

aumüller

Assembly and Commissioning Instructions

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



LKS - S2 24V DC - RACK AND PINION DRIVES FOR WINDOWS

CE



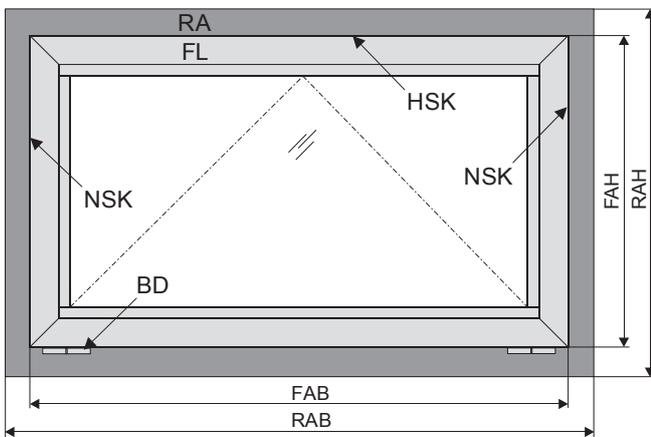
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ABBREVIATIONS

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 (SHEVS) (smoke and heat exhaust ventilation 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** Once the assembly and commissioning has been completed, the installer of a machine „power-operated window“ shall hand these instructions over to the end-user.

The end-user shall store these instructions in a safe place over the whole lifecycle and use it for further reference, if required.

 **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 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 or roof areas.

The main 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, with the electromotive operated window and a suitable external control unit, **the natural ventilation** of the building can be ensured.

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

NOTE

Intended use

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

The drive is in combination with an external Control Unit (e.g. from **AUMÜLLER**) released for its proper use at a power-operated window for the following use:

- Application for natural ventilation
 - with an installation height of the drive and the bottom side of casement of at least 2,5 m above the floor, **or**
 - with an opening width at the HSK of the driven part 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 ventilator(s) in accordance with EN12101-2 without dual purpose for ventilation.

WARNING

Pay attention to possible hazards on tilting or rotating windows, whose side closing edges (NSK) are located at less than 2,5 m installation height above the floor, under consideration of the Control Unit and usage!

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:

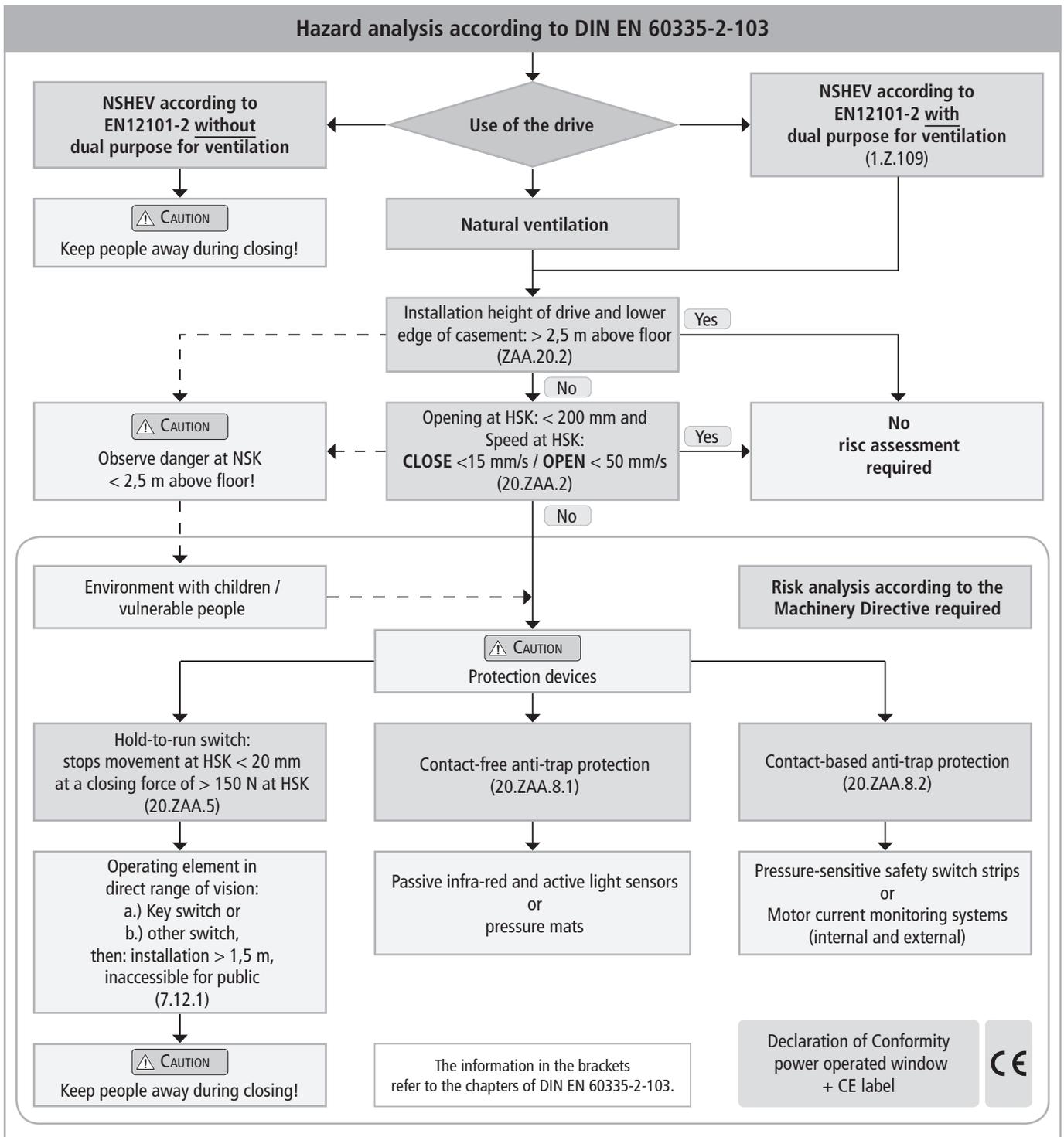
- The **constructor or his agent** (architect, specialist planner) **are obligated to evaluate the hazards to persons**, outgoing from the usage, installation position, opening parameters and from the external Control Unit of the power operated window, **already in the planning phase and to establish 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 it's 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 and lower edge of casement < 2,5 m above the floor **and** one of the following conditions:
- the opening width at the HSK is > 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
 Roof: roof window, sky light
 Opening direction: 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 space 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 electric controls, 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 product label) 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 fit with 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.

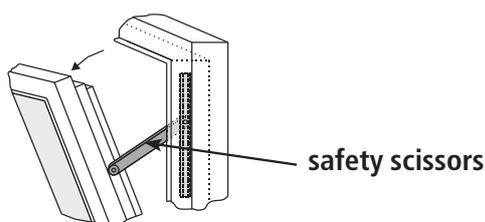
Unintentional or independent opening or falling

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.



Routing cables and electrical connection

Routing or installing of electrical cables and connections may be performed only by 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 national instructions shall be observed for the installation.



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!



24V DC drives may only be connected to power supply sources that comply with SELV specifications.

NOTE

In the case of tandem / multiple operation of drives connected in series, the cross-section of the connection cable must be checked autonomously, depending on the total current consumption of the drive system.



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 inside 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 boxes 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 instructed in all important operating steps.** If necessary, he must be advised of all remaining risks / dangers.

The end-user shall be specifically instructed that no additional forces, except pushing and pulling forces 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!

WARNING 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 actuate the drive or the casement when repair or re-setting works are 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 spare 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 ... +60°C
 Relative humidity: < 90% less 20°C;
 < 50% less 40°C;
 no formation of condensation

NOTE Observe temperature range during installation!

- **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 (local workmen's compensation insurance guidelines) shall be observed and adhered to.

Declaration of Conformity and of Incorporation

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

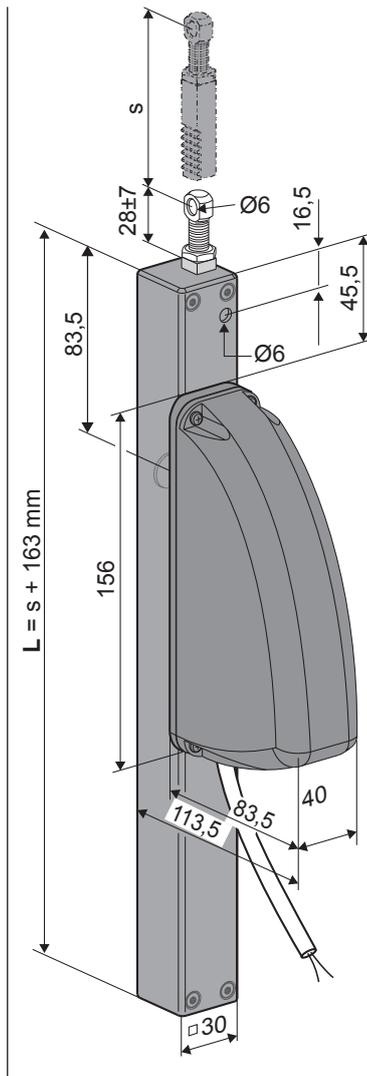
In case that the use of the drive differs from the intended use, a risk evaluation for the power operated window shall be performed and a Declaration of Conformity according Machinery Directive 2006 / 42 / EG issued.

