

Roto FS Kempton
Stainless-steel friction stays
for outward opening windows

Installation, maintenance and operation instructions
for aluminium, PVC and timber profiles



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1 General information

1.1 Version history

Version	Date	Changes
v0	04/11/2020	Publication
v1	26/07/2022	Mount for LB and LM scissor stays → <i>from page 31</i> Mount for locking systems → <i>from page 97</i>

1.2 Instructions

This manual contains important information, instructions, application diagrams (max. sash sizes and weights) and assembly instructions for the installation, maintenance and operation of hardware.

The information and instructions contained in this document refer to products belonging to the Roto hardware system named on the front page.

All steps must be completed in sequence.

The following documents apply in addition to these instructions:

- Outward opening catalogue: CTL_90
- Handles catalogue: CTL_1

The following guidelines also apply:

Gütegemeinschaft Schlösser und Beschläge e.V.

- Directive TDBK: Attachment of supporting fitting components for turn-only and tilt&turn fittings
- Directive VHBE: Hardware for windows and balcony doors – Guidelines/ advice for end-users
- Directive VHBH: Hardware for windows and balcony doors – Guidelines/ advice on the product and on liability

VFF (German Window and Facade Association)

- TLE.01: Correct handling of ready-to-install windows and external doors during transport, storage and installation
- WP.01: Maintenance of windows, facades and external doors – Maintenance, care and inspection – Information for sales
- WP.02: Maintenance of windows, facades and external doors – Maintenance, care and inspection – Measures and documents
- WP.03: Maintenance of windows, facades and external doors – Maintenance, care and inspection – Maintenance agreement

Additional guidelines

- Instructions and information issued by profile manufacturers, e.g. manufacturers of windows and balcony doors
- Instructions and information issued by screw manufacturers
- The applicable regulations, directives and national laws

Storing the instructions

These instructions are an important part of the product. The instructions must be stored so that they are always to hand.

Explanation of the markings

The manual uses the following markings for emphasis (e.g. in figures or instructions):

Marking	Meaning
	Sash
	Frame
	Drill holes, routing or screw positions
	Unaffected components / indirectly affected components
	Components, arrows or movements that have just been described
1	Item number
[1]	Legend
[A]	Steps



INFO

Any dimensions without a unit in the instructions are given in millimetres (mm). Other units of measurement are clearly indicated by the presence of the differing unit.



INFO

Figures are provided in the right-hand version (DIN 107).

1.3 Symbols

Symbol	Meaning
■	First-level list
□	Second-level list
→	(Cross-)reference
▷	Result
►	Unnumbered step
1.	Numbered step
a.	Numbered second-level step
⇒	Requirement

1.4 Pictographs

Symbol	Meaning
	Sash rebate width
	Sash rebate height
	Sash weight
 	Aluminium

Symbol	Meaning
	Timber
	PVC
	Timber, PVC and aluminium

1.5 Product features

Symbol	Meaning
	Description
	DIN left / right
	Sash rebate width
	Sash rebate height
	Sash weight
	Size
	Information
	Material number
	Maximum opening angle (degrees)
	Opening angle (mm)
	Scissor stay length
	Track width
	Stack height
	Packaging unit

1.6 Abbreviations

Abbreviation	Meaning
approx.	approximately
CTL	Catalogue
DIN L / R	DIN left / right

Abbreviation	Meaning
d _k	Screw head diameter
T&T	Tilt&Turn
SEW	Sash external width
SEH	Sash external height
RC	Rebate clearance
SRW	Sash rebate width
SRH	Sash rebate height
S.kg	Sash weight
HV	Height adjustment
IMO	Installation instructions
Y	Yes
kg	Kilograms
max.	Maximum
mm	Millimetres
N	No
Nm	Torque in newton metres
FIW	Frame internal width
FIH	Frame internal height
FgD	Frame groove insertion depth
SH	Side-Hung
TH	Top-Hung
e.g.	For example

1.7 Target groups

The information in this document is directed at the following target groups:

Hardware dealers

The “hardware dealers” target group includes all companies and individuals that purchase hardware from hardware manufacturers for resale, without modifying or further processing the hardware.

Window and balcony door manufacturers

The “window and balcony door manufacturers” target group includes all companies and individuals that purchase hardware from hardware manufacturers or hardware dealers and further process the hardware by integrating it in windows and balcony doors.

Building element dealers or installation companies

The “building element dealers or installation companies” target group includes all companies and individuals that purchase windows and balcony doors from window and balcony door manufacturers for resale and for installation in construction projects, without modifying the windows or balcony doors.

Builders

The “builders” target group includes all companies and individuals who place orders for the manufacture of windows and balcony doors for installation in their construction projects.

End users

The “end users” target group includes all individuals who use the installed windows and balcony doors.

1.8 Target groups' obligation to give instructions



INFO

Each target group must fulfil their obligation to give instructions in full.

Unless specified otherwise in the text below, documents and information can be passed on as a printed document, on a data storage device or via the Internet.

Responsibility of hardware dealers

Hardware dealers must pass the following documents on to the window and balcony door manufacturer:

- Catalogue
- Installation, maintenance and operation instructions
- Directive on attachment of supporting fitting components for turn-only and tilt&turn fittings (TBDK)
- Guidelines/advice on the product and on liability (VHBH)
- Guidelines/advice for end-users (VHBE)

Responsibility of the window and balcony door manufacturer

The window and balcony door manufacturer must pass the following documents on to building element dealers or the builder, even if a subcontractor (installation company) is involved:

- Installation, maintenance and operation instructions
- Directive on attachment of supporting fitting components for turn-only and tilt&turn fittings (TBDK)
- Guidelines/advice on the product and on liability (VHBH)
- Guidelines/advice for end-users (VHBE)

They must ensure that the end users are provided with the documents and information intended for them in printed format.

Responsibility of building element dealers and the installation company

Building element dealers must pass the following documents on to the builder, even if a subcontractor (installation company) is involved:

- Installation, maintenance and operation instructions (with a focus on hardware)
- Guidelines/advice on the product and on liability (VHBH)
- Guidelines/advice for end-users (VHBE)

Responsibility of the builder

The builder must pass the following documents on to the end user:

- Installation, maintenance and operation instructions (with a focus on hardware)
- Guidelines/advice for end-users (VHBE)

1.9 Copyright protection

The contents of this document are copyright-protected. This content can be used when working with the hardware. Any other use is not permitted without written permission of the manufacturer.

1.10 Limitation of liability

All information and instructions contained in this document have been compiled in consideration of the applicable standards and regulations, the latest developments in technology and many years of knowledge and experience.

The hardware manufacturer assumes no liability for damage caused by:

- Failure to comply with this document and all product-specific documents and other applicable directives (see the chapters entitled "Security" and "Stipulated use").
- Improper use / misuse (see the chapters entitled "Security" and "Stipulated use").
- Insufficient invitation to tender, non-compliance with installation specifications and non-compliance with the application diagrams (where available).
- Increased contamination.

Claims made by third parties against the hardware manufacturer on account of damage resulting from misuse or failure to comply with the obligation to give instructions on the part of hardware dealers, window, door and balcony door manufacturers and building element dealers or the builder are passed on accordingly.

The obligations agreed in the delivery contract, the general terms and conditions, the hardware manufacturer's terms and conditions of delivery and the legal provisions applicable when the contract was concluded shall apply.

The warranty only covers original Roto components.

We reserve the right to make technical changes as part of improvement to performance characteristics and further development.

