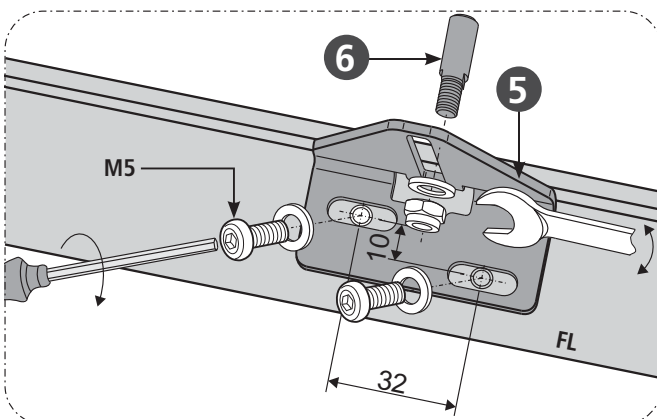


- Connect the connecting cable (**AK**) to terminal strip **4** (see chapter „CONNECTING CABLE AND DIP SWITCH“).
- Check the locking position on DIP switch. Observe the locking direction (see chapter „CONNECTING CABLE AND DIP SWITCH“).

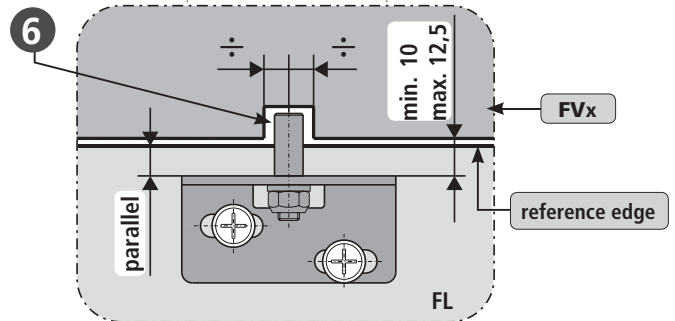


Clamp the connecting cable! Check position from DIP switch! (see: „CONNECTING CABLE AND DIP SWITCH“)

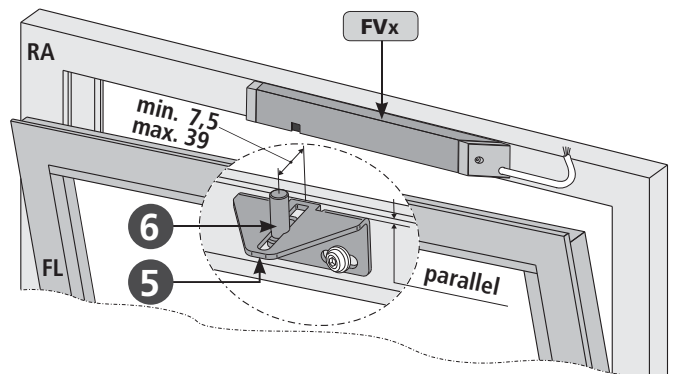
- Screw locking angle **5** - according to site condition.
- The locking pin **6** must be centered in the mounting slot of the locking drives **FVx**.



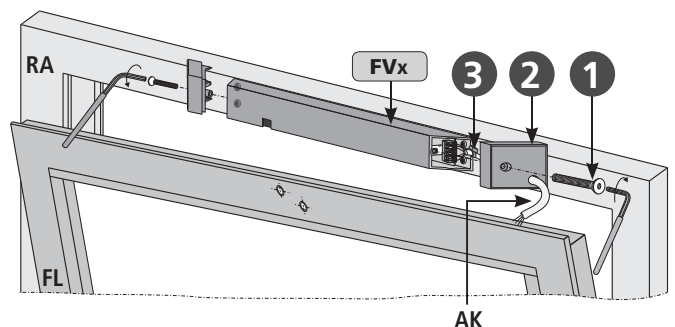
Make sure they are parallel to casement edge.



- Adjust the locking pin **6**. It should completely move into the locking drive **FVx**.
- Firmly tighten the locking pin **6** - using spanner SW10.



- Fit end caps **2** with screws **1**.
- Re-install strain relief **3**.



Note cable routing! (see chapter „CABLE ROUTING“) Check function! (see chapter „SAFETY CHECK AND PERFORMING TEST RUN“).

INSTALLATION STEP 8B: FV1/FV3/FV4 FRAME ASSEMBLY -
OUTWARD OPENING WINDOWS

FV

Assembly variant 1:

Locking angle B18 with adapter plate B22 (optional)

■ Screw the adapter plate B22 ① onto the casement frame (M5).

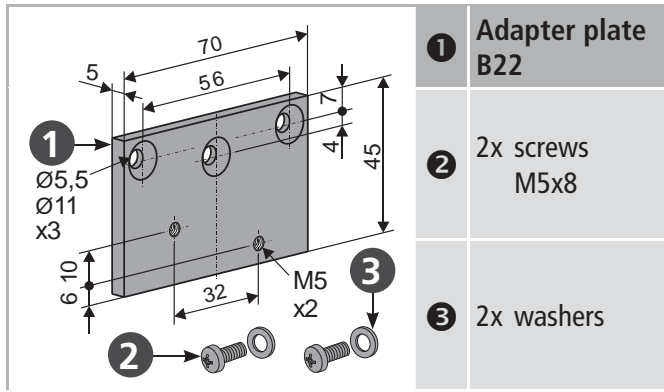
Adapter plate B22 ① for relocation of the mounting holes of the locking bracket B18 outside the glazing bead of outward opening windows.

Is not included in the scope of delivery.

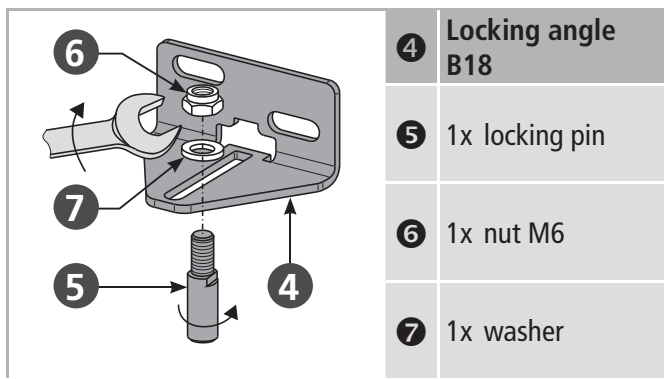
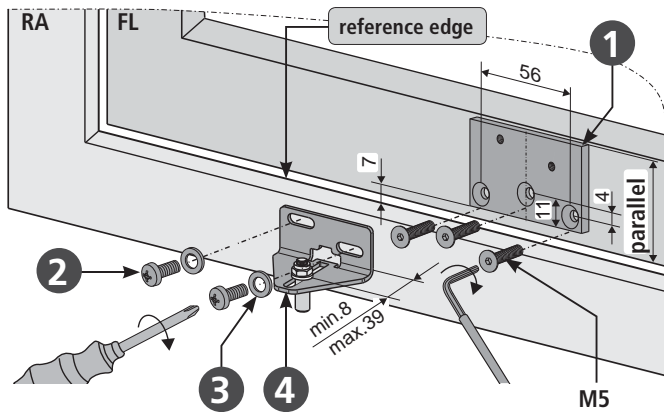
NOTE



Make sure they are parallel to casement edge.



■ Screw locking angle B18 ④ onto adapter plate B22 ① - using the provided screws ② and washers ③.

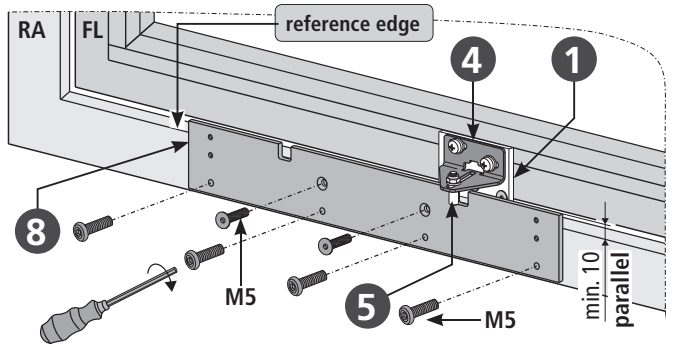


■ Screw mounting plate ⑧ for the locking drive FVx onto window frame (M5).



Align the mounting plate ⑧ depending on the design of the locking drives FVx „right-hand / left-hand“.

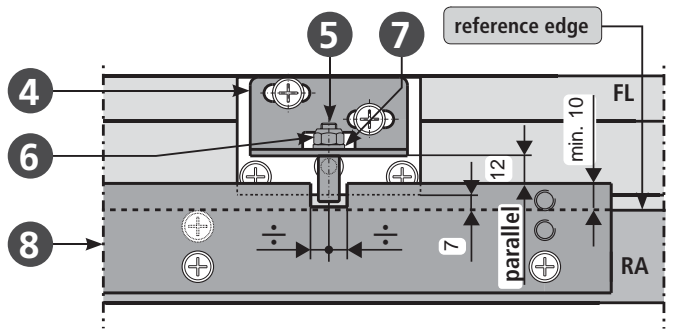
Make sure they are parallel to casement edge.



■ The locking pin ⑤ must be centered in the mounting slot of the mounting plate ⑧.

■ Adjust the locking pin ⑤. It should completely move into the locking drive FVx.

■ Firmly tighten the locking pin ⑤ with nut ⑥ and washer ⑦ (spanner SW10).