DATA SHEET **LKS S2 24V**

- Application: **natural ventilation** and **smoke and heat exhausting systems (SHEV)** as single-drive
- Internal load dependend cut-off switch S2

Options:

- Drillings for front suspension
- Monitored motion run of 2 drives up to $s = 300$ mm via USKM



Technical Data

U_N	Rated voltage	24V DC (19 V ... 28 V)
I_N	Rated current	0,6 A
I_A	Cut-off current	0,8 A
P_N	Rated power	15 W
DC	Duty cycle	5 cycles (ED 30 % - ON: 3 min. / OFF: 7 min.)
	Protection rating	IP 54
	Ambient temperature range	-5 °C ... +60 °C
F_Z	Pulling force max.	550 N
F_A	Pushing force max.	550 N

s (mm)	F (N)
100	550
200	550
300	550
400	550
500	550
600	550
750	550
1000	550

F_H	Pullout force	3.000 N (fastening depended)
	Rack	stainless steel
	Connecting cable	non-halogen, grey 2 x 0,75 mm ² , ~ 1 m
v	Speed	✕ 6,0 mm/s ↻ 6,0 mm/s
s	Stroke	100 – 1.000 mm
L	Length	$s + 163$ mm (see order data)
	Sound pressure level	≤ 70 dB (A)

Order data

s [mm]	L [mm]	Version	Finish	PU / pcs.	Part.-No.
100	263	LKS 100 S2 24V	E6/C-0	1	513100.N
200	363	LKS 200 S2 24V	E6/C-0	1	513200.N
300	463	LKS 300 S2 24V	E6/C-0	1	513300.N
400	563	LKS 400 S2 24V	E6/C-0	1	513400.N
500	663	LKS 500 S2 24V	E6/C-0	1	513500.N
600	763	LKS 600 S2 24V	E6/C-0	1	513600.N
750	913	LKS 750 S2 24V	E6/C-0	1	513800.N
1000	1163	LKS 1000 S2 24V	E6/C-0	1	513805.N

APPLICATION AREAS AND CASEMENT SIZES

(Casement size max. 4 m² - depending on the system)

Top-hung casement and bottom-hung casement outward opening

FAB max. = 1200 mm / Solo
= 2500 mm / Tandem

FAH max. = 2500 mm

Top-hung casement **Bottom-hung casement**

Roof window

FAB max. = 1200 mm / Solo
= 2500 mm / Tandem

FAH max. = 2500 mm

Total weight casement including snow load: max. 100 kg

Top-hung casement **Bottom-hung casement**

Sky light

FAB max. = 1200 mm / Solo
= 2500 mm / Tandem

FAH max. = 2500 mm

Total weight casement including snow load: max. 100 kg

Snow load on roof windows

Example:
snow load = 60 kg
(Casement area x
Typical snow
load)

Example: FG = 40 kg

Example calculation: Establish snow loading based on national standards /directives (EN 1991-3)

total weight = FG + snow load
total weight = (40 kg + 60 kg snow load) = 100 kg

EXPLANATIONS ON THE PRODUCT LABEL

The product label provides information on the most important characteristics, such as:

- manufacturer's address
- article reference number and name
- technical characteristics
- date of manufacturing with firmware version
- serial number
- certifications

NOTE Never install and operate damaged products.

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

Exemplary representation

Product designation **certifications**

Product designation: aumüller ■ XXX window drive

certifications: TÜV, CE, EAC

86672 Thierhaupten
Tel.: +49 8271 8185-0
Made in Germany

S: xxx mm F_A: xxx N -5°C +60°C

U_N: xxx V IP: xxx

I_N: xxx A DC: xxx cycles

Date: 19W01 V:2.0
SN: xxxxxxxx
Art.-Nr.: xxxxxx

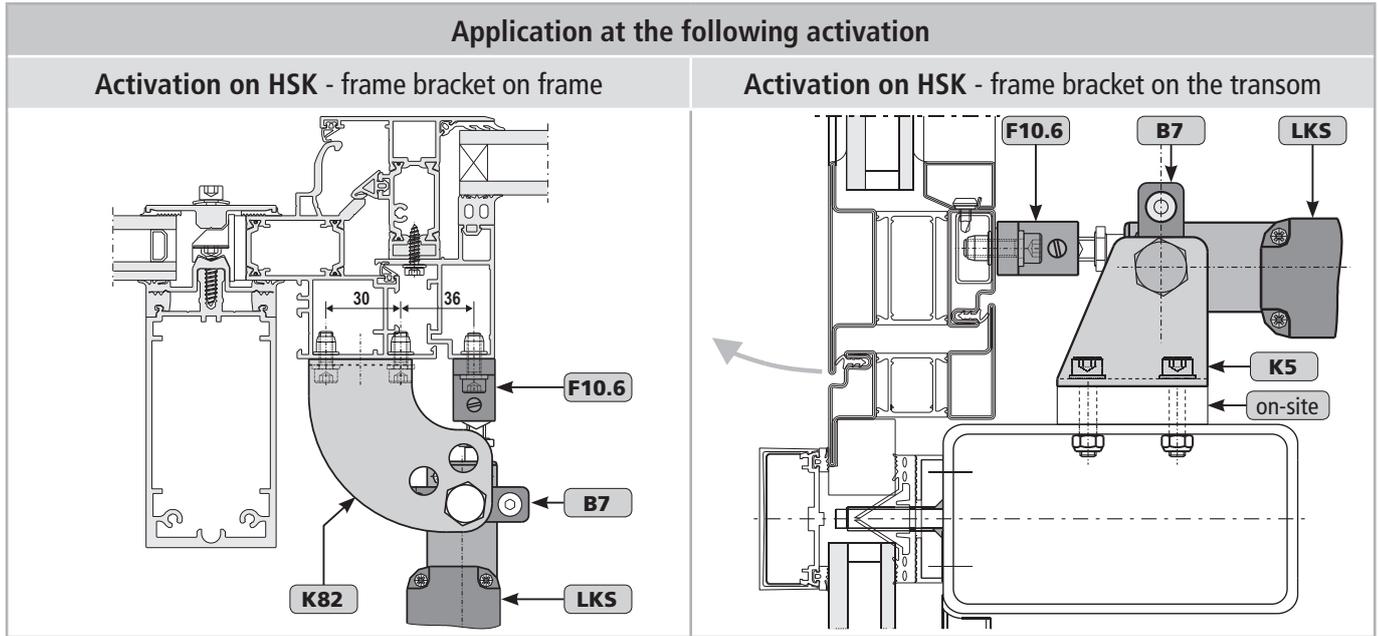
serial number

article reference number

symbols see „Technical data“

date of manufacturing with firmware version

OPENING ANGLE AT DIRECT OPERATION (OUTWARD OPENING WINDOW)