1.11 Preserving the surface finish



ATTENTION

Surface treatments may cause property damage.

Surface treatments (e.g. painting and varnishing) on elements can damage components or prevent them from working properly.

- ▶ For masking, only use adhesive tape that does not damage the paint coats. Consult the manufacturer if in doubt.
- ▶ Protect components against direct contact with the surface treatment.
- ▶ Protect components against contamination.



ATTENTION

Using incorrect cleaning agents and sealing compounds may cause property damage.

Cleaning agents and sealing compounds may damage the surfaces of components and gaskets.

- ▶ Do not use aggressive or flammable liquids, acidic cleaners or abrasive cleaners.
- ▶ Only use mild, pH-neutral cleaning agents that have been diluted.
- ▶ Apply a thin protective film to the components, for example using a cloth soaked in oil.
- ▶ Avoid aggressive vapours (e.g. produced by formic acid, acetic acid, ammonia, amine compounds, ammonia compounds, aldehyde, carboic acid, chlorine, tannic acid) around the element.
- ▶ Do not use any acetic acid-crosslinking or acid-crosslinking sealing compounds or those with the aforementioned constituents as both direct contact with the sealing compound and its fumes can corrode the surface of the components.



ATTENTION

Contamination may cause property damage.

Contamination prevents components working properly.

- ▶ Remove deposits and contamination caused by construction materials (e.g. plaster, gypsum).
- ▶ Keep components free of deposits and contaminants.



ATTENTION

(Permanently) damp room air may cause property damage.

Damp room air can lead to mould growth and corrosion caused by condensation.

- ▶ Provide adequate ventilation for components, particularly during the construction phase.
- ▶ Intensively air out the room several times per day by opening all elements for approximately 15 minutes. If intensive airing is not an option, place the elements in the tilt position and provide airtight masking inside the room, e.g. if there is fresh screed that cannot be walked on or must not be exposed to draughts. Discharge any humidity present in the room air to the outside using condensation dryers.
- ▶ Establish a ventilation plan for more complex construction projects if necessary.
- ▶ Provide adequate ventilation during holiday periods as well.

2 Security

This manual contains instructions relating to safety. The principal safety information in this chapter includes information and instructions relevant to the safe use or maintaining the safe condition of the product. Warning instructions that relate to handling warn of residual risks and are located before steps that are relevant to safety.

- Follow all of the instructions in order to prevent personal injury and property and environmental damage.

2.1 Presentation and structure of warning instructions

The warning instructions relate to individual actions and are structured as follows with a warning symbol:



DANGER

Nature and source of the danger.

Explanation and description of the danger and the implications.

- Measures to take to avert the danger.

2.2 Security levels of warning instructions

The warning instructions that relate to handling are identified differently according to the severity of the associated danger. The signal words and the associated warning symbols used are clarified below.



DANGER

Immediate risk of death or serious injuries.

- Observe these warning instructions to avoid personal injuries.



WARNING

Potential risk of death or serious injuries.

- Observe these warning instructions to avoid personal injuries.



CAUTION

Risk of injuries

- Observe these warning instructions to avoid personal injuries.



ATTENTION

Reference to property or environmental damage.

- Observe these warning instructions to avoid property or environmental damage.

2.3 Stipulated use

Outward opening hardware is hardware for outward opening windows in building construction. This hardware is used to open window sashes and balcony door sashes by actuating a hand lever.

Outward opening hardware may be used on vertically installed windows made of timber, PVC, aluminium or steel, or corresponding combinations of the aforementioned materials.

When closing a sash and locking the hardware, the gasket counter force must generally be overcome.



Stipulated use also includes compliance with all safety information and specifications contained in these instructions, the other applicable documents and the applicable regulations, directives and national laws.

Any use and processing of the products that goes beyond or differs from the stipulated use is considered misuse and can lead to hazardous situations. The product can be used without restrictions under the warranty if the stipulated use is adhered to.

Note the following usage restriction: open window sashes and balcony door sashes, and window sashes and balcony door sashes that are unlocked or placed in ventilation positions, only have a shielding effect.



WARNING

Opening and closing sashes in an uncontrolled manner may pose a risk of death!

Opening and closing the sash in an uncontrolled manner may lead to serious injuries.

- ▶ When operating the sash, do not lean too far outward.
- ▶ Ensure that the sash is slowly guided by hand throughout its entire movement range, until it has been brought into a fully closed or opening position.



ATTENTION

Opening and closing sashes in an uncontrolled manner may result in property damage.

Opening and closing the sash in an uncontrolled manner may cause the element to malfunction.

- ▶ When opening the sash, watch out for obstacles on the building (e.g. window sills, protruding roller shutter boxes, etc.).
- ▶ Ensure that the sash is slowly guided by hand throughout its entire movement range, until it has been brought into a fully closed or opening position.

No claims can be made on account of damage resulting from failure to comply with the stipulated use.

2.3.1 Misuse

Any use and processing of the products that goes beyond or differs from the stipulated use is considered misuse and can lead to hazardous situations.



WARNING

Misuse may pose a risk of death!

Misuse and incorrect installation of hardware can lead to serious injuries.

- ▶ Only use hardware combinations that have been approved by the hardware manufacturer.
- ▶ Only use original accessories or those that have been approved by the hardware manufacturer.
- ▶ Note the product-related documentation → *from page 9*.

2.3.2 Usage restriction

Open window sashes, and windows that are unlocked or placed in ventilation positions, only have a shielding effect. They do not meet the following requirements:

- Joint sealing

- Driving rain impermeability
- Sound insulation
- Thermal insulation
- Burglary inhibition

2.4 Stipulated use for end users

Outward opening hardware is hardware for outward opening windows in building construction. This hardware is used to open window sashes and balcony door leaves by actuating a hand lever.

When closing a sash and locking the hardware, the gasket counter force must generally be overcome.



WARNING

Opening and closing sashes in an uncontrolled manner may pose a risk of death!

Opening and closing the sash in an uncontrolled manner may lead to serious injuries.

- ▶ Ensure that the sash does not collide with the frame, opening restrictor (buffer) or other sashes when it is moved into the fully open or closed position.
- ▶ Ensure that the sash is slowly guided by hand throughout its entire movement range, until it has been brought into a fully closed or opening position.



ATTENTION

Opening and closing sashes in an uncontrolled manner may result in property damage.

Opening and closing the sash in an uncontrolled manner may cause the element to malfunction.

- ▶ Ensure that the sash does not collide with the frame, opening restrictor (buffer) or other sashes when it is moved into the fully open or closed position.
- ▶ Ensure that the sash is slowly guided by hand throughout its entire movement range, until it has been brought into a fully closed or opening position.

Any use and processing of the products that goes beyond or differs from the stipulated use is considered misuse and can lead to hazardous situations.

No claims of any kind can be made on account of damage resulting from failure to comply with the stipulated use.

2.4.1 Misuse

Any use and processing of the products that goes beyond or differs from the stipulated use is considered misuse and can lead to hazardous situations.



WARNING

Misuse may pose a risk of death!

Misuse and incorrect installation of hardware can lead to serious injuries.

- ▶ Only use hardware combinations that have been approved by the hardware manufacturer.
- ▶ Only use original accessories or those that have been approved by the hardware manufacturer.
- ▶ Note the product-related documentation → *from page 9*.



2.5 Basic safety information

The following hazards may arise when handling the product:

2.5.1 Installation

Incorrect installation poses an immediate risk of death or serious injuries.