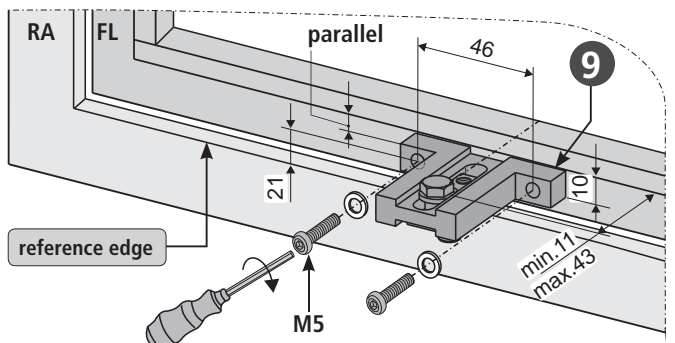
Assembly variant 2:

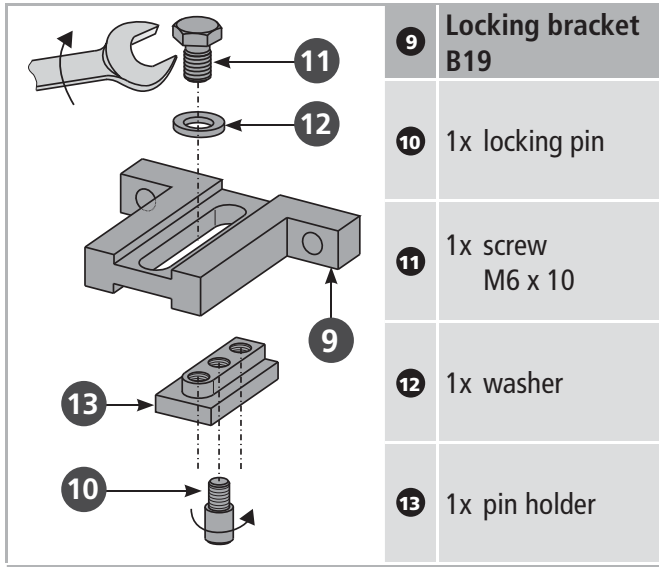
Locking angle B19 (small)

■ Screw the locking angle B19 ⑨ onto casement frame (M5).




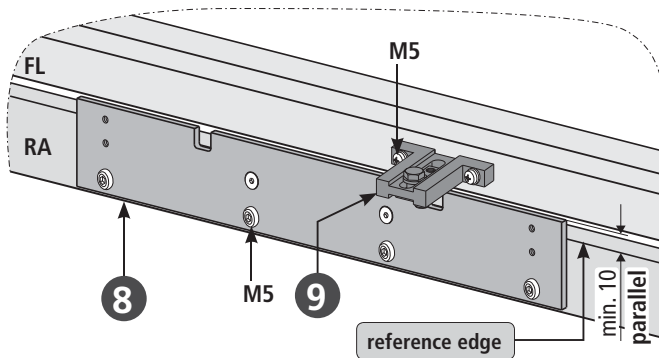
Make sure they are parallel to casement edge.



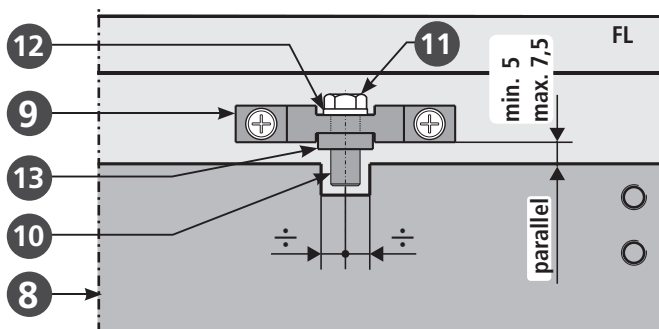


■ Screw mounting plate 8 for the locking drive FVx onto window frame (M5).

 Align the mounting plate 8 depending on the design of the locking drives FVx „right-hand / left-hand“. Make sure they are parallel to casement edge.

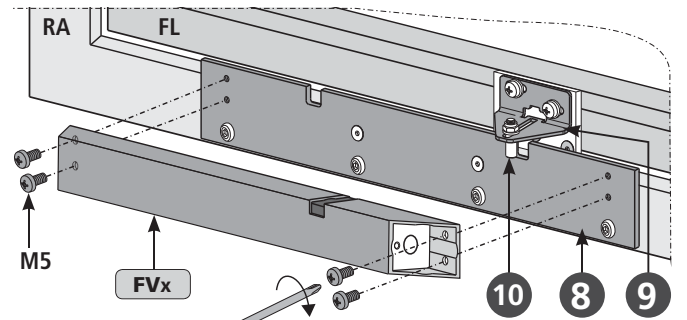


- The locking pin 10 must be centered in the mounting slot of the mounting plate 8.
- Adjust the locking pin 10. It should completely move into the locking drive FVx.
- Firmly tighten the locking pin 10 with screw 11 and washer 12 and pin holder 13 (spanner SW10).



Assembly: locking drive

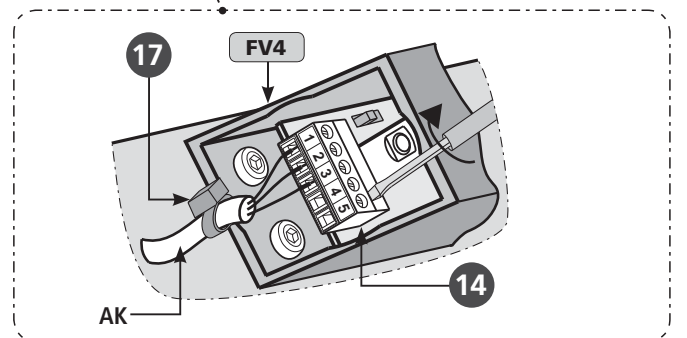
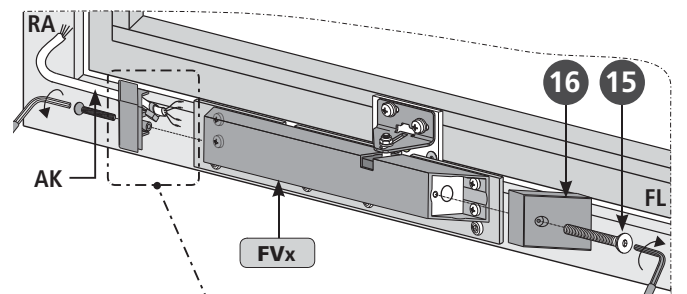
■ Screw locking drive FVx on mounting plate 8 (M5).




- Connect the connecting cable (AK) to terminal strip 14 (see chapter „CONNECTING CABLE AND DIP SWITCH“).
- Check the locking position on DIP switch. Observe the locking direction of the locking fitting (see chapter „CONNECTING CABLE AND DIP SWITCH“).

 Clamp the connecting cable! Check position from DIP switch! (see: „CONNECTING CABLE AND DIP SWITCH“)

- Fit end caps 16 with screws 15.
- Re-install strain relief 17.



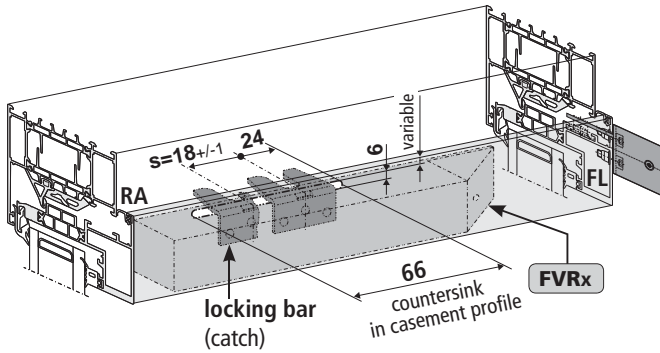
 Note cable routing! (see chapter „CABLE ROUTING“) Check function! (see chapter „SAFETY CHECK AND PERFORMING TEST RUN“).

INSTALLATION STEP 8c: FVR3/FVR4 FRAME ASSEMBLY - INWARD OPENING WINDOWS **FVR**

- Determine position of locking drives **FVRx** on casement.
- Determine the locking direction.
- Ensure free space (countersink) in the area of the locking bar (catch) according to the window-profile and the actual stroke of the bar.

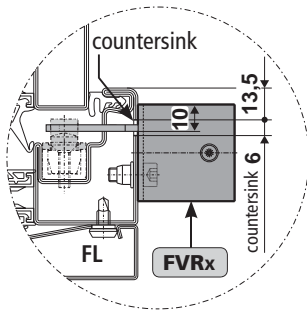


Ensure that the locking bar moves freely.

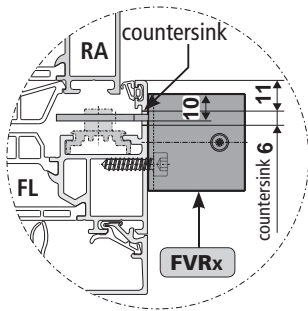


Countersinking for FVR - typical applications

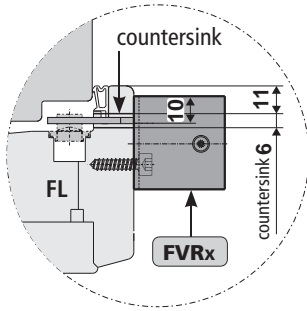
View on steel window



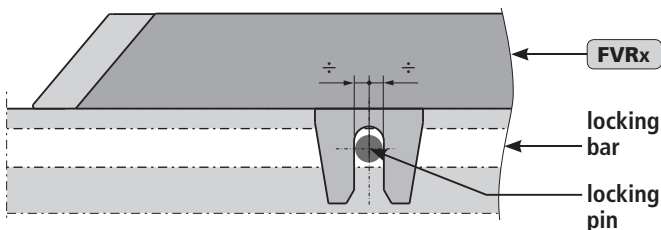
View on alumin. window



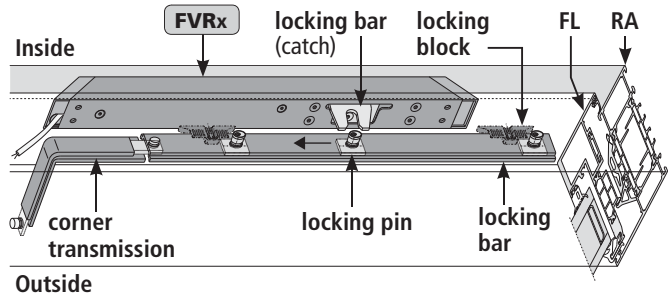
View on wood window



The locking pin of locking bar must be centered in the mounting slot of the locking bar (catch) from the locking drive.