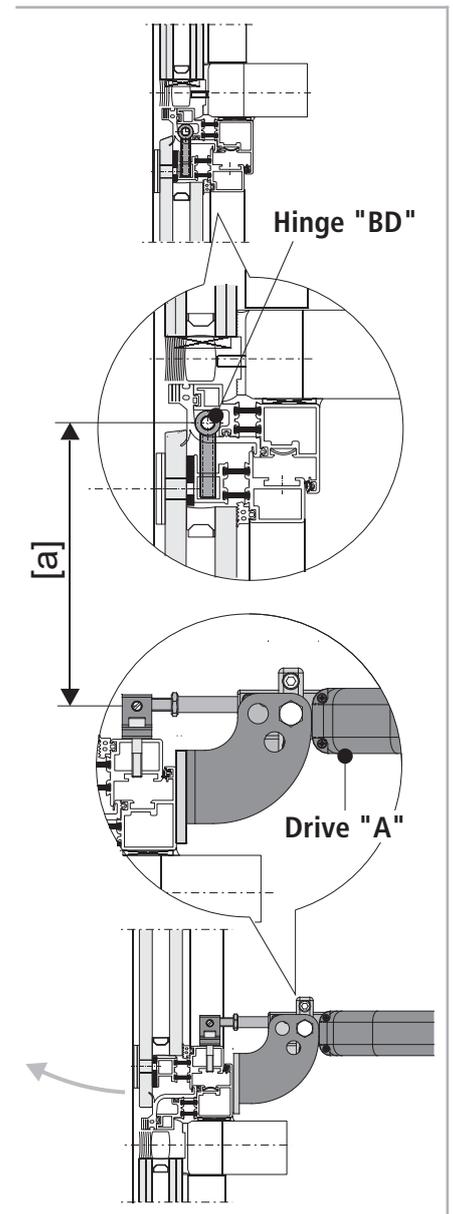
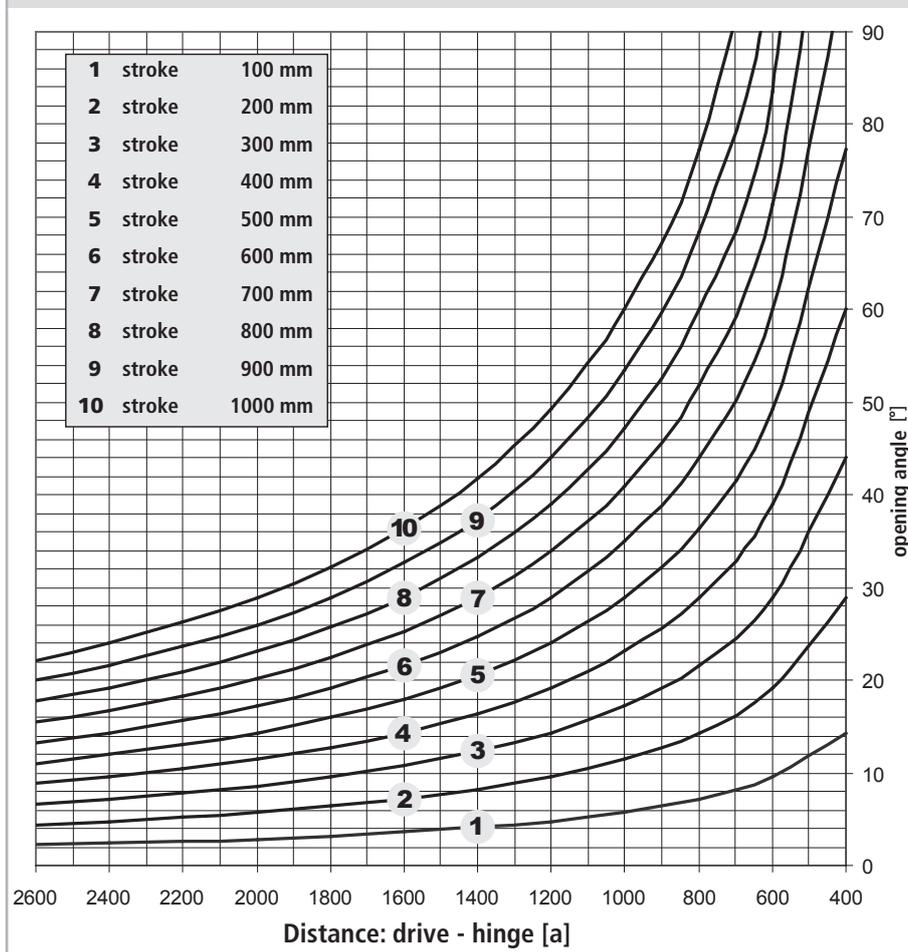


Planning the opening angle for direct operation

This diagram is a general guide to help establish the most appropriate drive stroke for the opening width required. The specific installation conditions are to be observed.

The opening angle for direct operating drives on the main closing edge (HSK) depends on:

- distance: in between hinges (BD) and activation point of drive
- stroke or opening width at the activation point of drive
- casement height



INSTALLATION STEP 1: INSPECTION BEFORE THE INSTALLATION



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

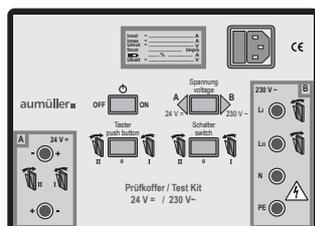
Check drives and window before installation for good mechanical condition and completeness. The chains / spindles of the drives must be extendable or retractable easily. The casement must run smoothly and the weight must be in balance.

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 ... + 40 °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 integrated 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 (if existing),
- 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	Wood screws: i.e. DIN 96, DIN 7996, DIN 571 round head with slot, round head with cross, hex head, special type	
steel, stainless steel, aluminum windows	Self-tapping screws, thread screws, sheet-metal screws i.e. ISO 4762, ISO 4017, ISO 7049, ISO 7085, DIN 7500 cylinder head with hex socket, internal serration (Torx), Phillips head or external hex head blind rivet nut	
plastic windows	Screws for plastic i.e. DIN 95606, DIN 95607, ISO 7049, ISO 7085, DIN 7500 round head with cross, external hex head, Torx	Recommendation: if possible, screw through two cavity webs

Tools required

- Marker,
- Grains,
- Hammer,
- Screwdriver (slotted-head, cross or Torx) size by site conditions,
- Hexagonal wrench size 4 / 5
- Fork wrench for SW 13, SW 14
- Torque wrench,
- Power drill,
- Threadlock adhesive,
- possibly a tool for blind rivet nuts (size 6).

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:

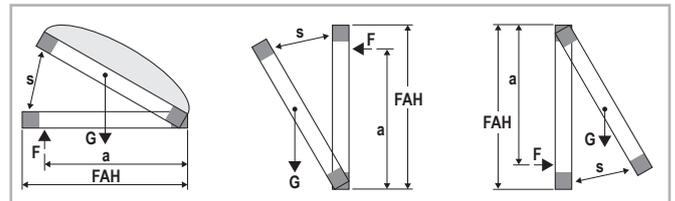
$$G \text{ (Casement weight) [kg]} = \frac{\text{FAB [m]} \cdot \text{FAH [m]} \cdot \text{Glass thickness [mm]} \cdot 2,5 \cdot 1,1}{\text{glass-density} \cdot \text{frame share}}$$

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

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

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

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



Scope of delivery:

Prior to assembly, check items quantity in the delivery for completeness.

Accessories: LKS

Assembly Instructions

Warning sign sticker
„Risk of entrapment“

Positioning of the drives at the HSK **HSK**

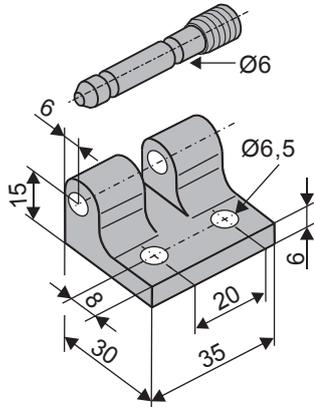
One drive

Two drive - stroke max. 300 mm

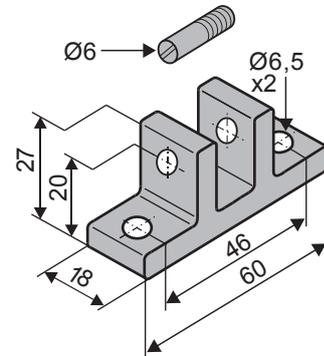
INSTALLATION STEP 3: CASEMENT BRACKETS AND FRAME BRACKETS AND ACCESSORIES

Dimensions and Drill holes

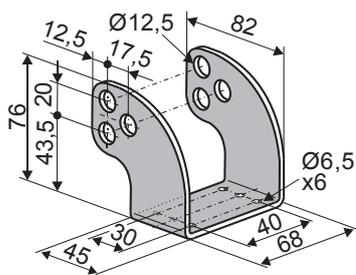
Casement bracket F1
Suspension with bore \varnothing 6 mm



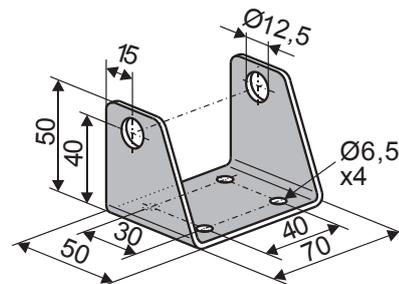
Casement bracket F10.6
Suspension with bore \varnothing 6 mm



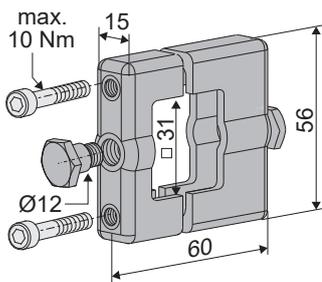
Frame bracket K82
for swivelling suspension



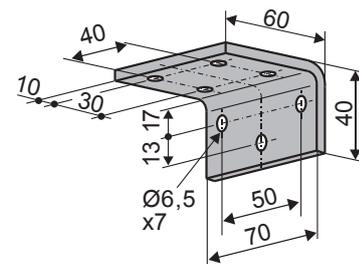
Frame bracket K5
for swivelling suspension



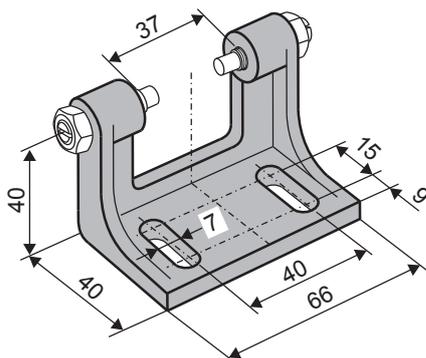
Adjustable clamping B7
Mounting with K5 or K82



Frame bracket K21K
For moving the mounting level from the horizontal to the vertical position.