Incorrect installation or assembly of hardware can lead to hazardous situations or property damage. Depending on the height of the fall, this can result in serious to life-threatening injuries and glass breakage.

- ▶ Only use hardware combinations that have been approved by the hardware manufacturer.
- ▶ Only use original accessories or those that have been approved by the hardware manufacturer.
- ▶ Always have installation performed by a specialist company.

Heavy loads pose a risk of injury.

Lifting and carrying heavy loads may lead to injuries in the event of a fall or physical overexertion.

- ▶ Note the applicable accident prevention regulations.
- ▶ Transport heavy loads with two people and use suitable transportation means (such as an industrial truck).

Physical strain may cause damage to health.

Moving heavy loads for extended periods leads to physical injury in the long term.

- ▶ When carrying and lifting by hand, comply with a maximum weight of 25 kg for men and 10 kg for women.
- ▶ Carry and lift even small loads with an ergonomically correct posture.

2.5.2 Use

Falls from open windows and balcony doors present an immediate risk of death and pose the risk of serious injuries.

Opened sashes of windows and balcony doors create a danger zone. Depending on the height of the fall, this can result in serious to life-threatening injuries and glass breakage.

- ▶ Take care when in the vicinity of open windows and balcony doors.
- ▶ Keep children and anyone unable to understand the risks away from the hazardous area.

Trapping body parts in the opening between sash and frame may lead to serious injuries.

Gripping between the sash and frame when closing windows and balcony doors poses the risk of crushing injuries.

- ▶ When closing windows and balcony doors, never grip between the sash and frame and always exercise caution.

- ▶ Keep children and anyone unable to understand the risks away from the hazardous area.

Opening and closing sashes improperly poses the risk of injury and property damage.

Incorrect opening and closing of sashes can result in serious injuries and substantial property damage.

- ▶ When moving the sash, ensure that it will not slam against the frame or other sashes once fully opened or closed.
- ▶ Ensure that the sash is slowly guided by hand throughout its entire movement range, until it has been brought into a fully closed or opening position.
- ▶ When closing a sash and locking the hardware, the gasket counter force must be overcome.
- ▶ If no opening restrictor is used, the sash may close in an uncontrolled manner. Ensure that the sash does not strike any obstacles.

Misuse poses a risk of injury and property damage.

Misuse can lead to hazardous situations and may destroy the hardware, frame materials or other individual components within the windows or balcony doors.

- ▶ Do not introduce any obstacles in the opening area between the frame and window or balcony door sashes.
- ▶ Do not place additional loads on windows and balcony door sashes.
- ▶ Refrain from intentionally or uncontrollably slamming or pushing the window or balcony door sash against the window reveal.

Improper maintenance poses the potential risk of injury and property damage.

Windows and balcony doors, including the hardware, require expert maintenance (care, cleaning, maintenance and inspection) in order to guarantee their proper condition and safe use.

- ▶ Keep the hardware free of deposits and contaminants.
- ▶ Carry out care and cleaning tasks as specified in these instructions.
- ▶ Always have regular maintenance, adjustment and repair work carried out by a specialist company.

2.5.3 Ambient conditions

Falling sashes pose an immediate risk of death or serious injuries.

In strong winds, the sash can be torn out of its fixing.

Depending on the height of the fall, this can result in serious to life-threatening injuries and glass breakage.

- ▶ Avoid exposing the open sash to wind.
- ▶ Close and lock the window and balcony door sash in windy or draughty conditions.

Physical and chemical influences may result in property damage.

Hardware components can be permanently damaged in a saline, aggressive or corrosive environment to the point that they can no longer function.

- ▶ Do not use the hardware components in a saline, aggressive or corrosive environment.
- ▶ Carry out care and cleaning tasks as specified in these instructions.



- Corrosion protection must be inspected by an authorised specialist company as part of regular maintenance work.

Moisture may cause property damage.

Depending on the outside temperature, relative humidity of the room air and installation situation of the windows and balcony doors, a temporary build-up of condensation may occur. This can lead to corrosion on the hardware and mould growth on the frame or wall. Ambient conditions that are too damp, particularly during the construction phase, can lead to window elements warping.

- Avoid preventing the circulation of air (e.g. due to deep reveals, curtains and unfavourable positioning of heaters or the like).
- Intensively air out the room several times per day.
Open all windows and balcony doors for approximately 15 minutes so that the air in the room can be completely replaced.
- Provide adequate ventilation during holiday periods as well.
- Create a ventilation plan for construction projects if necessary.

2.6 Operation

The safety symbols and markings and the associated warning instructions explained below apply to the safe operation of windows and balcony doors.

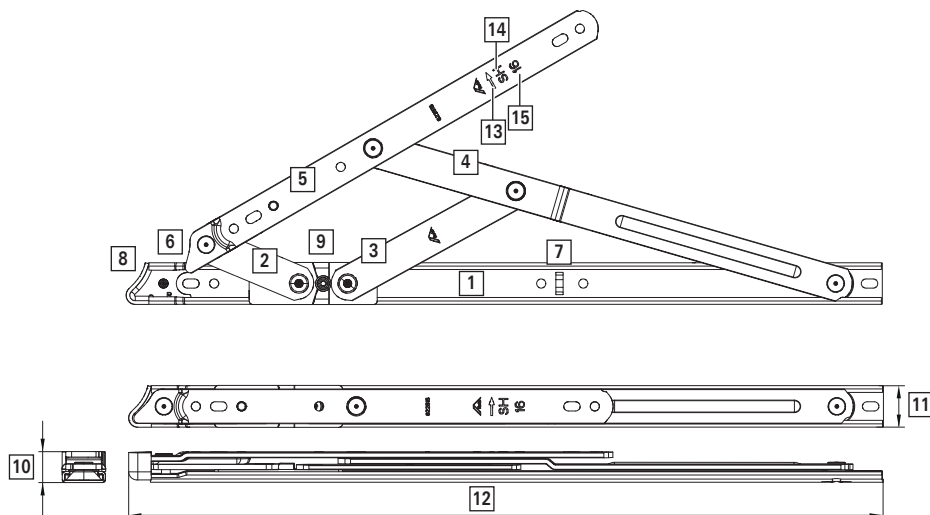
Safety symbols and markings

Symbol		Meaning
Top-Hung	Side-Hung	
		Falls from open windows and balcony doors present an immediate risk of death and pose the risk of serious injuries. Take care when in the vicinity of open windows and balcony doors. Keep children and anyone unable to understand the risks away from the hazardous area.
		Trapping body parts in the opening between sash and frame may lead to serious injuries. When closing windows and balcony doors, never grip between the sash and frame and always exercise caution. Keep children and anyone unable to understand the risks away from the hazardous area.
		Placing additional loads on the sash may lead to minor injuries and property damage. Avoid placing additional loads on the sash.