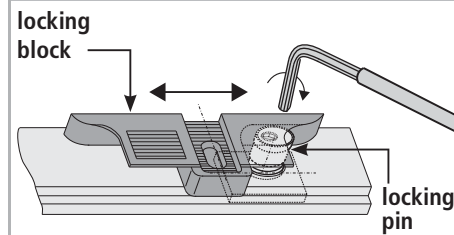


- Check whether the traverse path of the locking drive **FVRx** with the traverse path of the on-site locking bar moves synchronously.



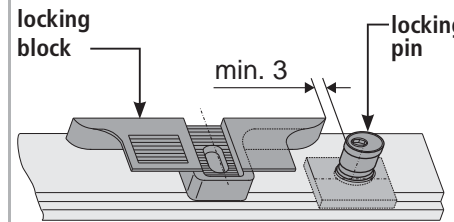
- Adjust locking block and locking pin on site-supplied fittings.

Locking block: locked



The locking pin should completely move into the locking block when locking.

Locking block: unlocked

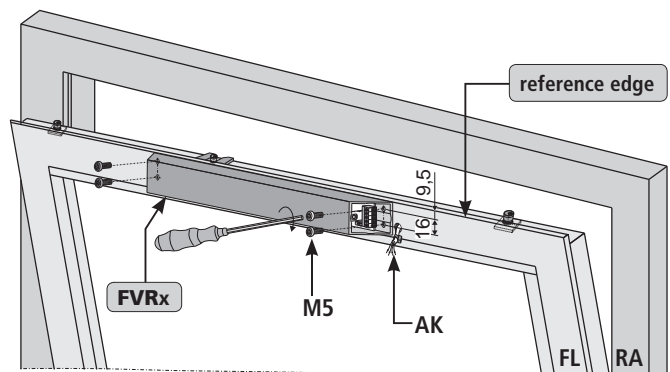


The locking pin should completely move out of the locking block when unlocking.


- Screw locking drive **FVRx** onto casement frame (**M5**).



Make sure they are parallel to casement edge. The drive body must lie completely flush on the casement frame surface.




- Connect the connecting cable (AK) to terminal strip ④ (see chapter „CONNECTING CABLE AND DIP SWITCH“).
- Check the locking position on DIP switch ⑤. Observe the locking direction of the locking fitting (see chapter „CONNECTING CABLE AND DIP SWITCH“).

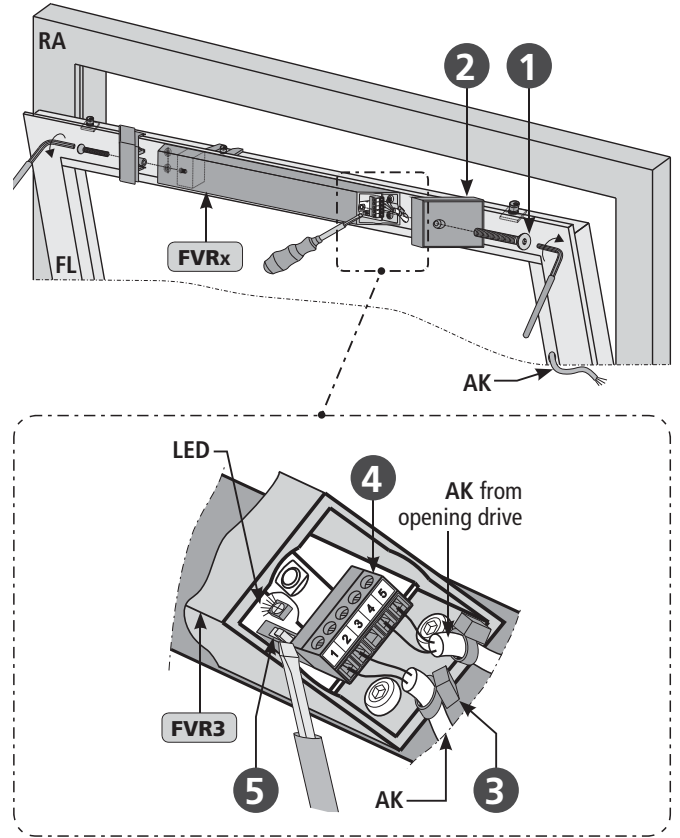


Clamp the connecting cable!
Check position from DIP switch!
(see: „CONNECTING CABLE AND DIP SWITCH“)

- Fit end caps ② with screws ①.
- Re-install strain relief ③.

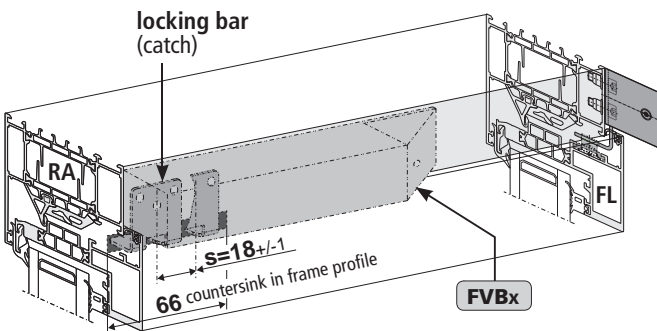



Note cable routing!
(see chapter „CABLE ROUTING“)
Check function! (see chapter „SAFETY CHECK AND PERFORMING TEST RUN“).

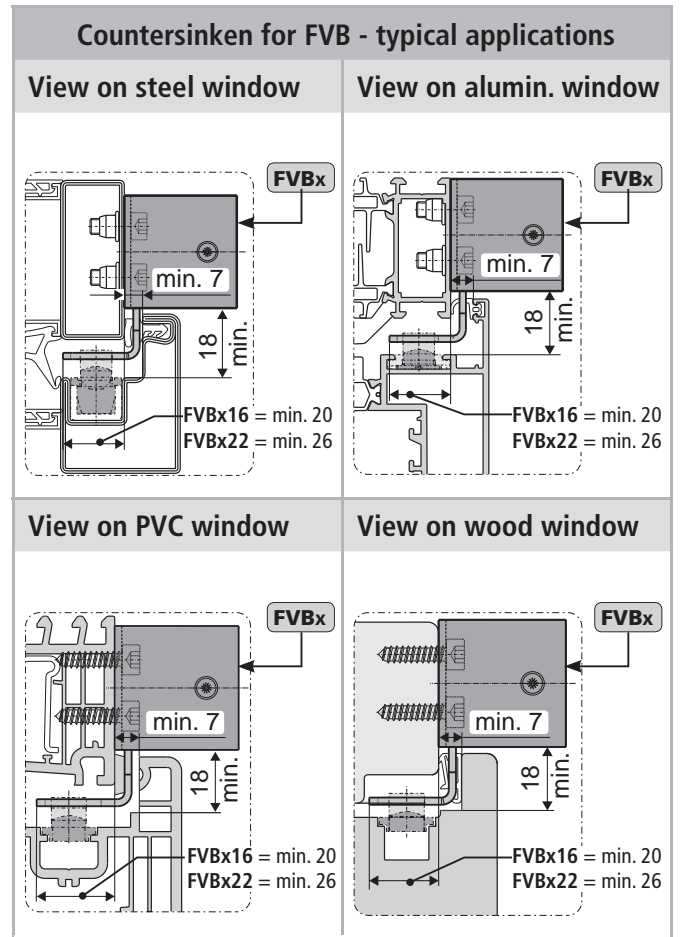
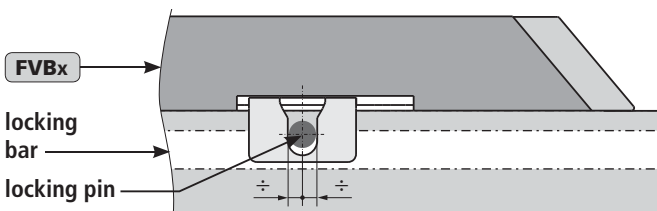


INSTALLATION STEP 8D: FVB3/FVB4 FRAME ASSEMBLY - INWARD OPENING WINDOWS **FVB**

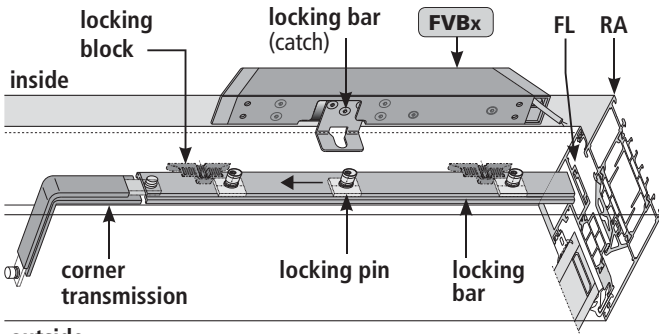
- Determine position of locking drives **FVBx** on casement.
- Determine the locking direction.
- Ensure free space (countersink) in the area of the locking bar (catch) according to the window-profile and the actual stroke of the bar.

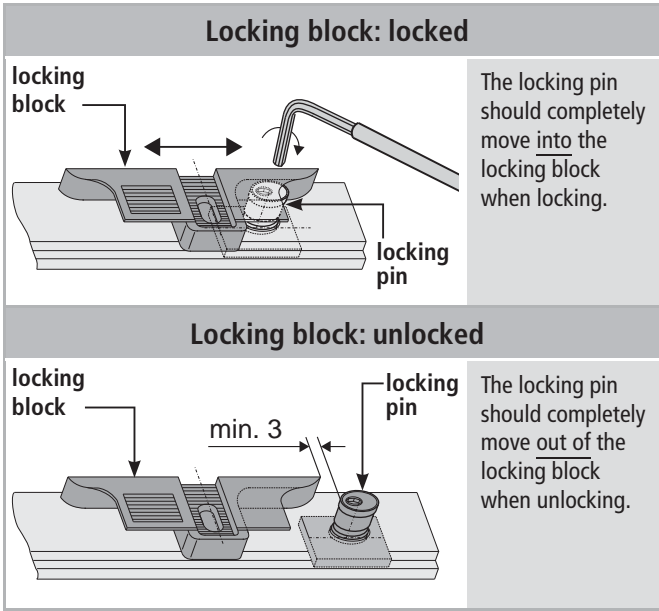
Ensure that the locking bar moves freely.
The locking pin of locking bar must be centered in the mounting slot of the locking bar (catch) from the locking drive.