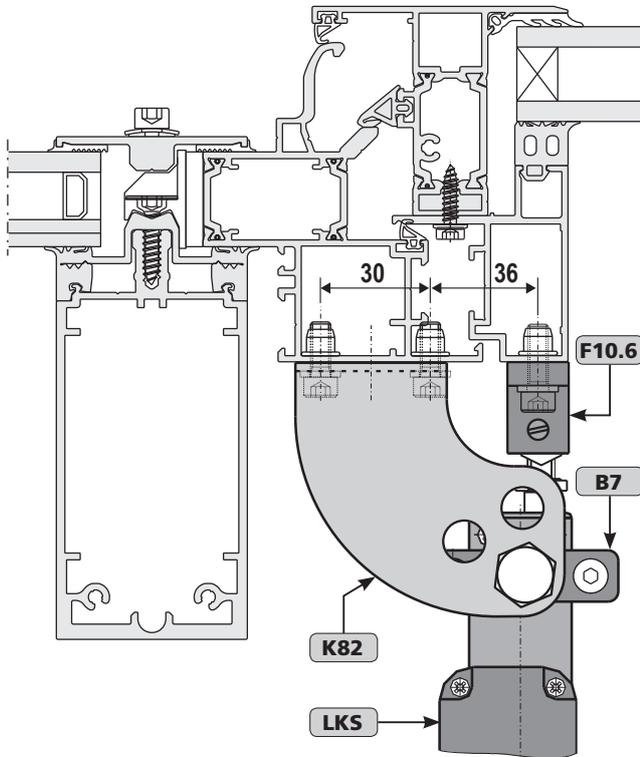
Frame bracket K29
for swivelling suspension



APPLICATION EXAMPLES

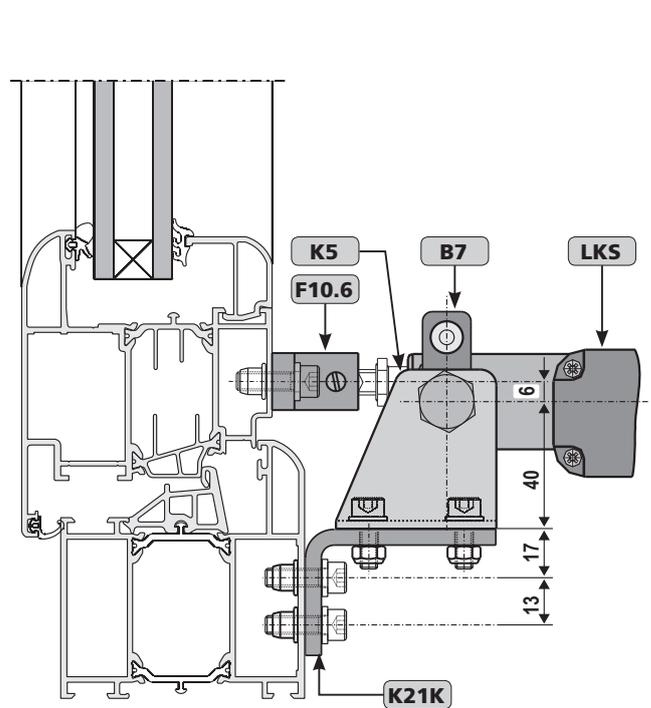
Frame assembly at the HSK (Main closing edge) - Application examples

Roof window outwards opening
Frame assembly - HSK



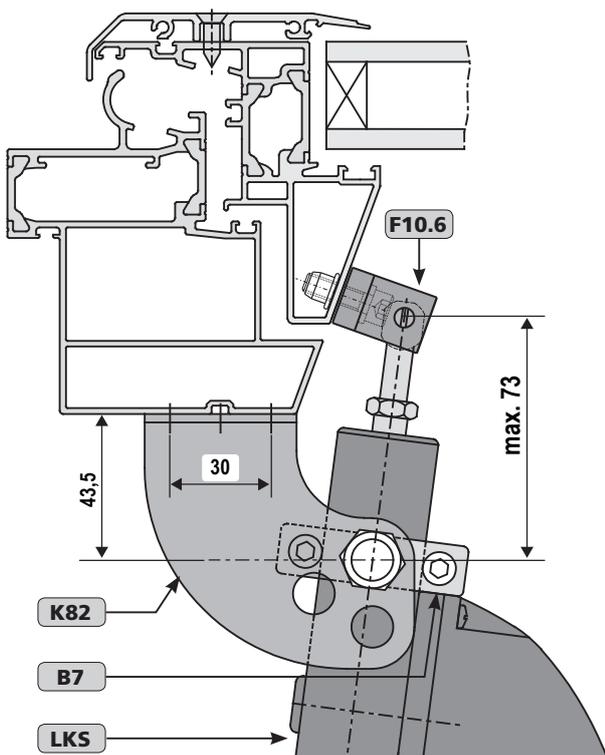
View on aluminium window

Top-hung casement outwards opening
Frame assembly - HSK



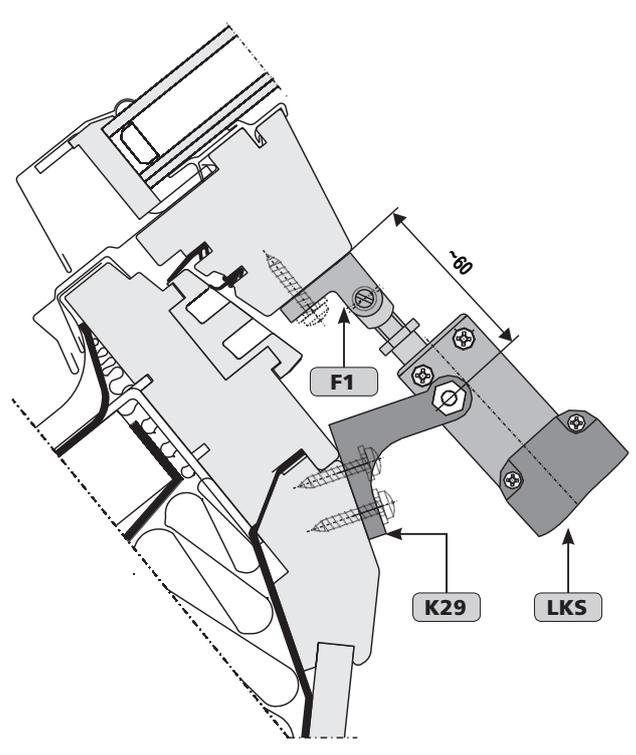
View on PVC window

Roof window outwards opening
Frame assembly - HSK



View on aluminium window

Roof window outwards opening
Frame assembly - HSK



View on wood window

INSTALLATION STEP 4A: ASSEMBLY DRIVE WITH FRAME BRACKET K29

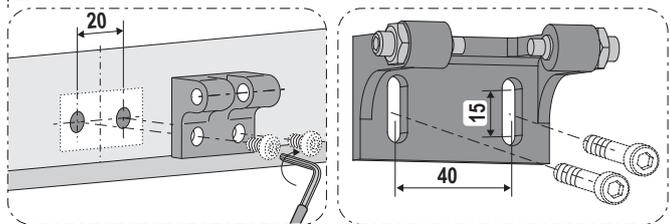
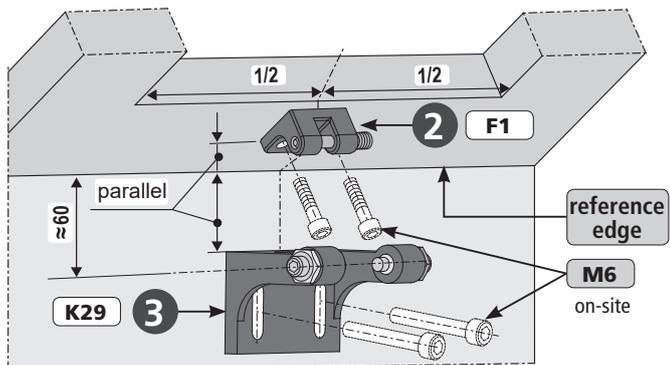
On the window frame - main closing edge - outward opening windows

- Determine fastenings for casement bracket **F1** ② and frame bracket **K29** ③.
- Produce drill holes with appropriate cross-section (for mounting dimensions see drill holes „INSTALLATION STEPE 3” or project-specific documents and drawings).

NOTE Screws - for mounting on the window - are to be provided by the customer!

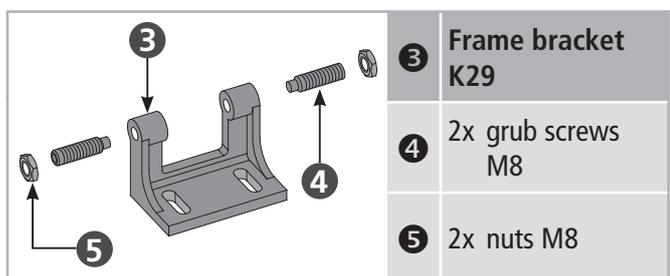
- Screw the casement bracket **F1** ② onto the casement (M6).
- Screw the frame bracket **K29** ③ onto the window frame (M6).

! Make sure they are parallel to casement edge. „Casement bracket” center and „rack” must be in line.