Symbol		Meaning
Top-Hung	Side-Hung	
		<p>Very windy conditions pose an immediate risk of death or serious injuries and property damage.</p> <p>Avoid exposing the open sash to wind.</p> <p>Close and lock the window and balcony door sash in windy or draughty conditions.</p>
		<p>Introducing obstacles into the opening between sash and frame may result in minor injuries and property damage.</p> <p>Avoid introducing obstacles into the opening between sash and frame.</p>
		<p>Pressing the sash against the edge of an opening (reveal) may pose a risk of minor injuries and cause property damage</p> <p>Refrain from pressing the sash against the edge of an opening (reveal).</p>

3 Information on the product

3.1 General hardware characteristics



[1] Guide track	[5] Scissor stay arm	[9] Brake	[13] Opening direction
[2] First link	[6] Scissor stay arm lug	[10] Scissor stay installation height	[14] Opening type
[3] Second link	[7] End stop	[11] Scissor stay width	[15] Scissor stay size
[4] Third link	[8] Retraction mechanism	[12] Scissor stay length	

Technical features

- Side-Hung and Top-Hung version of friction stays
- Adjustable friction stays.
- Can be used for a variety of sash formats.
- Sash weights up to max. 180 kg with scissor stay size of 26".
- Surface
HX: class 5 = 480 h corrosion resistance (EN 1670:2007).
LB and LM: class 4 = 240 h corrosion resistance (EN 1670:2007).
- Safety in use class 1.

Advantages

- Specified mounting points enable correct installation simply and quickly.
- Tight sealing in outward opening windows.
- High-performance components are used in the entire scissor stay area. This achieves high operational reliability.

Benefits

- Simple, reliable operation.
- Ten-year performance warranty.
- Entire room can be used because the window opens outward.

3.1.1 Specifications

3.1.1.1 HX

Top-Hung

							
							± 2.5°
8	HX SH / TH 08	212	23	16	300 – 450	35 kg	50°
10	HX TH 10	261	23	16	300 – 650	35 kg	40°
12	HX TH 12	305	23	16	450 – 800	45 kg	40°
14	HX TH 14	353	23	16	600 – 950	50 kg	40°
16	HX TH 16	414	23	16	750 – 1250	65 kg	50°
22	HX TH 22	565	23	16	1100 – 1500	100 kg	20°
24	HX TH 24	613	23	16	1200 – 1800	120 kg	20°
26	HX TH 26	666	23	16	1450 – 2500	180 kg	20°

Side-Hung

							
							± 2.5°
8	HX SH / TH 08	212	23	16	300 – 400	35 kg	50°
10	HX SH 10	261	23	16	350 – 450	40 kg	87°
12	HX SH 12	312	23	16	380 – 570	40 kg	87°
14	HX SH 14	357	23	16	500 – 600	40 kg	87°
16	HX SH 16	413	23	16	550 – 750	45 kg	87°

3.1.1.2 LB

Top-Hung

							
08-F	LB TH 08-F	209	18	13	200 – 350	12 kg	65°
08-F-S16	LB TH 08-F-S16	209	18	16	200 – 350	12 kg	65°
10-F	LB TH 10-F	259	18	13	275 – 400	16 kg	80°
10-F-S16	LB TH 10-F-S16	259	18	16	275 – 400	16 kg	80°
12-F	LB TH 12-F	310	18	13	350 – 550	20 kg	80°
12-F-S16	LB TH 12-F-S16	310	18	16	350 – 550	20 kg	80°
16-F	LB TH 16-F	412	18	13	500 – 780	21 kg	80°
16-F-S16	LB TH 16-F-S16	412	18	16	500 – 780	21 kg	80°
20-F	LB TH 20-F	513	18	13	700 – 1100	26 kg	50°
20-F-S16	LB TH 20-F-S16	513	18	16	700 – 1100	26 kg	50°
24-F	LB TH 24-F	615	18	13	850 – 1300	40 kg	38°
24-F-S16	LB TH 24-F-S16	615	18	16	850 – 1300	40 kg	38°

Side-Hung

							
							± 2.5°
12-F	LB SH 12-F	310	18	13	300 – 600	22 kg	60°
12-F-S16	LB SH 12-F-S16	310	18	16	300 – 600	22 kg	60°
16-F	LB SH 16-F	412	18	13	400 – 700	24 kg	60°
16-F-S16	LB SH 16-S16	412	18	16	400 – 700	24 kg	60°



3.1.1.3 LM

Side-Hung

12	LM SH 12	310	18	13	300 – 600	22 kg	80°
16	LM SH 16	413	18	13	400 – 700	24 kg	90°

3.1.2 Certifications

3.1.2.1 HX

Top-Hung

Size	Description	Mat. no.	Certification		
			DIN EN 13126-6	JG/T 127	AAMA 904
8	HX SH / TH 08	785740	■	■	■
10	HX TH 10	823192	■	■	■
12	HX TH 12	823193	■	■	■
14	HX TH 14	823194	■	■	■
16	HX TH 16	823195	■	■	■
22	HX TH 22	823196	■	■	■
24	HX TH 24	823197	■	■	■
26	HX TH 24	823198	■	■	■

■ = tested

Durability

DIN EN 13126-6 Class H3 = 20,000 cycles

JG/T 127 = 35,000 cycles

AAMA 904 = 8000 cycles

Side-Hung

Size	Description	Mat. no.	Certification		
			DIN EN 13126-6	JG/T 127	AAMA 904
8	HX SH / TH 08	785740	■	■	■
10	HX SH 10	823188	■	■	■
12	HX SH 12	823189	■	■	■
14	HX SH 14	823190	■	■	■
16	HX SH 16	823191	■	■	■

■ = tested

Durability

DIN EN 13126-6 Class H3 = 20,000 cycles

JG/T 127 = 35,000 cycles

AAMA 904 = 8000 cycles

3.1.2.2 LB

Top-Hung

Size	Description	Mat. no.	Certification
			BBA ES2-03
08-F	LB TH 08-F	318423	■
08-F-S16	LB TH 08-F-S16	318431	■
10-F	LB TH 10-F	318424	■
10-F-S16	LB TH 10-F-S16	318432	■
12-F	LB TH 12-F	318425	■
12-F-S16	LB TH 12-F-S16	318433	■
16-F	LB TH 16-F	318426	■
16-F-S16	LB TH 16-F-S16	318434	■
20-F	LB TH 20-F	318427	■
20-F-S16	LB TH 20-F-S16	318435	■
24-F	LB TH 24-F	318428	■
24-F-S16	LB TH 24-F-S16	318436	■

■ = tested

Durability

BBA ES2-03 = 30,000 cycles

Side-Hung

Size	Description	Mat. no.	Certification
			BBA ES2-02
12-F	LB SH 12-F	318429	■
12-F-S16	LB SH 12-F-S16	318437	■
16-F	LB SH 16-F	318430	■
16-F-S16	LB SH 16-F-S16	318438	■

■ = tested

Durability

BBA ES2-02 = 30,000 cycles

3.1.2.3 LM

Side-Hung

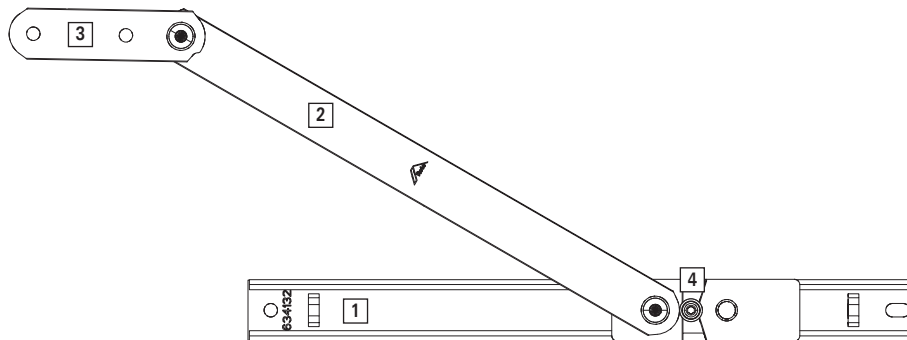
Size	Description	Mat. no.	Certification
			BBA BS EN 1191
12	LM SH 12	318470	■
16	LM SH 16	318471	■

■ = tested

Durability

BBA BS EN 1191 = 10,000 cycles

3.2 Opening restrictor



- [1] Guide track
- [2] Arm
- [3] Sash bearing
- [4] Brake

Purpose of use

- To help prevent the window moving by itself or to limit the opening width.