- Check whether the traverse path of the locking drive **FVBx** with the traverse path of the on-site locking bar moves synchronously.



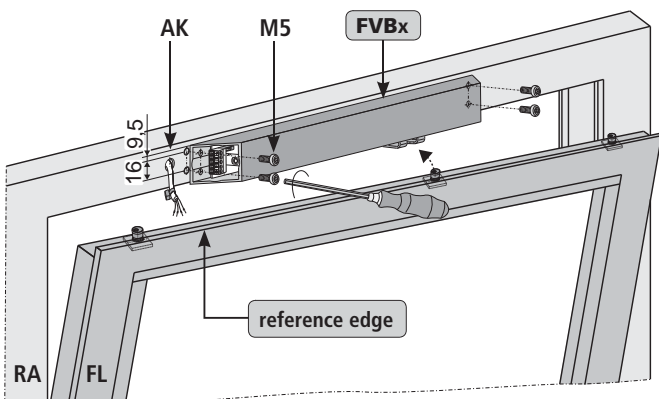
- Adjust locking block and locking pin on site-supplied fittings.



- Screw locking drive **FVBx** onto window frame (**M5**).



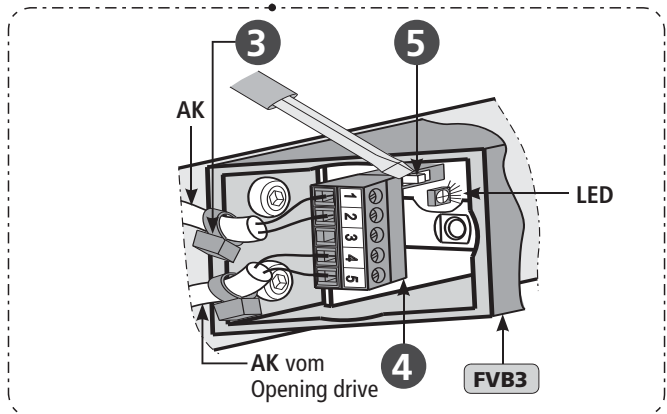
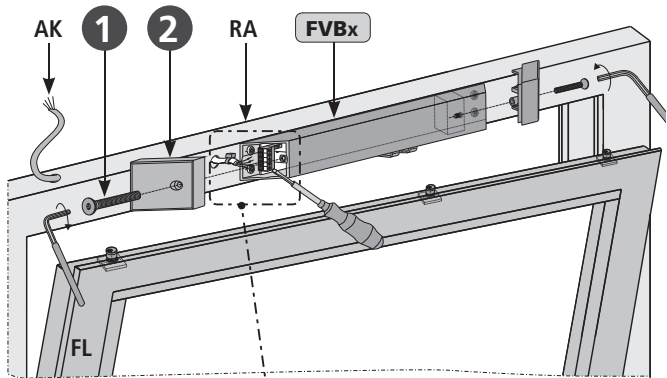
Make sure they are parallel to casement edge. The drive body must lie completely flush on the window frame surface.



- Connect the connecting cable (**AK**) to terminal strip **4** (see chapter „CONNECTING CABLE AND DIP SWITCH“).
- Check the locking position on DIP switch **5**. Observe the locking direction of the locking fitting (see chapter „CONNECTING CABLE AND DIP SWITCH“).

Clamp the connecting cable!
Check position from DIP switch!
(see: „CONNECTING CABLE AND DIP SWITCH“)

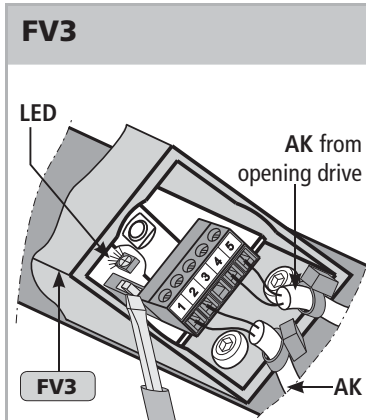
- Fit end caps **2** with screws **1**.
- Re-install strain relief **3**.



Note cable routing!
(see chapter „CABLE ROUTING“)
Check function! (see chapter „SAFETY CHECK AND PERFORMING TEST RUN“).

INSTALLATION STEP 9: CONNECTING CABLE AND DIP SWITCH

FV FVR FVB

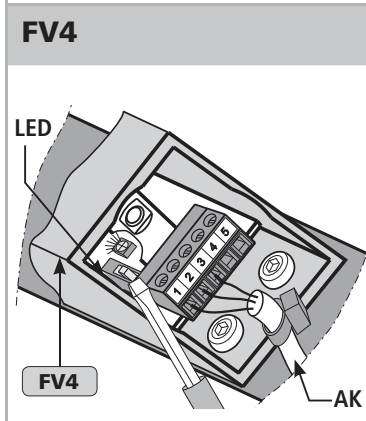


The opening drives **must not** have an integrated disconnection and / or an electronic overload disconnection.

- Terminal 1: blue
feed line from control unit
- Terminal 2: brown
feed line from control unit
- Terminal 4: blue *)
to the opening drive
- Terminal 5: brown *)
to the opening drive

*) Note the opening direction of casement.

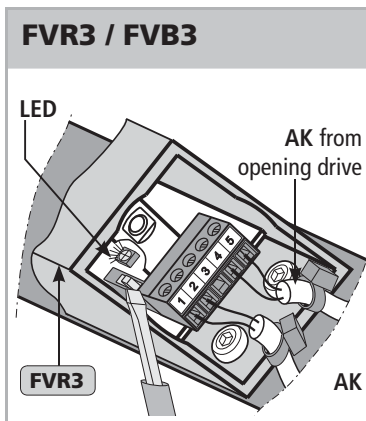
For drives with software S1



The opening drives **must have** an integrated disconnection and / or an electronic overload disconnection.

- Terminal 1: blue
- Terminal 2: brown
- Terminal 3: white

Configuration is done by M-COM
For drives with internal load dependent cut-off switch S3/S12

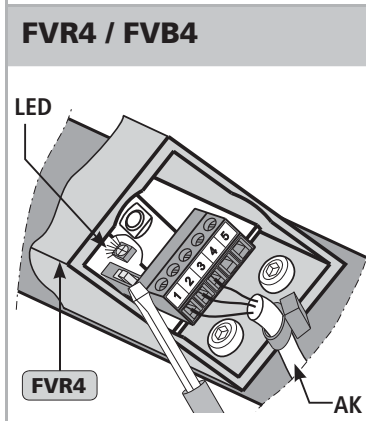


The opening drives **must not** have an integrated disconnection and / or an electronic overload disconnection.

- Terminal 1: blue
feed line from control unit
- Terminal 2: brown
feed line from control unit
- Terminal 4: blue *)
to the opening drive
- Terminal 5: brown *)
to the opening drive

*) Note the opening direction of casement.

For drives with software S1



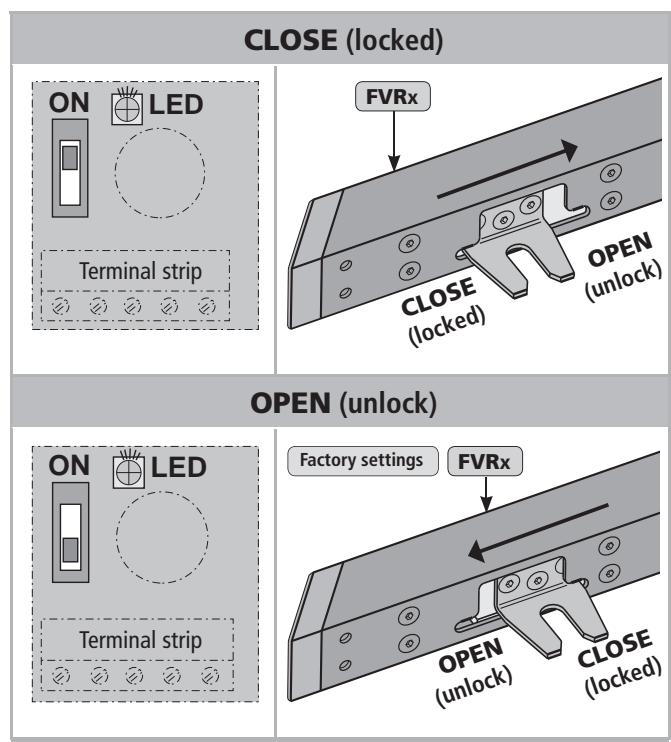
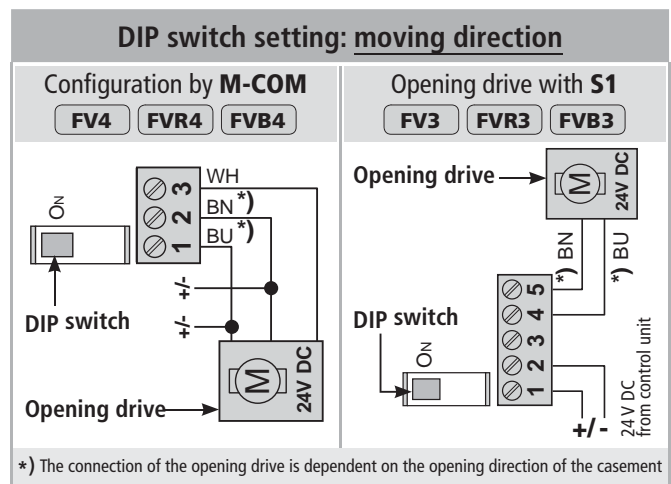
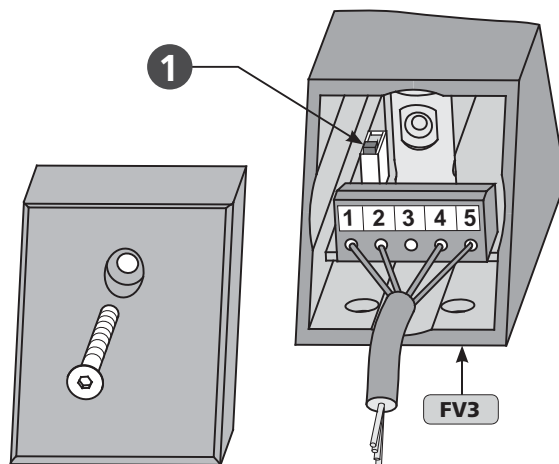
The opening drives **must have** an integrated disconnection and / or an electronic overload disconnection.