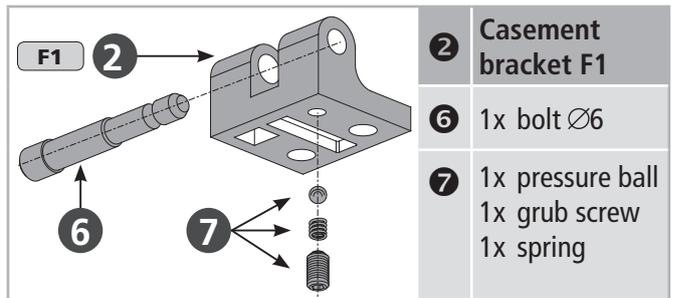
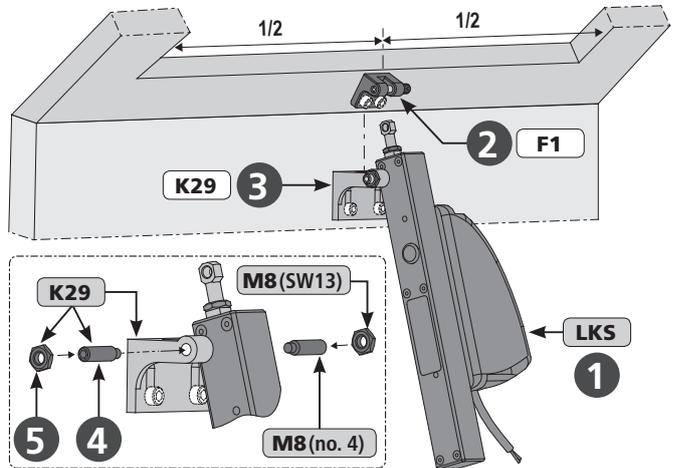


! Carefully clear away drilling swarfs to prevent seals from being damaged. Avoid surface scratches, for example by using masking tape.

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

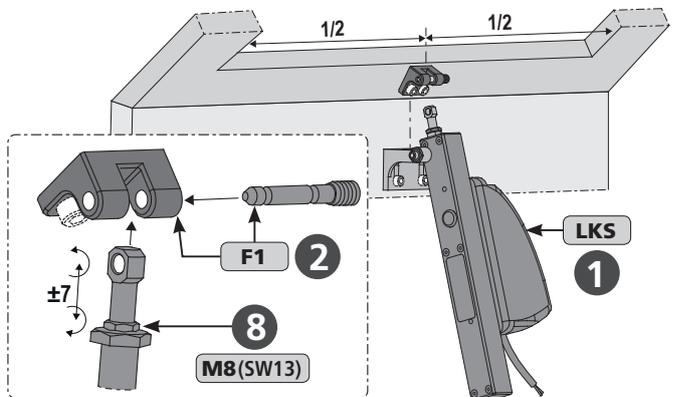


- Place the pre-drilled holes of the drive **LKS** ① in the frame bracket **K29** ③.
- Connect the drive **LKS** ① and the frame bracket **K29** ③ - with the associated grub screws M8 (no. 4) ④ and nuts M8 (SW13) ⑤.



- Attach drive **LKS** ① to the casement bracket **F1** ②.
- Insert the associated bolt Ø6 ⑥ of the casement brackets **F1** ② into the eyebolt of **LKS** ①.

! Bolt ⑥ - of the casement bracket **F1** ② - needs to slot in securely. The snap is audible.



- Optionally adjust the pressure ball ⑦ - of the casement bracket **F1** ② - with grub screw and the spring.
- Adjust casement pressure - using of the nut M8 (SW13) ③ of the drive **LKS** ① (see „INSTALLATION STEPE 5”).

INSTALLATION STEP 4B: ASSEMBLY DRIVE WITH CLAMPING B7 AND FRAME BRACKET K82

On the window frame - main closing edge - outward opening windows

- Determine fastenings for casement bracket **F10.6** ② and for frame bracket **K82** ③.
- Produce drill holes with appropriate cross-section (for mounting dimensions see drill holes „INSTALLATION STEPE 3“ or project-specific documents and drawings).

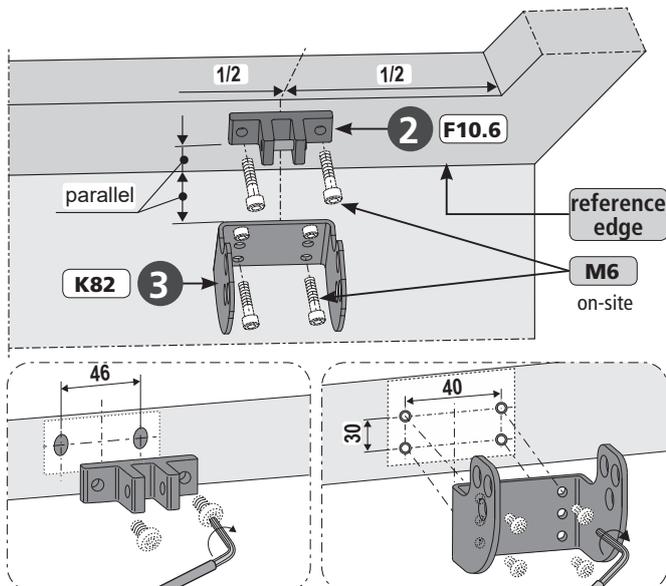
NOTE

Screws - for mounting on the window - are to be provided by the customer!

- Screw the casement bracket **F10.6** ② onto the casement (**M6**).
- Screw the frame bracket **K82** ③ onto the window frame (**M6**).

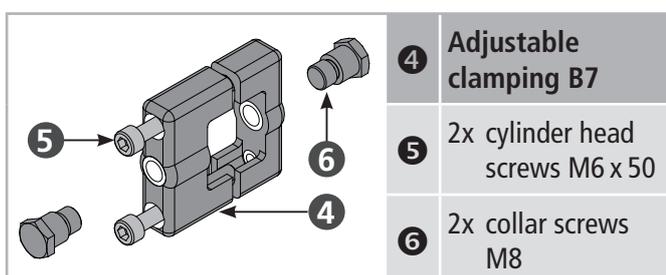


Make sure they are parallel to casement edge. „Casement bracket“ center and „rack“ must be in line.

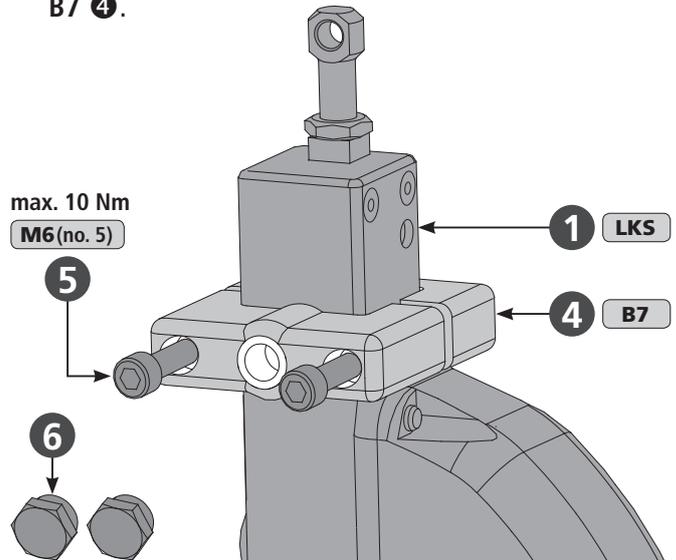


Carefully clear away drilling swarfs to prevent seals from being damaged. Avoid surface scratches, for example by using masking tape.

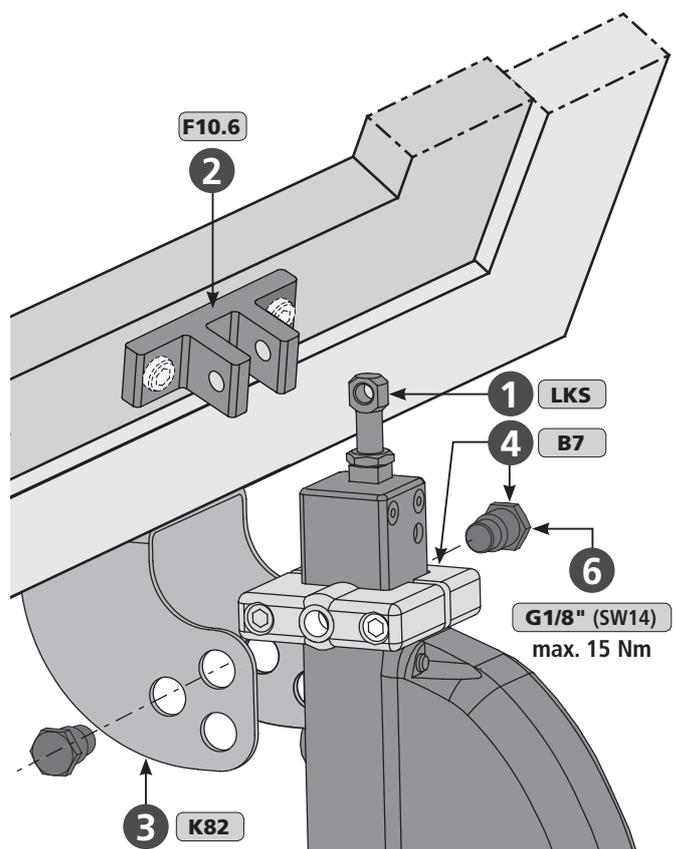
- Secure fasteners against loosening; e.g. by applying removable thread-locking compound such as „Loctite“.