Operation

In daily use, the sash with the RH version of the Roto FS Kempton opening restrictor is opened until the slider hits the end point.



INFO

Choose a sash opening width that will not cause self-jamming of the sash.

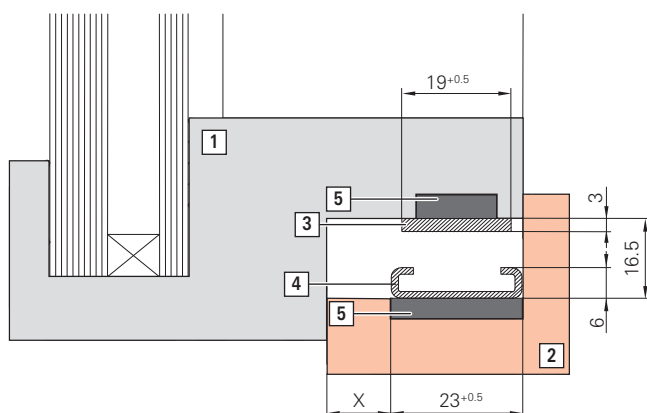
3.3 Requirements for the frame and sash



INFO

Individual profile assessment by Roto customer service is recommended.

HX



- [1] Sash
Tolerance: SEW / SEH ± 1 mm
- [2] Frame
Tolerance: FIW / FIH ± 1 mm

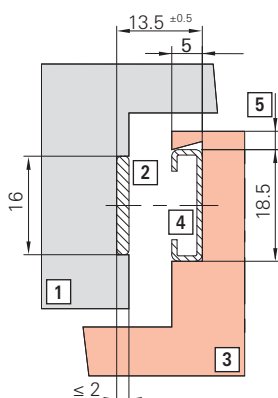
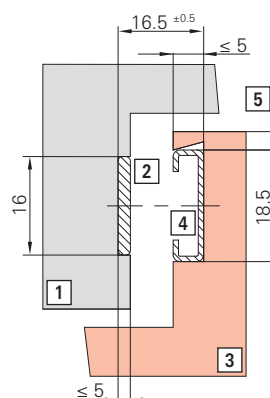
- [3] Scissor stay arm
- [4] Guide track
- [5] Pressure-resistant packer, if required
- [x] As small as possible



INFO

Choose the smallest dimension [x] possible so that a maximum opening angle can be achieved.

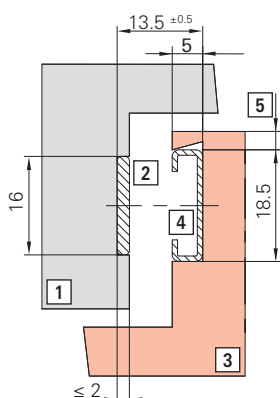
LB



- [1] Sash
- [2] Sash arm
- [3] Frame
- [4] Track
- [5] As small as possible for best possible operation

Choose the smallest dimension possible so that a maximum opening angle can be achieved.

LM

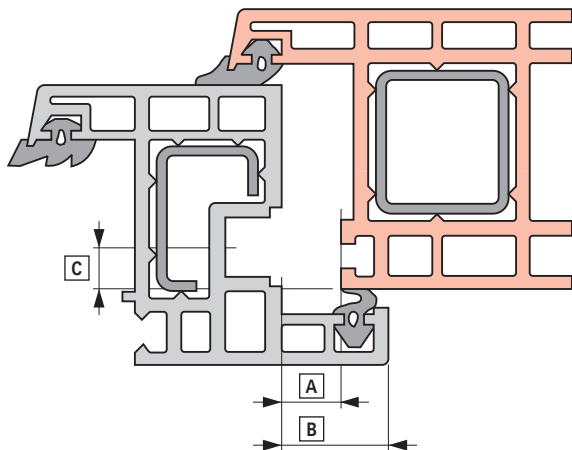


- [1] Sash
- [2] Sash arm
- [3] Frame
- [4] Track
- [5] As small as possible for best possible operation

Choose the smallest dimension possible so that a maximum opening angle can be achieved.

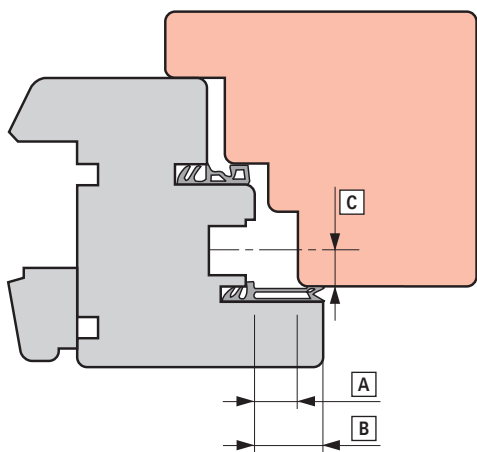
3.4 Profile sections

3.4.1 PVC



System	Rebate clearance [A]	Overlap width [B]	Hardware axis [C]
12/18-9	12 mm	18 mm	9 mm
12/18-13			13 mm
12/20-9		20 mm	9 mm
12/20-13			13 mm
12/21-13		21 mm	13 mm
12/22-13		22 mm	13 mm

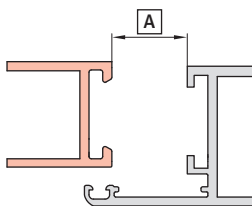
3.4.2 Timber



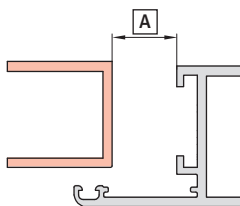
System	Rebate clearance [A]	Overlap width [B]	Hardware axis [C]
12/18-9	12 mm	18 mm	9 mm
12/18-13			13 mm
12/20-9		20 mm	9 mm
12/20-13			13 mm
Euro-rebate 18		–	9 mm
Euro-rebate 20		–	9 mm
Euro-rebate 24		–	13 mm
Euro-rebate 30		–	13 mm
Euro-groove 7/8		–	9 mm
Euro-groove 11/8		–	13 mm

3.4.3 Aluminium

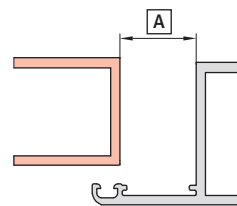
Profile versions



Frame with groove
 Sash with groove



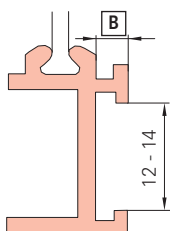
Frame without groove
 Sash with groove



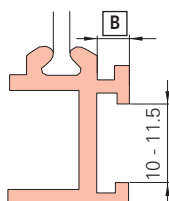
Frame without groove
 Sash without groove

Friction stay	Rebate clearance [A]
HX	16 – 17
LB...-F	13 – 14
LB...-S16	16 – 17
LM	13 – 14

Groove versions



Groove version V.01



Groove version V.02

Groove version	FgD = frame groove insertion depth [B]
V.01	4.5 – 5
V.02	4.5 – 5



INFO

When ordering profile-related frame components, the groove versions must be noted.