- Terminal 1: blue
- Terminal 2: brown
- Terminal 3: white

Configuration is done by M-COM
For drives with internal load dependent cut-off switch S3/S12

The DIP switch ① in the locking drive FVx / FVRx / FVBx are used to setting the moving direction.

Set of DIP switch ① in a **voltage-free** state, when the locking drive FVx / FVRx / FVBx is not mounted.

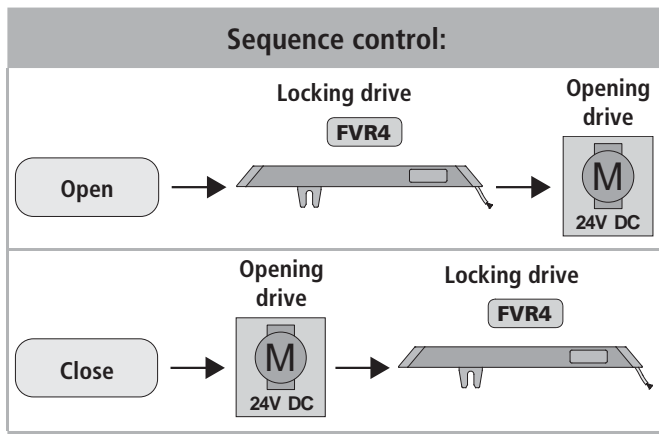


INSTALLATION STEP 10A: ASSEMBLY WITH M-COM

FV4 FVR4 FVB4

Test run: locking drive

- Close the casement manually. During the test run press the casement fixed to the frame.
- **Switch on the control voltage** at locking drive **FV4 / FVR4 / FVB4** - in **CLOSE** direction.
- Switch the control voltage - from the locking drive **FV4 / FVR4 / FVB4** in **OPEN** direction.
- Ensure the easy movement of the casement.
- Open the casement manually.
- **Switch off the control voltage** from the locking drive **FV4 / FVR4 / FVB4**.



- Hinge opening drive on casement.
- Make mechanical settings in accordance with „Assembly and Commissioning Instructions“ of the drives.

Installation: M-COM

- Installing the **M-COM** (see separate „Installation Instructions“ for M-COM) and make the electrical connection - in accordance with chapter: „ELECTRIC CONNECTION - INSTALLATION STEP 12A“.



Installing **M-COM** in a voltage-free state. The configuration is always in **CLOSE** direction.

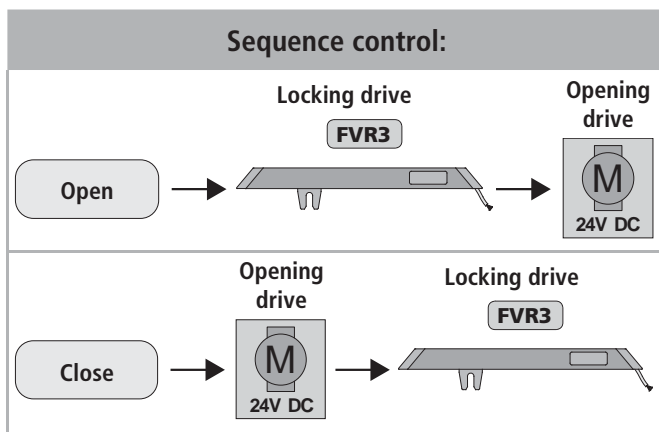
- **Switch on the control voltage** at locking drive **FV4 / FVR4 / FVB4** and at opening drive - in **CLOSE** direction.
- **M-COM** is configured (see LED display).
- Check sequence control.
- Ensure the easy movement of the casement.
- The locking pin must completely drive into the receptacle of the locking block.

INSTALLATION STEP 10B: ASSEMBLY OF A PREPROGRAMMED SET

FV3 FVR3 FVB3

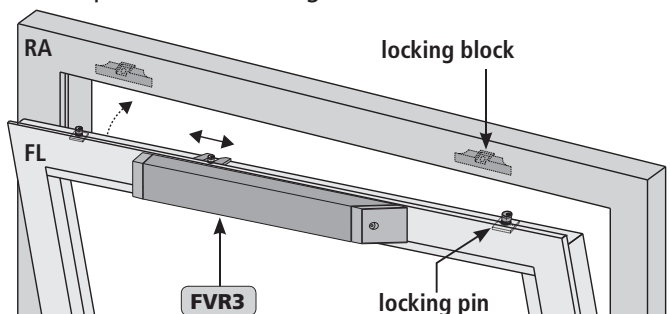
Test run: locking drive

- Close the casement manually. During the test run press the casement fixed to the frame.
- **Switch on the control voltage** at locking drive **FV3 / FVR3 / FVB3** and at the opening drive - in **CLOSE** direction.
- Move locking drive **FV3 / FVR3 / FVB3** and opening drive in **OPEN** direction.
- Ensure the easy movement of the casement.
- Open the casement manually.



Test run and installation: FV3 / FVR3 / FVB3 and opening drive as a preprogrammed set

- Hinge opening drive on casement.
- Make mechanical settings in accordance with „Assembly and Commissioning Instructions“ of the drives.
- **Switch on the control voltage** at locking drive **FV3 / FVR3 / FVB3** and at the opening drive - in **CLOSE** direction.
- Check sequence control.
- Ensure the easy movement of the casement.
- The locking pin must completely drive into the receptacle of the locking block.

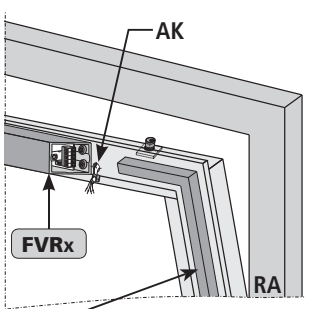
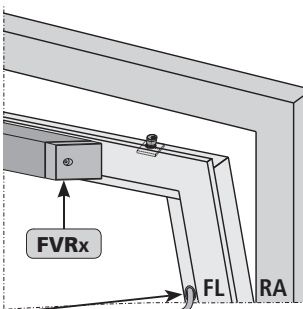


NOTE

When subsequent programming with **UniPC** the same assembly steps as in the installation must be carried out with **preprogrammed set** (see separate: Installation Instructions for UniPC).

INSTALLATION STEP 11: CABLE ROUTING

Cable routing on or in the casement

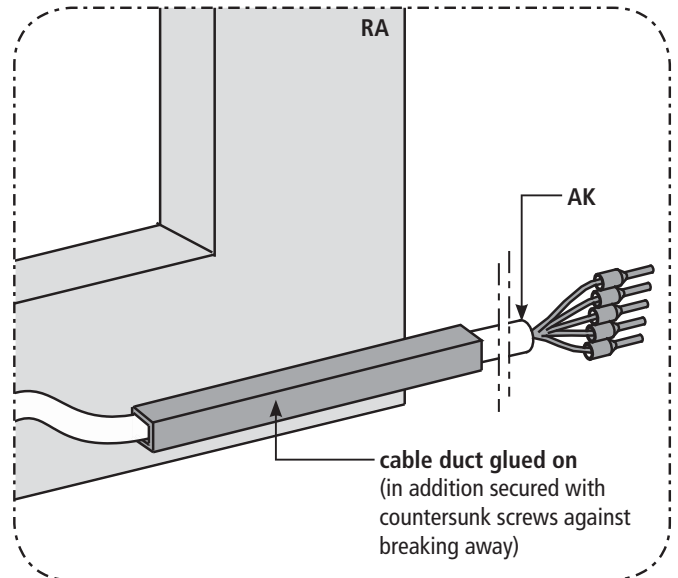
Cable on casement	Cable in glazing bead
 <p data-bbox="161 752 421 864">Cable duct glued on (in addition secured with countersunk screws against breaking away).</p>	 <p data-bbox="488 752 775 837">Drill hole in glazing bead (cable bushing protects against damage to cable).</p>
<p>Connection cable routing on the casement:</p> <ul style="list-style-type: none"> • Cable must be protected against damage (shearing-off, kinking, splitting), i.e. by using bushings. 	

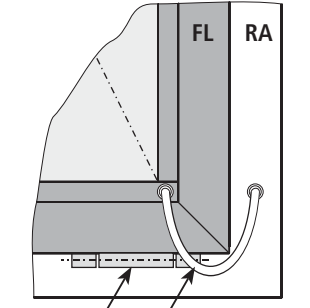
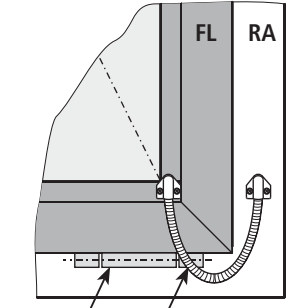


Upon removal of the glazing bead is the danger that the glass may fall.

Cable routing on the frame

- Route cable on the frame or mullion/transom. Cable must be protected against damage (shearing-off, kinking, splitting).