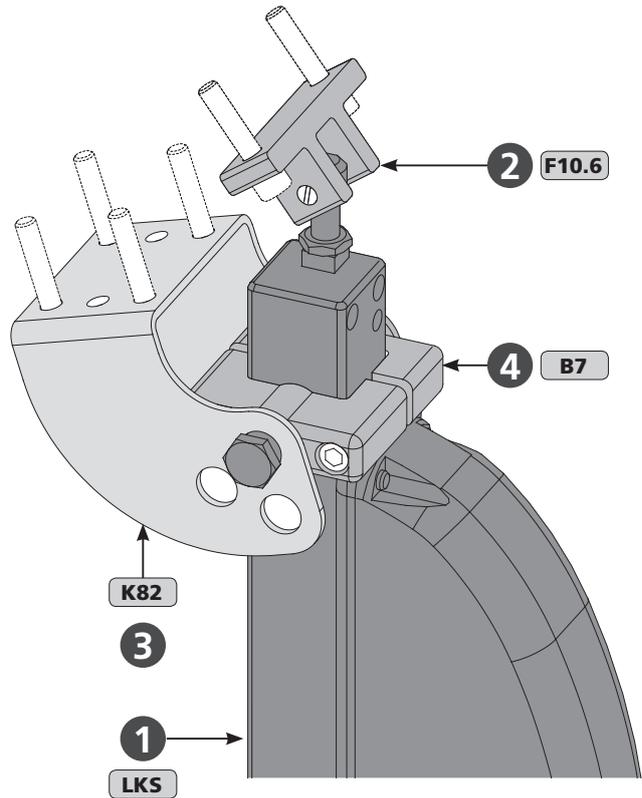
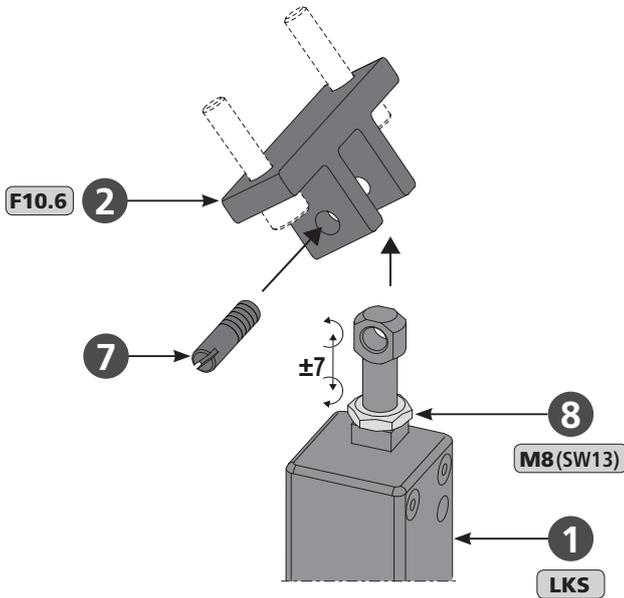
- Untighten the cylinder head screws **M6** ⑤ of the adjustable clamping **B7** ④.
- Slide the adjustable clamping **B7** ④ gently on the drive body **LKS** ① by hand (do not force).
- Screw the cylinder head screws **M6** ⑤ of the adjustable clamping **B7** ④ and tighten to a maximum of 10 Nm.
- Remove the collar screws ⑥ of the adjustable clamping **B7** ④.



- Attach drive **LKS** ① and the adjustable clamping **B7** ④ to the frame bracket **K82** ③.
- Screw in collar screws ⑥ of the adjustable clamping **B7** ④ and tighten to a maximum of 15 Nm.



- Attach drive **LKS 1** to the casement bracket **F10.6 2**.
- Screw in bolt **M6 7** - of the casement bracket **F10.6 2**.
- Adjust casement pressure - using of the nut **M8 (SW13) 8** of the drive **LKS 1** (see „INSTALLATION STEP 5“).



INSTALLATION STEP 4c: ASSEMBLY DRIVE WITH CLAMPING B7 AND FRAME BRACKET K5

On the window frame - main closing edge - outward opening windows

- Determine fastenings for casement bracket **F10.6 2**, frame bracket **K21K 3** and for frame bracket **K5 4**.
- Produce drill holes with appropriate cross-section (for mounting dimensions see drill holes „INSTALLATION STEP 3“ or project-specific documents and drawings).

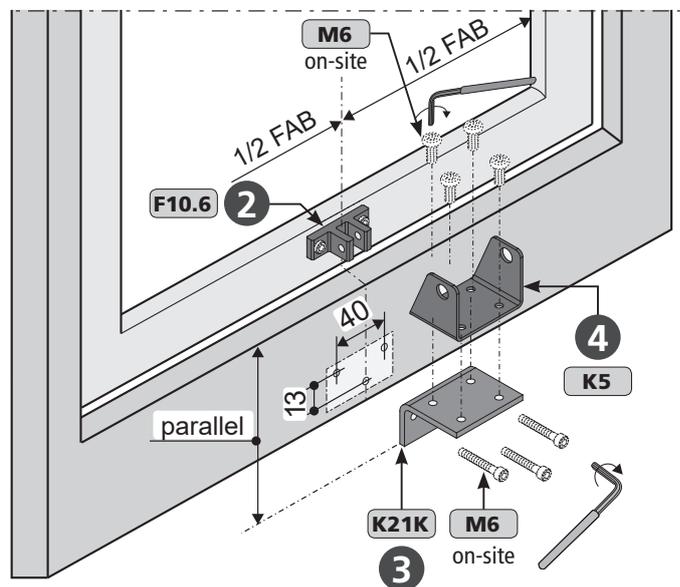
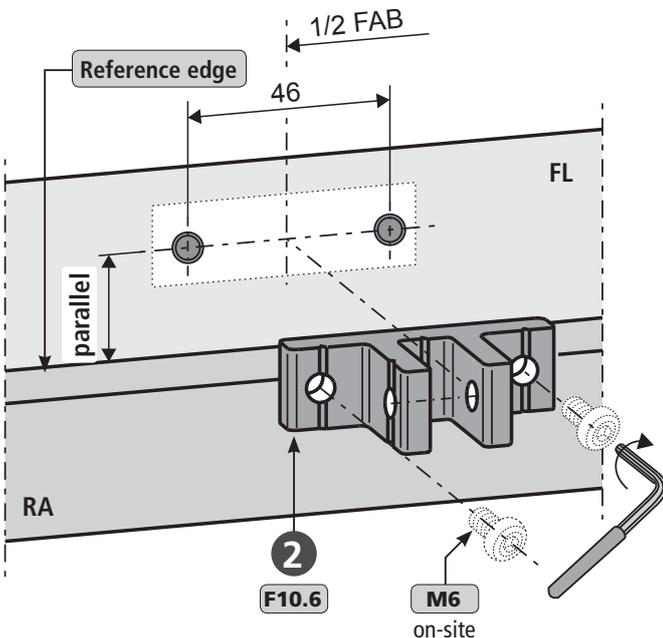
- Screw the casement bracket **F10.6 2** onto the casement (**M6**).
- Screw the frame bracket **K21K 3** onto the window frame (**M6**).
- Screw the frame bracket **K5 4** onto the frame bracket **K21K 3** (**M6**).

NOTE

Screws - for mounting on the window - are to be provided by the customer!



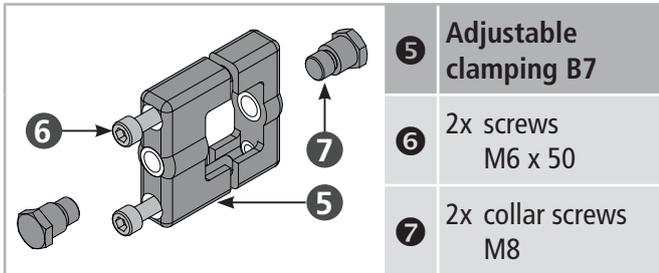
Make sure they are parallel to casement edge. „Casement bracket“ center and „rack“ must be in line.



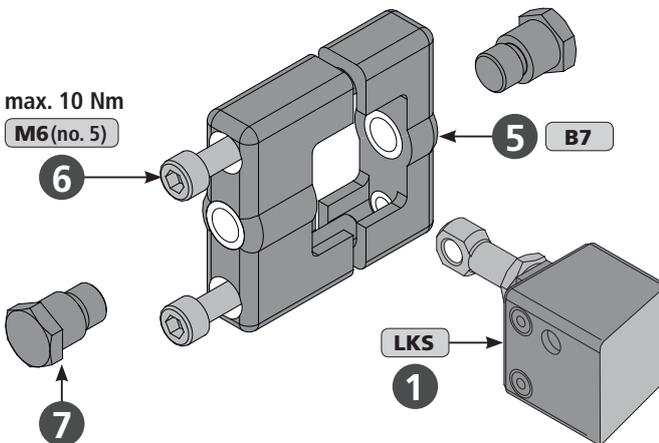


Carefully clear away drilling swarfs to prevent seals from being damaged.
Avoid surface scratches, for example by using masking tape.