3.5 Profile assessment

Roto generally recommends carrying out profile assessments in the form of theoretical and practical tests. Roto customer service can assist with this upon request.



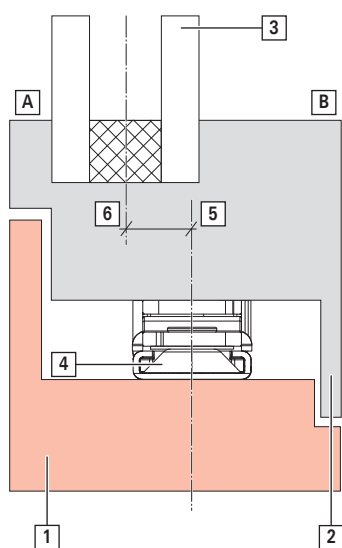
3.6 Opening and closing behaviour – factors

Various factors (such as sash format, sash centre of mass, hardware axis, etc.) influence the behaviour of the sash and therefore operating convenience. The impact of a changing sash centre of mass, for example, is demonstrated below. Other factors such as profile design, installation situation and wind conditions are not taken into consideration at this point.

The opening behaviour is affected by two factors: the sash format (see diagram above) and profile geometry.

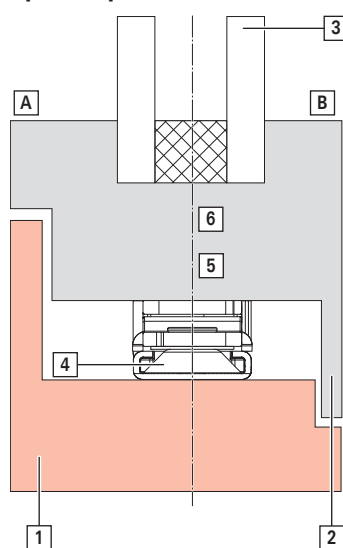
Example profile geometry

Sash centre of mass moved inwards in relation to the hardware axis



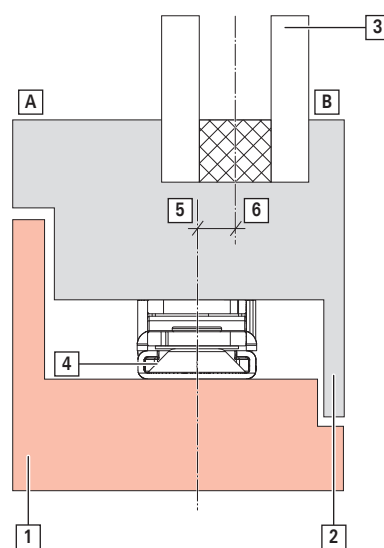
[A] Inside
[B] Outside

Sash centre of mass in alignment with hardware axis – optimal profile structure



[1] Frame
[2] Sash
[3] Sash panel

Sash centre of mass moved outwards in relation to the hardware axis



[4] Friction stay
[5] Hardware axis
[6] Sash centre of mass axis



INFO

Sash tends to open in an uncontrolled manner. This becomes worse as the opening angle and width increase.

Recommended: use an opening restrictor



INFO

Sash tends to fall back in an uncontrolled manner when opening. This becomes worse as the opening angle and width increase.

Recommended: use an opening restrictor

3.7 Application diagrams

3.7.1 Application ranges

FS Kempton	
HX	Heavy-duty friction stays for industrial purposes in the extended application range.
LB	Lightweight friction stays for private purposes in the standard application range.
LM	Lightweight Side-Hung friction stays with simple cleaning function.



INFO

The LM hinge side offers additional functions (e.g. “easy cleaning”).

3.7.2 HX

3.7.2.1 Top-Hung



INFO

The middle of the application range is where the operating forces when opening and closing are the most balanced.

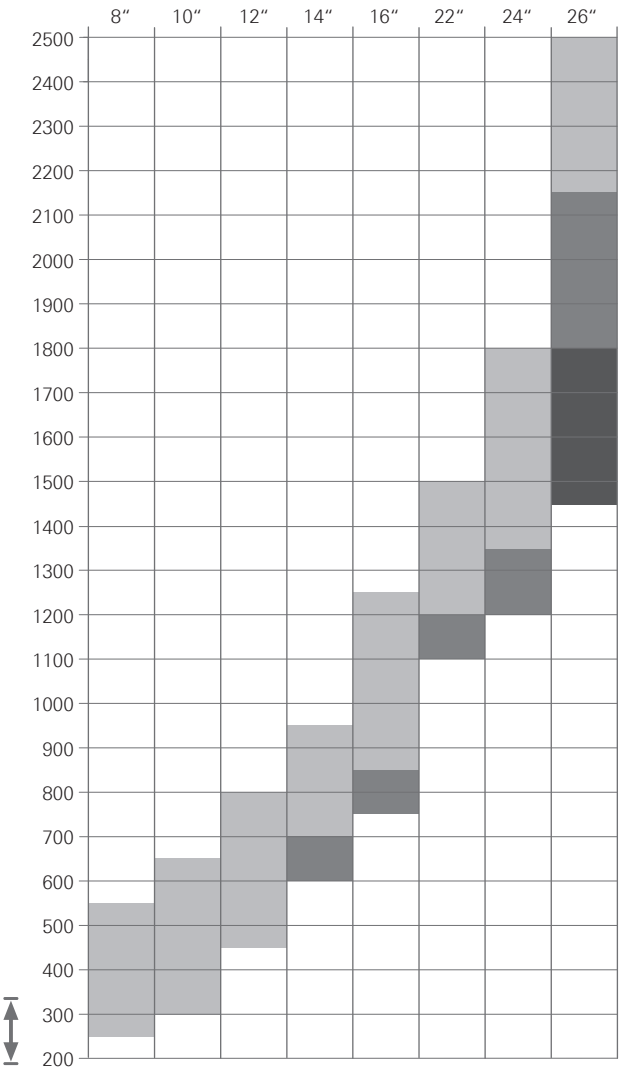
The exception is HX TH 26": with this version, the operating forces are the most balanced at the upper end of the application range.



INFO

If manually operated sashes go beyond the specified application range, contact the technical customer service team.

Top-Hung





-  = Impermissible application range
-  = Application range
-  = Use of an opening restrictor (opening width 100 mm)
-  = Use of an opening restrictor (opening width 300 mm)



INFO

Select the scissor stay size so that the SRH is in the middle of the application range.

Application ranges

Friction stay	Sash rebate height	Sash weight	Opening angle	Opening width
HX SH / TH 08	300 – 450	35 kg	max. 50° ^[1]	–
HX TH 10	300 – 650	35 kg	max. 40° ^[4]	–
HX TH 12	450 – 800	45 kg	max. 40° ^{[2], [4]}	max. 500 mm ^[3]
HX TH 14	600 – 950	50 kg	max. 40° ^[4]	max. 500 mm ^[3]
HX TH 16	750 – 1250	65 kg	max. 50° ^[2]	max. 500 mm ^[3]
HX TH 22	1100 – 1500	100 kg	max. 20° ^{[1], [5]}	max. 500 mm ^[3]
HX TH 24	1200 – 1800	120 kg	max. 20° ^[1]	max. 500 mm ^[3]
HX TH 26	1450 – 2500	180 kg	max. 20° ^[1]	max. 500 mm ^[3]

^[1] Depending on the profile system, only a limited installation sequence may be possible and the brake might not be adjustable.