Cable crossover without protective cable hose	Cable crossover with protective cable hose
 <p data-bbox="240 1704 320 1731">BD AK</p>	 <p data-bbox="544 1704 767 1760">BD protective cable hose</p>

Connection cable routing on the hinge side:

- Make sure that during opening or closing procedure the cable will not be damaged by shearing-off, kinking, crushing.
- Protect cable feedthrough in profile e.g. by using cable bushings, cable transitions.

INSTALLATION STEP 12: ELECTRIC CONNECTION

FV FVR FVB



Make sure when establishing the connection that there is no voltage at the terminals!
Unused wires must be safely insulated!

Wire colour coding		Direction of travel
Colour	DIN IEC 757	OPEN
white	WH	CLOSE
brown	BN	Polarity reversal
blue	BU	
green	GN	
violet	VT	
grey	GY	

Connection assignment from the opening drive

BN	+	-
BU	-	+

WH is used for communication in systems with synchronized multi-drive operation.
Version Z:
contact max. 24 V, 500 mA (min. 10mA)
In drives KS4: standard „CLOSE“ optional „OPEN“

Connection assignment from the locking drive

BN	+	-
BU	-	+

WH is used for communication in systems with synchronized multi-drive operation.

INSTALLATION STEP 12A:

Multi-drive operation: Opening drive and locking drive with M-COM

WH connection. Drives does not work, if not connected.

junction box site-supplied \uparrow 24 V DC control from control unit

WH is used for communication in systems with synchronized multi-drive operation
Optional: 1 to 4 drives and max. 2 locking drives are possible.

INSTALLATION STEP 12B:

Multi-drive operation: Opening drive (master /slave) and locking drive

junction box site-supplied \uparrow 24 V DC control from control unit

WH connection. Drives does not work, if not connectede

The programming of the drives in multi-drive occurs at factory or on site with UniPC

WH is used for communication in systems with synchronized multi-drive operation
Optional: 1 to 4 drives and max. 2 locking drives are possible.

M-COM (Main control unit)

Order number:	524177
Application:	Configuration module for the automatic configuration and monitoring of max. 4 opening / 2 locking drives type S12 / S3 in multi-drive systems.
Rated voltage:	24V DC +/- 20%, (max. 2 Vss)
Current consumption:	<12 mA
Drive type:	S12
Protection class:	IP30 rubber jacket
Ambient temperature:	0 °C ... + 70 °C
Dimensions:	45 x 17 x 6 mm
Connecting wires:	3 wires 0,5 mm ² x 50 mm

Feature / Equipment:
printed circuit board with connecting wires for integration in site-supplied junction box.



UniPC with configuration interface

Order number:	524178
Application:	Hard- and software for configuration of drives supplied by AUMÜLLER GmbH
Rated voltage:	24V DC +/-20%
Parameterizable drives:	24V DC type MP, S3, S12, S12 V.2 230V AC type S12, S12 V.2
Scope of delivery:	software UniPC (Downloadlink*), Interface "ParInt", USB cable, connection cable * http://www.aumuller-gmbh.de/Downloads

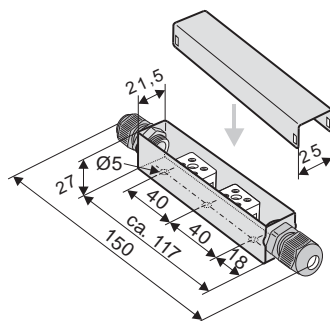
Features / Equipment:
Power supply 24V DC is not included in the scope of delivery!
Any extended settings require a software licence.



Any reconfiguration of a drive is entirely at the user's own risk and responsibility.

Cable junction box (for renewal)

Order number:	513344
Application:	to extend a drive cable
Rated voltage:	only for „safety extra low voltage“ to max. 50V DC/AC
Material:	stainless steel (V2A)
Protection class:	IP 40
Dimensions:	25 x 27 x 150 mm
Equipment:	with cable gland (grey) including strain relief, with 2 loose ceramic terminals (bipolar).

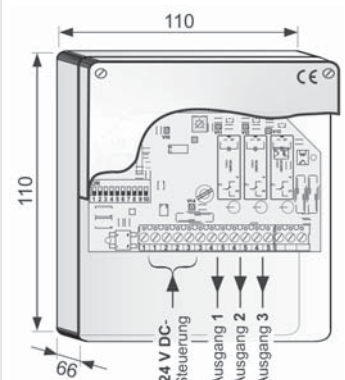


USKM

Order number:	512140
Application:	Control module with 3 outputs and individual settable cut-off current, monitored motion run, delayed sequence control.
Rated voltage:	24V DC +/- 20 %, (max. 2 Vpp)
Close circuit current:	< 50 mA
Connections:	max. 3 drives; s < 300 mm
Rated current per drive:	max. 2,5 A
Drive type:	S1, S2, S3, S12, MP, FV1, OFV1
Protection rating:	IP 54
Ambient temperature range:	0 °C ... +70 °C
Surf. mount. plastic housing:	110 x 110 x 66 mm

Features / Equipment:
DIP switches for settings
connection terminals: 2,5 mm²

Functions:
External electronic cut-off switch (max. 0,9 A),
motion-monitoring
up to 3 drives / locking drives,
max. 2 sequential controls

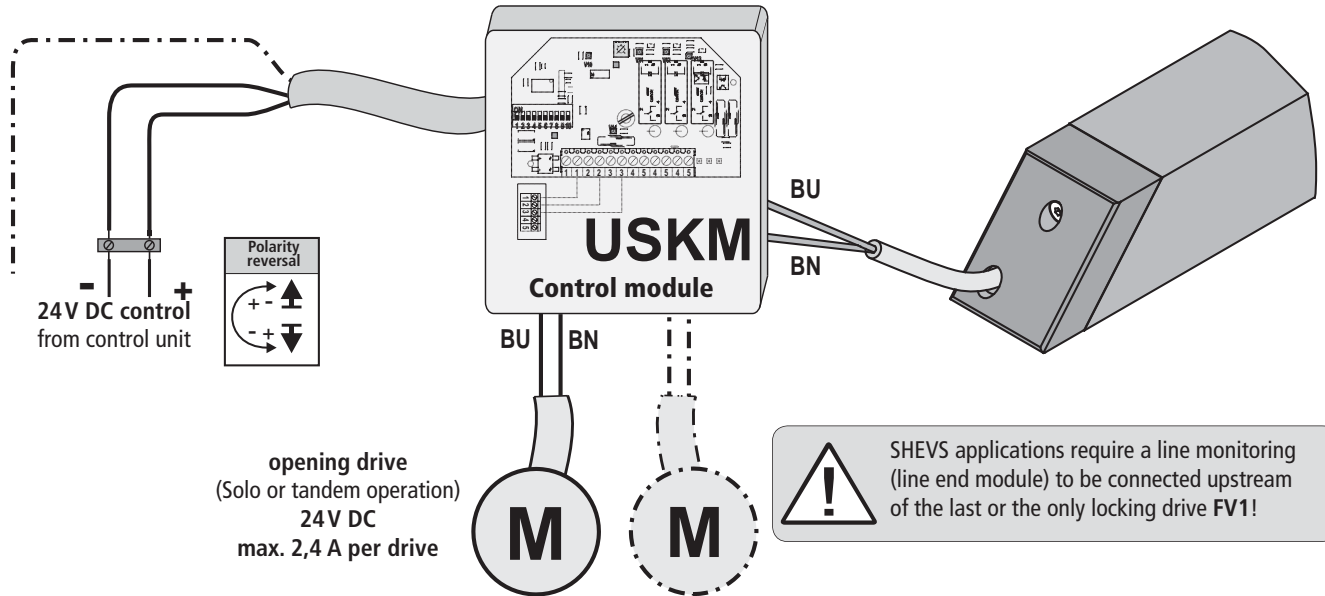


ELECTRIC CONNECTION WITH USKM - FV1

FV1

Solo or tandem operation - locking drive FV1

DIP switches in the USKM set in accordance with the electronic cut-off switch.



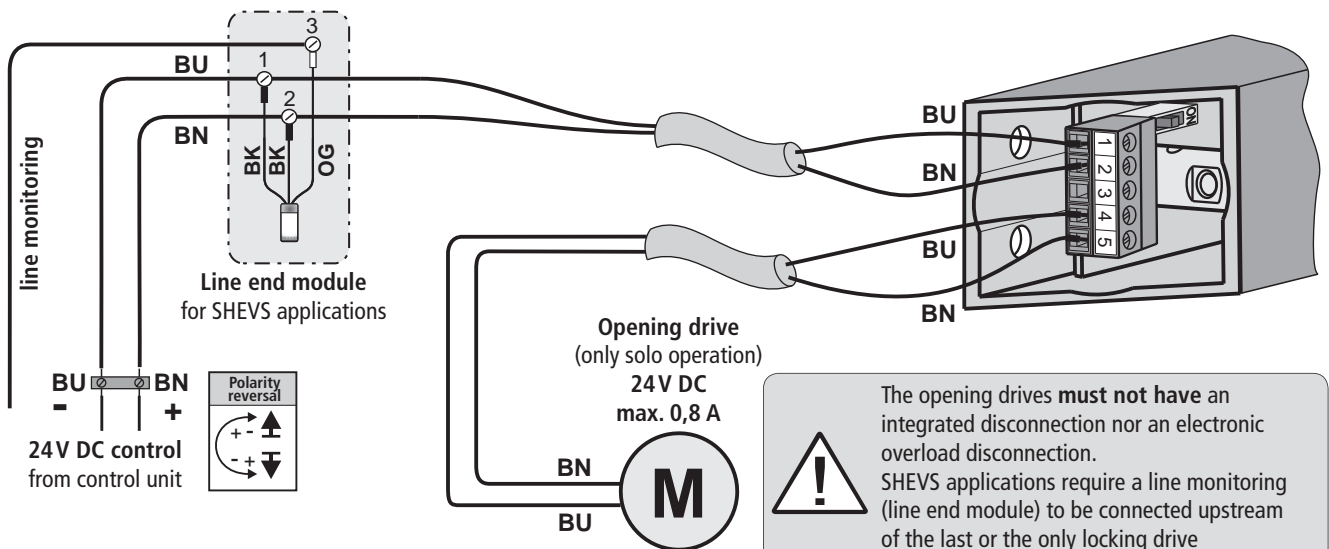
Version without sequential control module
 Disconnection and sequential control for the locking drive FV1 is provided by the control module USKM.