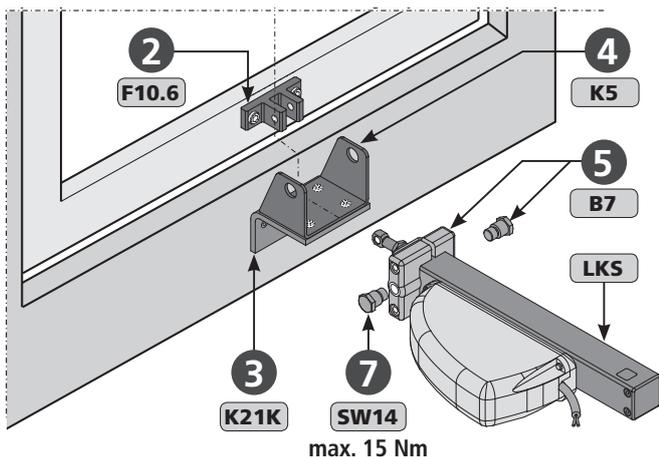
- Secure fasteners against loosening; e.g. by applying removable thread-locking compound such as "Loctite".



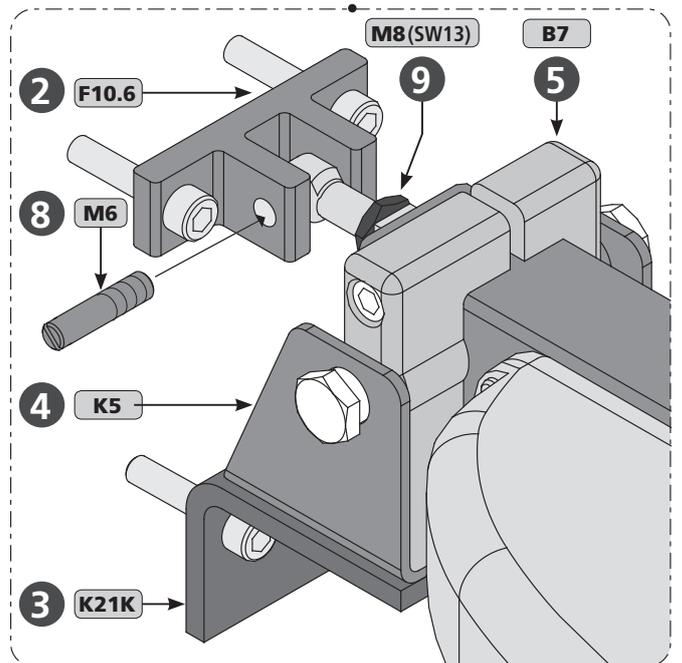
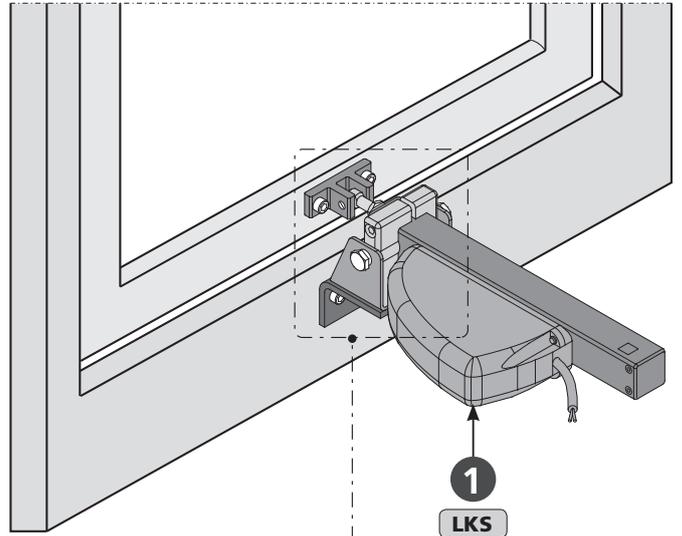
- Untighten the cylinder head screws M6 **6** of the adjustable clamping B7 **5**.
- Slide the adjustable clamping B7 **5** gently on the drive body LKS **1** by hand (do not force).
- Screw the cylinder head screws M6 **6** of the adjustable clamping B7 **5** and tighten to a maximum of 10 Nm.
- Remove the collar screws **7** of the adjustable clamping B7 **5**.



- Attach drive LKS **1** and the adjustable clamping B7 **5** to the frame bracket K5 **4**.
- Screw in collar screws **7** of the adjustable clamping B7 **5** and tighten to a maximum of 15 Nm.



- Attach drive LKS **1** to the casement bracket F10.6 **2**.
- Screw in bolt M6 **8** - of the casement bracket F10.6 **2**.
- Adjust casement pressure - using of the nut M8 (SW13) **9** of the drive LKS **1** (see „INSTALLATION STEPE 5“).



INSTALLATION STEP 4D: ASSEMBLY DRIVE WITH FRAME BRACKET K29 AND K21K

On the window frame - main closing edge - outward opening windows

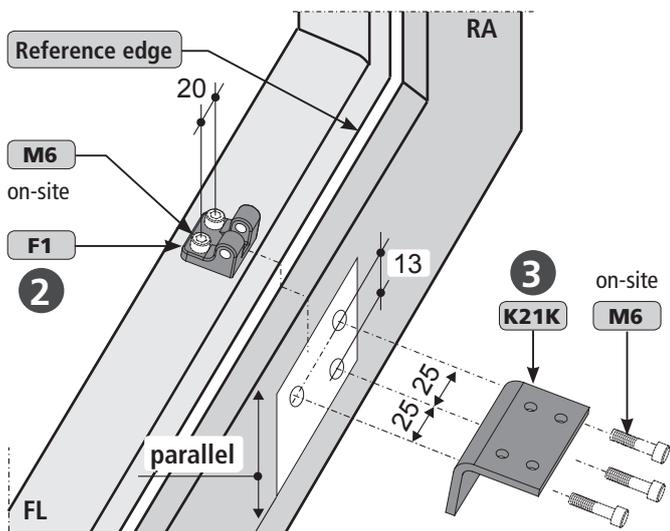
- Determine fastenings for casement bracket **F1** **2**, for frame bracket **K21K** **3** and for frame bracket **K29** **4**.
- Produce drill holes with appropriate cross-section (for mounting dimensions see drill holes „INSTALLATION STEPE 3” or project-specific documents and drawings).

NOTE

Screws - for mounting on the window - are to be provided by the customer!

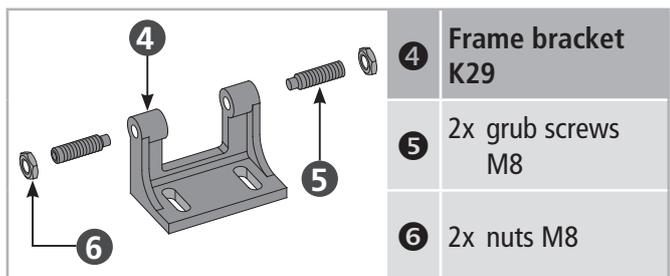
- Screw the casement bracket **F1** **2** onto the casement (**M6**).
- Screw the frame bracket **K21K** **3** onto the window frame (**M6**).

 Make sure they are parallel to casement edge. „Casement bracket” center and „rack” must be in line.

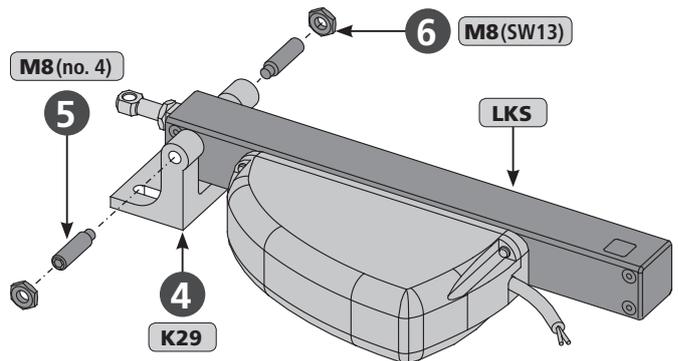


 Carefully clear away drilling swarfs to prevent seals from being damaged. Avoid surface scratches, for example by using masking tape.

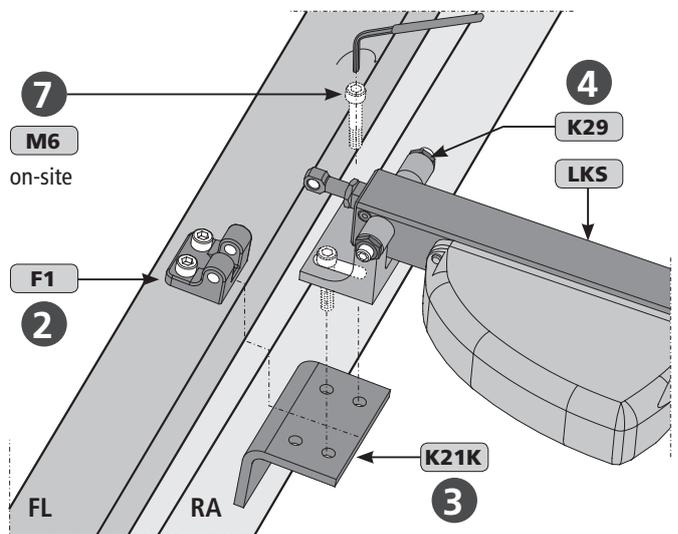
- Secure fasteners against loosening; e.g. by applying removable thread-locking compound such as „Loctite”.