^[2] Depending on the format and weight, it may be necessary to use an opening restrictor as an additional brake.

^[3] The opening width may need to be limited to reduce the operating forces.

^[4] Secondary application range 50° (for installation purposes only)

^[5] Secondary application range 25° (for installation purposes only)



INFO

Depending on the maximum permitted sash weight, the sash width can be unlimited.

3.7.2.2 Side-Hung



INFO

If manually operated sashes go beyond the specified application range, contact the technical customer service team.



INFO

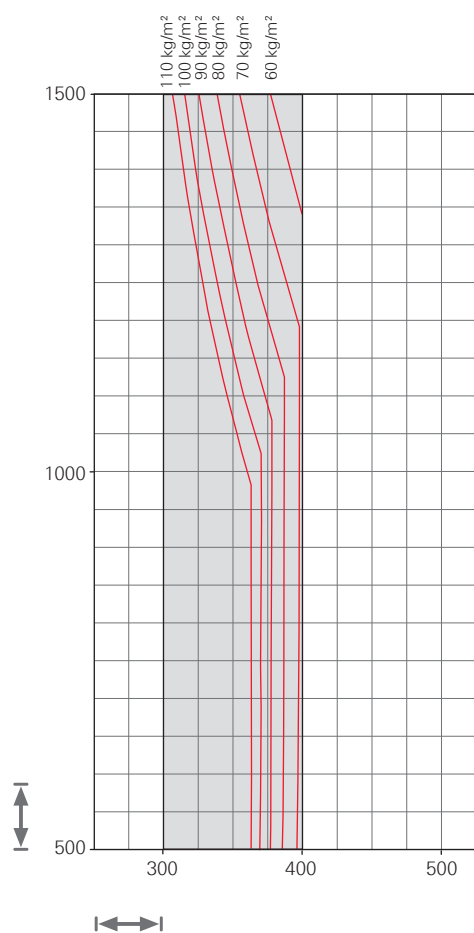
Lower deductible dimensions of glass or higher profile weights require a separate assessment.



INFO

Depending on the maximum permitted sash weight, the sash height can be unlimited.

HX SH / TH 08



= Impermissible application range

The specifications in the application diagram refer to the glass weight in kg/m².

1 mm/m² glass thickness $\approx$ 2.5 kg

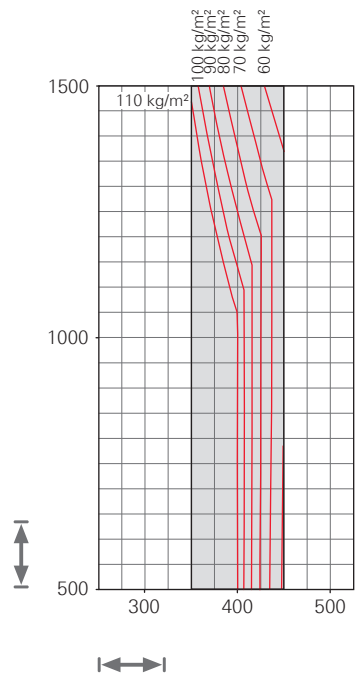
Assumption: sash profile weight is 2 kg/m.



Application range

Basic security		
	Sash rebate width	300 – 400 mm
	Sash rebate height	Depending on the maximum permitted sash weight, the sash height can be unlimited.
	Sash weight	35 kg
	Opening angle	max. 50°

HX SH 10



 = Impermissible application range

The specifications in the application diagram refer to the glass weight in kg/m².

1 mm/m² glass thickness $\approx$ 2.5 kg

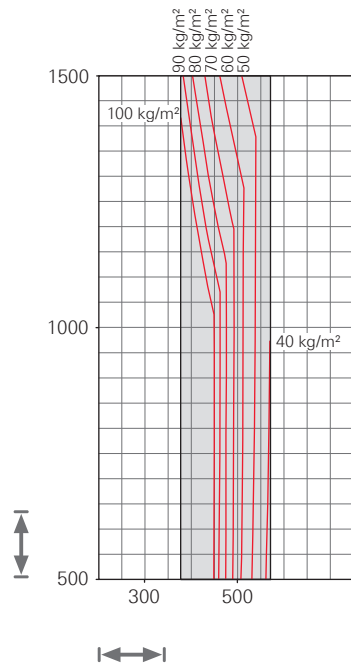
Assumption: sash profile weight is 2 kg/m.

Application range

Basic security		
	Sash rebate width	350 – 450 mm
	Sash rebate height	Depending on the maximum permitted sash weight, the sash height can be unlimited.
	Sash weight	40 kg

Basic security		
	Opening angle	max. 87°

HX SH 12



 = Impermissible application range

The specifications in the application diagram refer to the glass weight in kg/m².

1 mm/m² glass thickness $\approx$ 2.5 kg

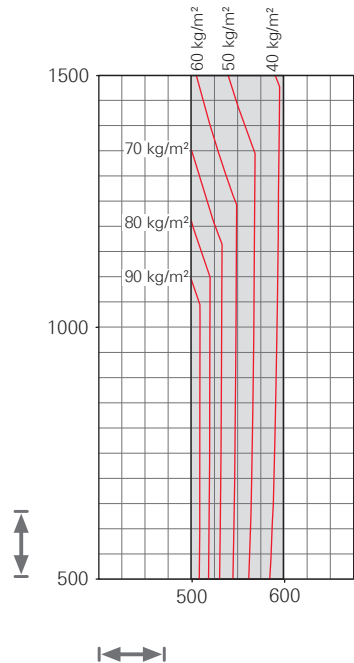
Assumption: sash profile weight is 2 kg/m.

Application range

Basic security		
	Sash rebate width	380 – 570 mm
	Sash rebate height	Depending on the maximum permitted sash weight, the sash height can be unlimited.
	Sash weight	40 kg
	Opening angle	max. 87°



HX SH 14



 = Impermissible application range

The specifications in the application diagram refer to the glass weight in kg/m².

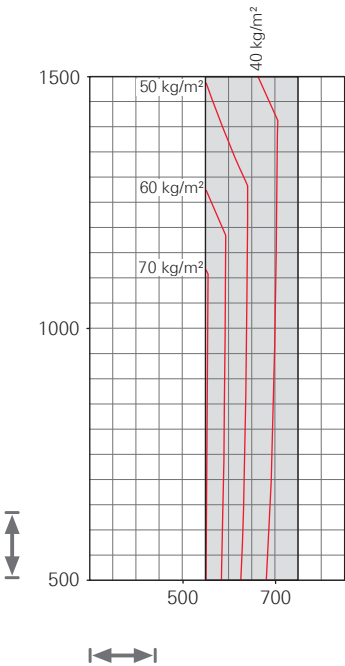
1 mm/m² glass thickness $\approx$ 2.5 kg

Assumption: sash profile weight is 2 kg/m.

Application range

Basic security		
	Sash rebate width	500 – 600 mm
	Sash rebate height	Depending on the maximum permitted sash weight, the sash height can be unlimited.
	Sash weight	40 kg
	Opening angle	max. 87°

HX SH 16



= Impermissible application range

The specifications in the application diagram refer to the glass weight in kg/m².