BN	=	brown
BU	=	blue
WH	=	white

ELECTRIC CONNECTION - FV3 / FVR3 / FVB3

FV3 FVR3 FVB3

Solo operation - locking drive FV3 / FVR3 / FVB3



Version with sequential control module
 By applying the 24V voltage supply on terminal 1(-) and 2(+) the locking mechanism unlocks the casement. After complete opening of the casement locking the opening drive on terminal 4 and 5 receives the command to move up (opening of the casement).

BK	=	black
BN	=	brown
BU	=	blue
OG	=	orange

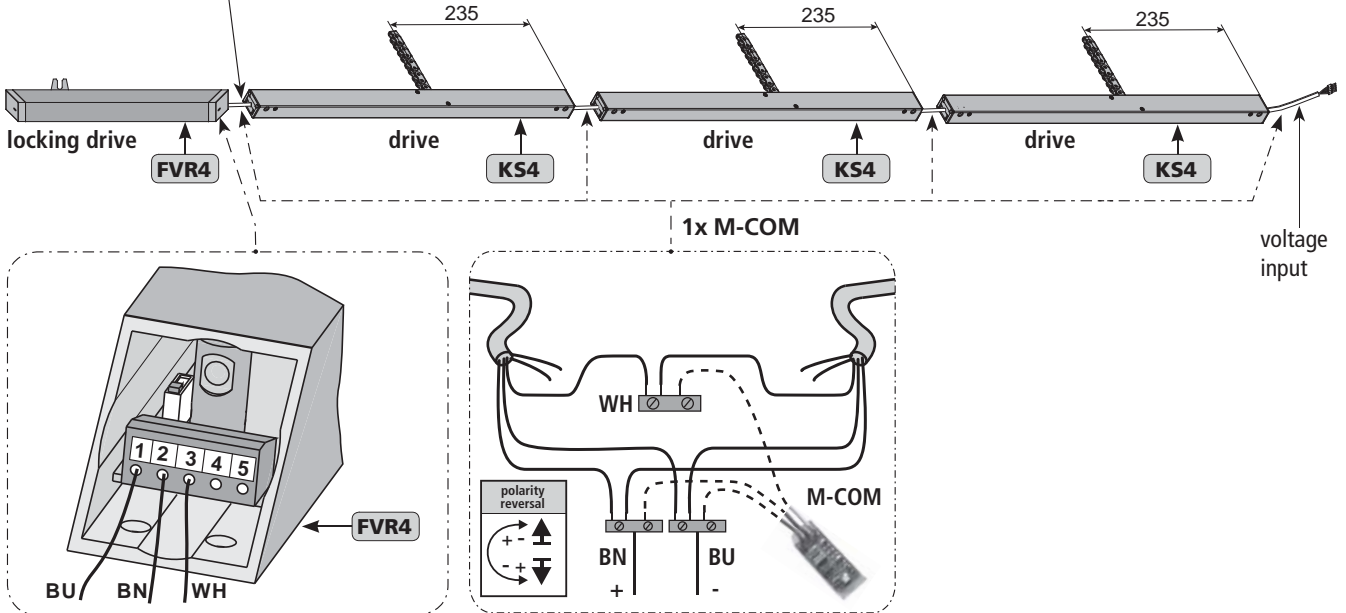
ELECTRIC CONNECTION CONFIGURED WITH M-COM

FV4 **FVR4** **FVB4**

Multi-drive operation with M-COM and locking drive - series connection

Remove the filler plug and Aumüller-Click plug set install.

Individual configuration



A maximum of three individual drives and one locking drive in series connection possible. Configuration is done by M-COM.

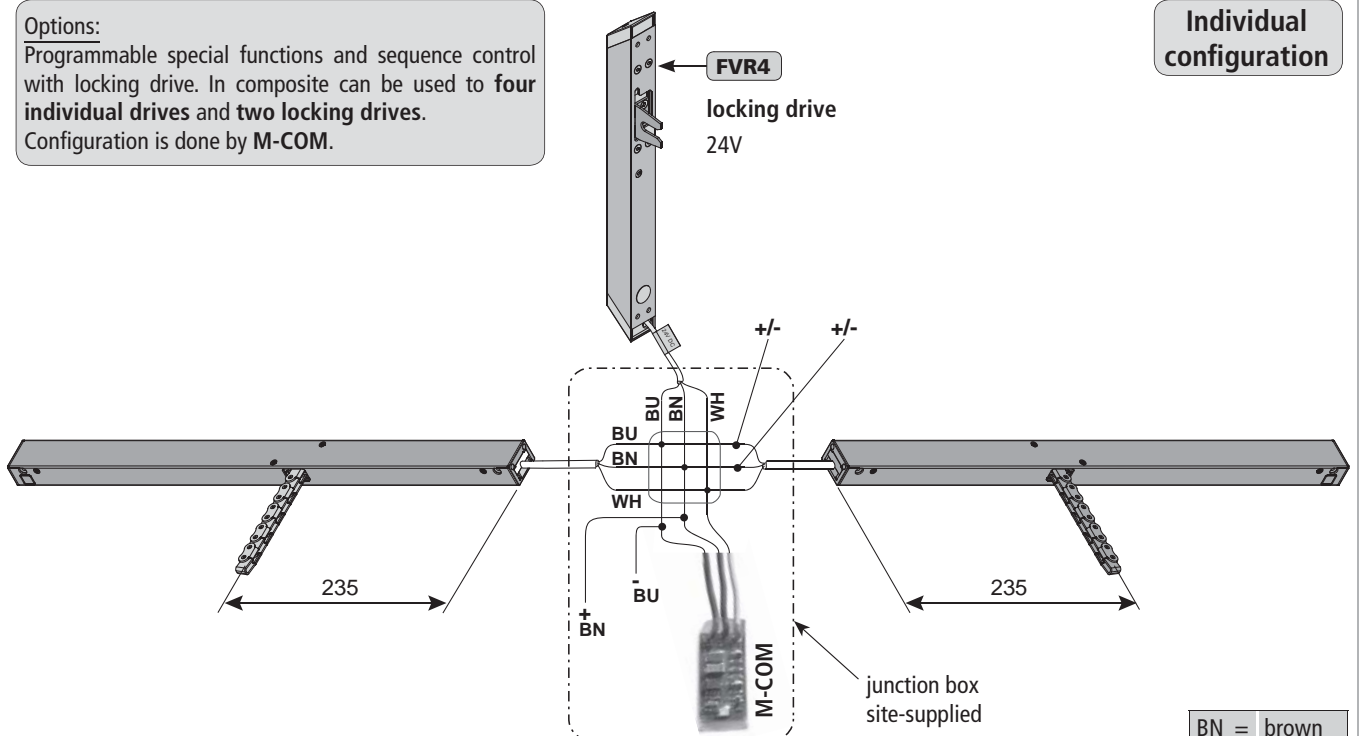
BN	=	brown
BU	=	blue
WH	=	white

Multi-drive operation with M-COM and locking drive - star wiring

Options:

Programmable special functions and sequence control with locking drive. In composite can be used to **four individual drives and two locking drives**. Configuration is done by M-COM.

Individual configuration



BN	=	brown
BU	=	blue
WH	=	white

INSTALLATION STEP 13: SUPPLY LINES OF DRIVES TO THE CONTROL UNIT

Observe current regulations and guidelines e.g. DIN 4102-12 regarding the "Fire behavior of building materials-circuit integrity maintenance of electric cable systems" (E30, E60, E90) and the "Specimen Guideline on Conduits German designation - MLAR", and also prescribed constructional regulations!

RECOMMENDATION For safety reasons a cable of the next higher wire cross section should be selected.

Formula to calculate
the required wire cross-section of a supply line

24V

$$A \text{ mm}^2 = \frac{I_{A \text{ (total)}} * L_m \text{ (length supply line)} * 2}{2,0^V \text{ (voltage drop)} * 56 \text{ m} / (\Omega * \text{mm}^2)}$$

Calculation example

Available data:

- cut-off current per drive (i. e. 2 x 4.0A) from data sheet
- length to be bridged from the last window to the control unit (i. e. 10 meters)

$$A = \frac{(2 * 4,0A) * 10m * 2}{2,0V * 56m / (\Omega * \text{mm}^2)}$$

A = 1,42mm² -> **1,5mm²** chosen

Laying and connecting the drive cable

- Avoid extreme temperature differences in the installation area (danger of condensation).
- Set clamping point close to window and ensure accessibility.
- Ensure expansion possibilities of the drive and the drive cable.
- Consider the cable length of drives.

INSTALLATION STEP 14: SAFETY CHECK AND TEST RUN

Check the mounted system for its safety; perform test run and commissioning.

Safety test:

- Connect operating voltage.
- Check fastening (frame brackets, casement brackets) for firm fit or tightening.

Test run:

- Visual inspection of casement movements.
- Stop immediately by malfunction!
- Pay attention to collision with facade construction and correct installation, if required.

Risk evaluation:

Before operating a power-operated window to which window drives were mounted, which were sold by the manufacturer as incomplete machines according to installation declaration, the possible risk to ahazard of persons must be determined, evaluated and minimized by taking appropriate technical measures in accordance with the Machinery Directive. Separate documents for performing a risk assessment can be downloaded from the homepage of

Firm AUMÜLLER Aumatic GmbH
(www.aumueller-gmbh.de).

Operation of the power-operated window

When operating the power-operated window safety instructions must be observed, specifically those pertaining to commissioning, operation and maintenance.

HELP IN CASE OF MALFUNCTIONS, REPAIRS AND MAINTENANCE

Professional repair of a defect drive can only be performed at the manufacturer's factory or manufacturer-certified specialist company. Unauthorized opening or manipulation of the drive terminates warranty.