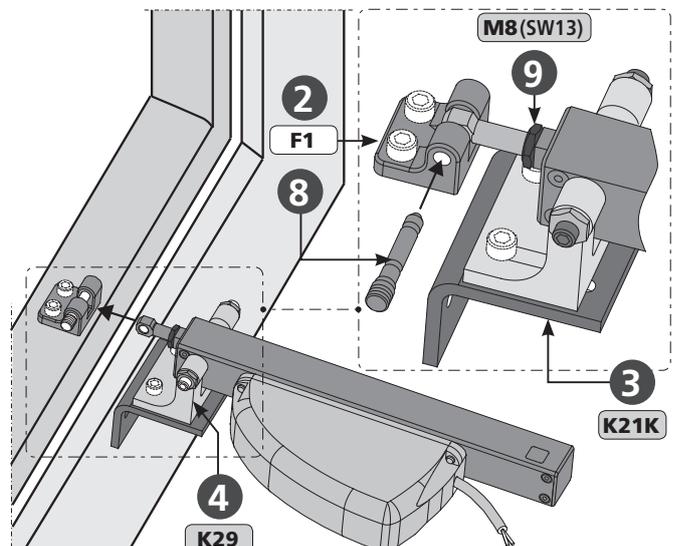
- Mount the frame bracket **K29** **4** - with the associated grub screws **M8** (no. 4) **5** and nuts **M8** (**SW13**) **6** - in the bores of the drive **LKS** **1**.



- Screw the frame bracket **K29** **4** - with 2 on-site screws **M6** **7** - onto the frame bracket **K21K** **3**.



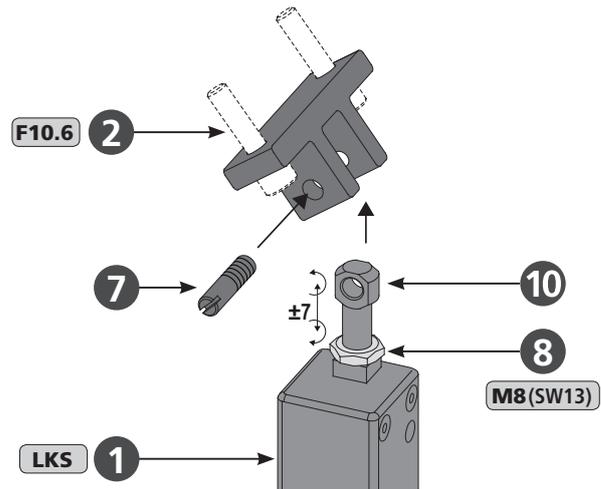
- Attach drive **LKS** **1** to the casement bracket **F1** **2**.
- Insert the associated bolt $\varnothing 6$ **8** of the casement brackets **F1** **2**, until it snaps into place. The snap is audible!



- Adjust casement pressure - using of the nut **M8** (**SW13**) **9** of the drive **LKS** **1** (see „INSTALLATION STEPE 5”).

INSTALLATION STEP 5: POSSIBILITY OF ADJUSTMENT FOR THE CASEMENT PRESSURE

- Adjust casement pressure by unfastening the drive LKS ① from the casement bracket Fxx ②.
- Release the nut M8 (SW13) ⑧ and turn the eyebolt ⑩ in or out - until the casement pressure fits.
- Reattach the drive LKS ① to the casement bracket Fxx ②.



INSTALLATION STEP 6: ELECTRIC CONNECTION



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



Drives must be switched by the controller to the opposite direction (pole reversed) when switched off at overload.

The running direction of the drive may be changed by interchanging (polarity reversal) the wires „BN – (brown)” - „BU – (blue)”.

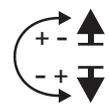
Wire colour coding

Colour	DIN IEC 757
brown	BN
blue	BU

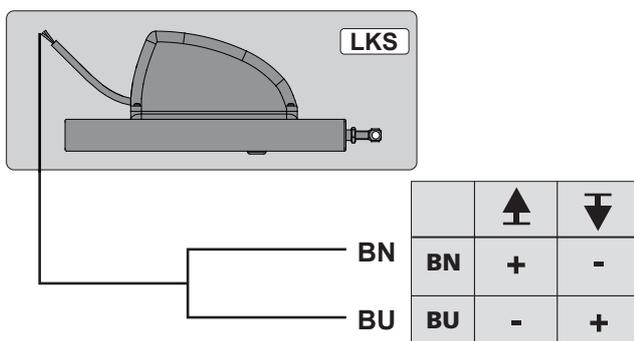
Direction of travel

OPEN	↑
CLOSE	↓

polarity reversal



Connection assignment LKS

S2


S2 = with internal load dependent cut-off switch

Control module: USKM

24V

Order number:
Application:

512140
with 3 outputs and individual
settable cut-off current,
monitored motion run,
delayed sequence control.

Rated voltage:
Close circuit current:

24V DC (19V ... 28V)
< 50 mA

Connections:
Rated current per drive:
Protection rating:

max. 3 drives; s < 300 mm
max. 2,5 A
IP 54

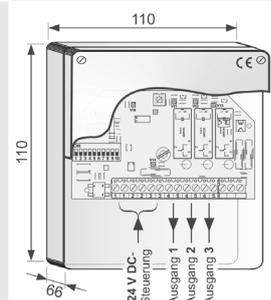
Ambient temperature range:
Surface mount. plastic housing:

0 °C ... +70 °C
110 x 110 x 66 mm

Motion-monitoring up to 3 drives,
2 sequential controls

DIP switches:
for settings.

Connection terminals:
2,5 mm²



INSTALLATION STEP 7: SUPPLY LINES OF CONTROL UNIT TO THE DRIVES

Observe current regulations and guidelines regarding the "Fire behavior of building materials-circuit integrity maintenance of electric cable systems" (E30, E60, E90) and the 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

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

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)

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

$$A = 1,42\text{mm}^2 \rightarrow 1,5\text{mm}^2 \text{ chosen}$$

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 and the cross sections of the drives supply lines.

INSTALLATION STEP 8: 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
Drive does not start	<ul style="list-style-type: none"> • Duration of mains power supply too short • Drive run direction not correct • Connecting cable not connected • Power supply / Control Unit voltage incorrect, too high or too low (see data sheet) • No mains supply to power supply unit / Control Unit (no voltage) • Drive has shut down on overload 	<ul style="list-style-type: none"> • Adjust supply voltage as specified in the technical documentation • Check drive cables • Check all connection cables • Check power supply unit and replace if necessary • Connect power supply • First move drive in CLOSE position
Drive doesn't start after having been in operation several times	<ul style="list-style-type: none"> • Operating time has been exceeded, drive has been overheated • See possible solutions above associated with „Drive doesn't start“ 	<ul style="list-style-type: none"> • Wait until drive has cooled down and start again • See possible solutions associated with: "Drive doesn't start"
Drive doesn't close	<ul style="list-style-type: none"> • Closing edge safety mechanism has been triggered (if existing) • See possible solutions above associated with „Drive doesn't start“ 	<ul style="list-style-type: none"> • Release safety area for operation and reset closing edge safety mechanism • See possible solutions associated with: "Drive doesn't start"
Drive travels uncontrolled in open and close direction	<ul style="list-style-type: none"> • Residual ripple of power supply / control unit too high • Fault in power supply unit / control unit 	<ul style="list-style-type: none"> • Adjust drive voltage to the required value of drive. (values see data sheet of drive) • Check output voltage of power supply unit or control unit

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 and recommended by manufacturer). 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 spare 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.
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

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.

DISPOSAL

According to the European Directive 2012/19 / EU on Waste Electrical and Electronic Equipment (WEEE) and its transposition into national law, obsolete electrical appliances must be collected separately and sent for environmentally friendly recycling.



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 German 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:

- No proper incoming goods inspection.
- 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.

Contact persons for possible warranty claims, for spare parts or accessories are the employees of the responsible branch office or the responsible person at

Firm AUMÜLLER AUMATIC GmbH.

Contact data are available at our homepage

(www.aumueller-gmbh.de)



CERTIFICATE AND DECLARATION OF CONFORMITY

We declare under our sole responsibility that the product described under "Data sheet" is in conformity with the following directives:

- 2014/30/EU
Directive relating to Electro-Magnetic Compatibility
- 2014/35/EU
Low voltage Directive



We further declare that the drive is an incomplete machine within the meaning of the European Machinery Directive (2006/45/EG).

Technical file and declaration at firm:

AUMÜLLER AUMATIC GmbH
Gemeindewald 11
D-86672 Thierhaupten

Ramona Meinzer
Managing Director (Chairman)

NOTE:

The proof of the application of a quality management system is for company:

AUMÜLLER AUMATIC GmbH
according to the certification basis **DIN EN 9001** as well the "Declaration of Incorporation and Conformity" can be accessed via the QR code or directly on our homepage:
(www.aumueller-gmbh.de)



TRANSLATION OF THE ORIGINAL INSTRUCTIONS (GERMAN)

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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