1. Exchange defect drives or have them repaired by the manufacturer.
2. In case of problems during installation or normal operation the following table might be useful:

Problem	Possible causes	Possible solutions
Locking drive does not start	<ul style="list-style-type: none"> • Duration of mains power supply too short • Drive run direction from the opening drive is not correct • Connecting cable not connected • DIP switch is wrong setting 	<ul style="list-style-type: none"> • Adjust supply voltage as specified in the technical documentation • Check drive cables change polarity • Check all connection cables • Setting the DIP switch properly

MAINTENANCE AND MODIFICATION

To ensure continuous function and safety of the drive periodic maintenance by a specialist company is required at least once a year (as mandated by law for smoke and heat exhaust systems). Operational readiness must be checked regularly. Frequent inspection of the system for imbalance and signs of wear or damages of cables and fastening elements must be performed.

During maintenance contaminations must be removed from the drive. Fastenings and clamping screws must be checked for tightness. Test runs during the opening and closing procedure of the devices must be performed.

The drive itself is maintenance-free. Defect devices may only be repaired in our factory. Only replacement parts of the manufacturer may be used. When the connection cable of this device is damaged it must be replaced by the manufacturer or his customer service or a similarly qualified person to avoid endangerment.

It is recommended to conclude a maintenance contract. A sample maintenance contract can be downloaded from the homepage of

Firm Aumüller Aumatic GmbH
(www.aumueller-gmbh.de).

While cleaning the windows, drives may not have direct contact with water or cleaning agents. Drives must be protected from dirt and dust during the construction phase or renovations.

Maintenance process

1. Open or extend power-operated casement completely.
2. Completely disconnect the system from the mains and secure it against automatic or manual activation.
3. Check windows and fittings for damages.
4. Check all mechanical fastenings (if required, observe information on torques in installation instructions).
5. Check electric drives for damages and contaminations.
6. Check connecting cables (drive cable) for:
 - tightness of the cable screw
 - functionality of the strain relief
 - damages
7. Check the mobility of hinges and fittings and re-adjust or apply lubricant, e.g. silicone spray (observe the instructions of the manufacturer of this window system).
8. Check peripheral seal, remove contaminations or replace.
9. Perform cleaning to maintain functionality (e.g. clean extending elements of the drive, such as chains or spindles by damp wiping them with acid or lye-free agents and drying them and, if required, lubricate them with cleansing oil e.g., Ballistol).
10. Turn on operating voltage.
11. Open and close the power-operated window via the operating voltage (functional test).
12. If available, check and re-adjust protection systems of the safe guard fixture.
13. Check the intactness of the CE label at the power-operated system (e.g. SHEV/Natural smoke and heat exhaust ventilators).
14. Check the intactness of warning instructions and labels at the respective drive.
15. Perform a risk assessment in accordance with Machinery Directive 2006 / 42 / EG, if required, e.g. after modifying the machine.

DEMOUNTING AND DISPOSAL

The drives are demounted by reversing the steps, as for the installation. The adjustments are omitted.

1. Completely disconnect the system from the power supply before demounting a drive.
2. After demounting a drive the window must be secured against independent opening.

Dispose of parts according to the locally applicable legal provisions.

LIABILITY

We reserve the right to change or discontinue products at any time without prior notice. Illustrations are subject to change. Although we take every care to ensure accuracy, we cannot accept liability for the content of this document.

WARRANTY AND CUSTOMER SERVICE

In principal apply our:

„General Terms for the Supply of Products and Services of the Electrical Industry (ZVEI)“.

The warranty corresponds with legal provisions and applies to the country in which the product has been acquired.

The warranty includes material and manufacturing defects incurred during normal use.

The warranty period for delivered material is twelve months.

Warranty and liability claims for personal injuries or material damages are excluded, if caused by one or more of the following:

- Improper use of the product.
- Improper installation, commissioning, operation, maintenance or repair of the product.
- Operating the product by defect and improper installed or not functioning safety and protection devices.
- Ignoring instructions and installation requirements in these instructions.
- Unauthorized constructional modifications at the product or accessories.
- Disaster situations due to effects of foreign bodies and Acts of God.
- Wear and tear.

Point of contact for possible warranty claims or for repair parts or accessories is the responsible branch office or the responsible person at

Firm AUMÜLLER Aumatic GmbH.

Contact data are available at our homepage

(www.aumueller-gmbh.de)

KONFORMITÄTSERKLÄRUNG DECLARATION OF CONFORMITY

Hersteller
Manufacturer

aumüller

Aumüller Aumatic GmbH
Gemeindewald 11
86672 Thierhaupten
Germany

Produktart | *Product type:*
Produktbaureihe | *Product series:*

Verriegelungsantriebe für Fenster | *Locking drives for windows*
FV1 / FV3 / FV4 - 24V - 1x / 2x / 3x - R/L
FVB3 / FVB4 xx M-COM - 24V
FVR3 / FVR4 xx M-COM - 24V
FVM2 / FVM3 M-COM - 24V
OFV1 / OFV1 M-COM - 24V

Ab Seriennummer | *From serial number:* **XXXXXX-XX-XXX**
Ab Datum | *From date:* (Year-W-Week) **16W10**

Wir bestätigen die Konformität des oben bezeichneten Produktes mit folgend gelisteten EU-Richtlinien sowie Normen:
We herewith confirm the conformity of the above mentioned product with EC Directives and the standards listed below:

KONFORMITÄT CONFORMITY

Richtlinie über elektromagnetische Verträglichkeit 2014/30/EU
Directive relating to Electro-Magnetic Compatibility 2014/30/EU
Niederspannungsrichtlinie 2014/35/EU
Low Voltage Directive 2014/35/EU

HARMONISIERTE NORMEN HARMONIZED STANDARDS

DIN EN 60335-2-102:2016-05
DIN EN 61000-6-1:2007-10
DIN EN 61000-6-2:2006-03
DIN EN 61000-6-3:2011-09
DIN EN 61000-6-4:2011-09

SONSTIGE TECHNISCHE NORMEN UND SPEZIFIKATIONEN FURTHER TECHNICAL STANDARDS AND SPECIFICATIONS

DIN EN 12101-2:2003-09 (in ferralux® NRWG - 24 V DC)
Montageanweisung | *Installation instructions*

Thierhaupten, 01.03.2016

R. Meitzer

Geschäftsführer / Verantwortlich für die technische Dokumentation
Managing Director / Head of technical documentation



Die Sicherheitshinweise der mitgelieferten Produktdokumentation sind zu beachten!
The safety instructions of the supplied product documentation are to be observed!

Zertifikat Certificate
 VdS Schadenverhütung
 S 814040
 1
 10.10.2014
 09.10.2017
 aumüller
 Aumüller Aumatic GmbH · Gemeindewald 11 · D-86672 Thierhaupten

VdS Schadenverhütung
 bescheinigt die Anwendung eines
Qualitätsmanagementsystems
 für



aumüller

Aumüller Aumatic GmbH · Gemeindewald 11 · D-86672 Thierhaupten

Zertifikats-Nr.:	Anzahl der Seiten:	Gültig von:	Gültig bis:
S 814040	1	10.10.2014	09.10.2017

Geltungsbereich des Zertifikates:

Entwicklung, Herstellung und Vertrieb von Produkten und Systemen für Rauch- und Wärmeabzug, natürliche Gebäudelüftung, automatische Tür- und Toranlagen sowie damit verbundene Wartungs-, Dienst- und Serviceleistungen

Das Zertifikat umfasst ausschließlich das Qualitätsmanagementsystem in dem angegebenen Geltungsbereich. Die gegenwärtige Gültigkeit kann unter www.vds.de verifiziert werden.

Das Zertifikat gibt keine Auskunft über die Zertifizierung von Qualitätsmanagementsystemen oder die VdS-Anerkennungen von Errichterfirmen, Wach- und Sicherheitsunternehmen, Produkten, Verfahren, o. ä. Hierfür sind gesonderte Nachweise erforderlich.

Das Zertifikat darf nur unverändert und mit sämtlichen Anlagen vervielfältigt werden. Während der Gültigkeit des Zertifikates muss das Qualitätsmanagementsystem der Organisation stets die Forderungen der Zertifizierungsgrundlagen erfüllen. Dies wird durch VdS Schadenverhütung regelmäßig begutachtet.

Jegliche Werbung mit dem Zertifikat muss den Inhalt korrekt wiedergeben und darf nicht auf wettbewerbsrechtswidrige Art und Weise erfolgen.

Zertifizierungsgrundlagen:

DIN EN ISO 9001
 Qualitätsmanagementsysteme
 Anforderungen
 Ausgabe Dezember 2008
 Qualitätsmanagementhandbuch des Zertifikatsinhabers

Köln, den 10.10.2014

Reiner Mann
 Geschäftsführer

ppa. Urban
 Leiter der Zertifizierungsstelle

VdS Schadenverhütung GmbH
 Zertifizierungsstelle
 Amsterdamer Str. 174
 D-50735 Köln

Ein Unternehmen des Gesamtverbandes der Deutschen Versicherungswirtschaft e.V. (GDV)

Akkreditiert als
 Zertifizierungsstelle für
 Qualitätsmanagementsysteme von
 der DAkkS - Deutsche
 Akkreditierungsstelle GmbH







TRANSLATION OF THE ORIGINAL INSTRUCTIONS (GERMAN)

Once the assembly and commissioning has been completed, the installer of a machine „power-operated window and door“ shall hand these instructions over to the end-user. The end-user shall store these instructions in a safe place for further reference and use, if required.

Important note:

We are aware of our responsibility, which is why we present life-supporting and value-preserving products with greatest possible conscientiousness. Although we make every effort to ensure that the data and information are as correct and up-to-date as possible, we still cannot guarantee that they are free from mistakes and errors.

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Basically the General Terms and Conditions of Aumüller Automatic GmbH apply to all offers, supplies and services.

The publication of these assembly and commissioning instructions supersedes all previous editions.

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