1 mm/m² glass thickness ÷ 2.5 kg

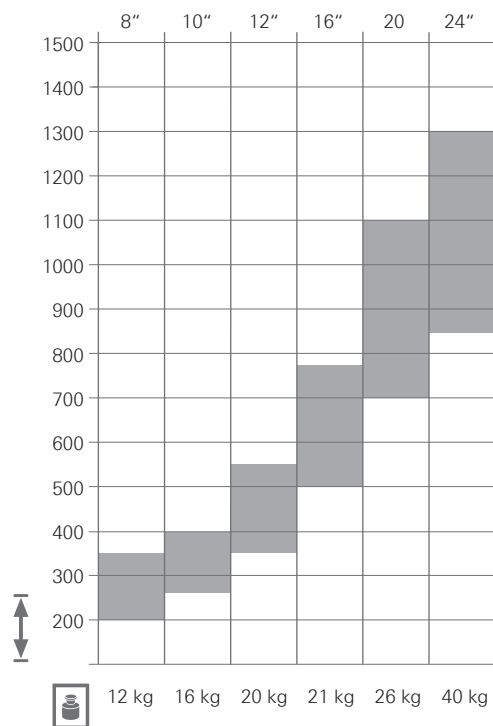
Assumption: sash profile weight is 2 kg/m.

Application range

Basic security		
	Sash rebate width	550 – 750 mm
	Sash rebate height	Depending on the maximum permitted sash weight, the sash height can be unlimited.
	Sash weight	45 kg
	Opening angle	max. 87°

3.7.3 LB

3.7.3.1 Top-Hung



 = Impermissible application range
 = Application range

Application ranges

Friction stay	Sash rebate height	Sash weight
LB TH 08	200 – 350	12 kg
LB TH 10	275 – 400	16 kg
LB TH 12	350 – 550	20 kg
LB TH 16	500 – 780	21 kg
LB TH 20	700 – 1100	26 kg
LB TH 24	850 – 1300	40 kg



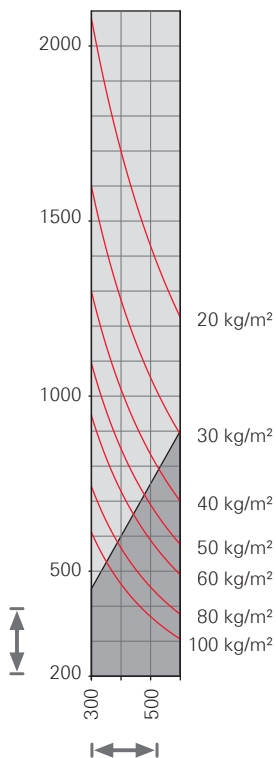
INFO

Depending on the maximum permitted sash weight, the sash width can be unlimited.

3.7.3.2 Side-Hung

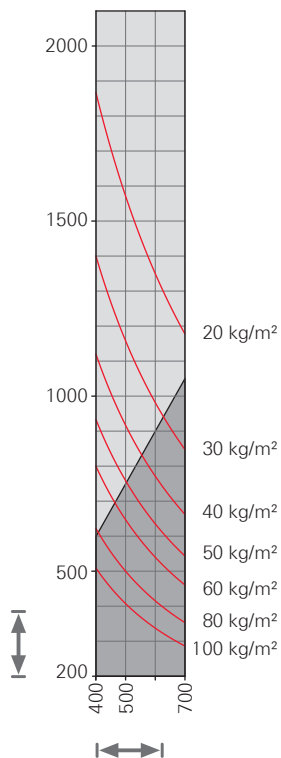
LB SH 12

S.kg max. 22 kg



LB SH 16

S.kg max. 24 kg



 = The height of Side-Hung sashes must be at least 1.5 times the sash width.

 = On Side-Hung sashes with a height that is less than 1.5 times their width, regular readjustment may be required to align the sash in the frame.

The specifications in the application diagram refer to the glass weight in kg/m².

1 mm/m² glass thickness $\approx$ 2.5 kg

Assumption: sash profile weight is 2 kg/m.

Application range		
	Sash width	300 – 700 mm
	Sash height	300 – 2100 mm
	Sash weight	max. 24 kg



INFO

The stated sizes refer only to the load-bearing capacity of the friction stays. Profile limitations due to window formats are not taken into consideration in this illustration and must be checked separately by the window manufacturer.

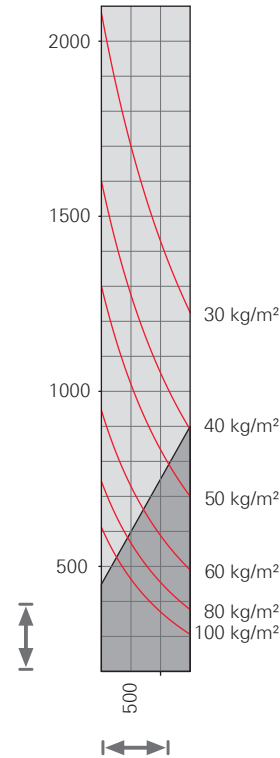


3.7.4 LM

3.7.4.1 Side-Hung

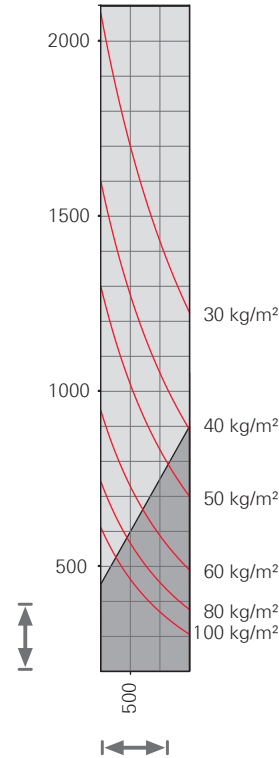
LM SH 12

S.kg max. 22 kg



LM SH 16

S.kg max. 24 kg



= The height of Side-Hung sashes must be at least 1.5 times the sash width.

= On Side-Hung sashes with a height that is less than 1.5 times their width, regular readjustment may be required to align the sash in the frame.

The specifications in the application diagram refer to the glass weight in kg/m².

1 mm/m² glass thickness $\approx$ 2.5 kg

Assumption: sash profile weight is 2 kg/m.

Application range		
	Sash width	300 – 700 mm
	Sash height	200 – 2100 mm
	Sash weight	max. 24 kg



INFO

The stated sizes refer only to the load-bearing capacity of the friction stays. Profile limitations due to window formats are not taken into consideration in this illustration and must be checked separately by the window manufacturer.

3.8 Product finder

Opening type	Groove width	Rebate clearance	Friction stay	
Top-Hung	18.5	13.5 ±0.5	LB	→ from page 39
		16.5 ±0.5	LB	
	23 +0.5	16.5	HX	→ from page 32
Side-Hung	18.5	13.5 ±0.5	LB	→ from page 39
			LM	→ from page 41
		16.5 ±0.5	LB	→ from page 39
	23 +0.5	16.5	HX	→ from page 32



4 Hardware overviews

The hardware overviews on the following pages are a recommendation on the part of Roto Frank Fenster- und Türtechnologie GmbH.

The basic page layout in the hardware overviews chapter firstly shows examples of the combination of individual hardware components, and the associated parts list can be seen on the following pages.

Additional combinations of hardware components can be found in the catalogue.

The item numbers in the squares link the hardware overview to the parts list.

The actual composition of the hardware depends on:

- the height of the element
- the width of the element
- the weight of the element
- Profile system

Profile-related frame components and general sets are listed in additional chapters.

Recommended handles can be found in the Roto Handles catalogue (CTL_1), see the chapter entitled "Outward Opening".

Determine the quantity of required hardware components with Roto Con Orders.



INFO

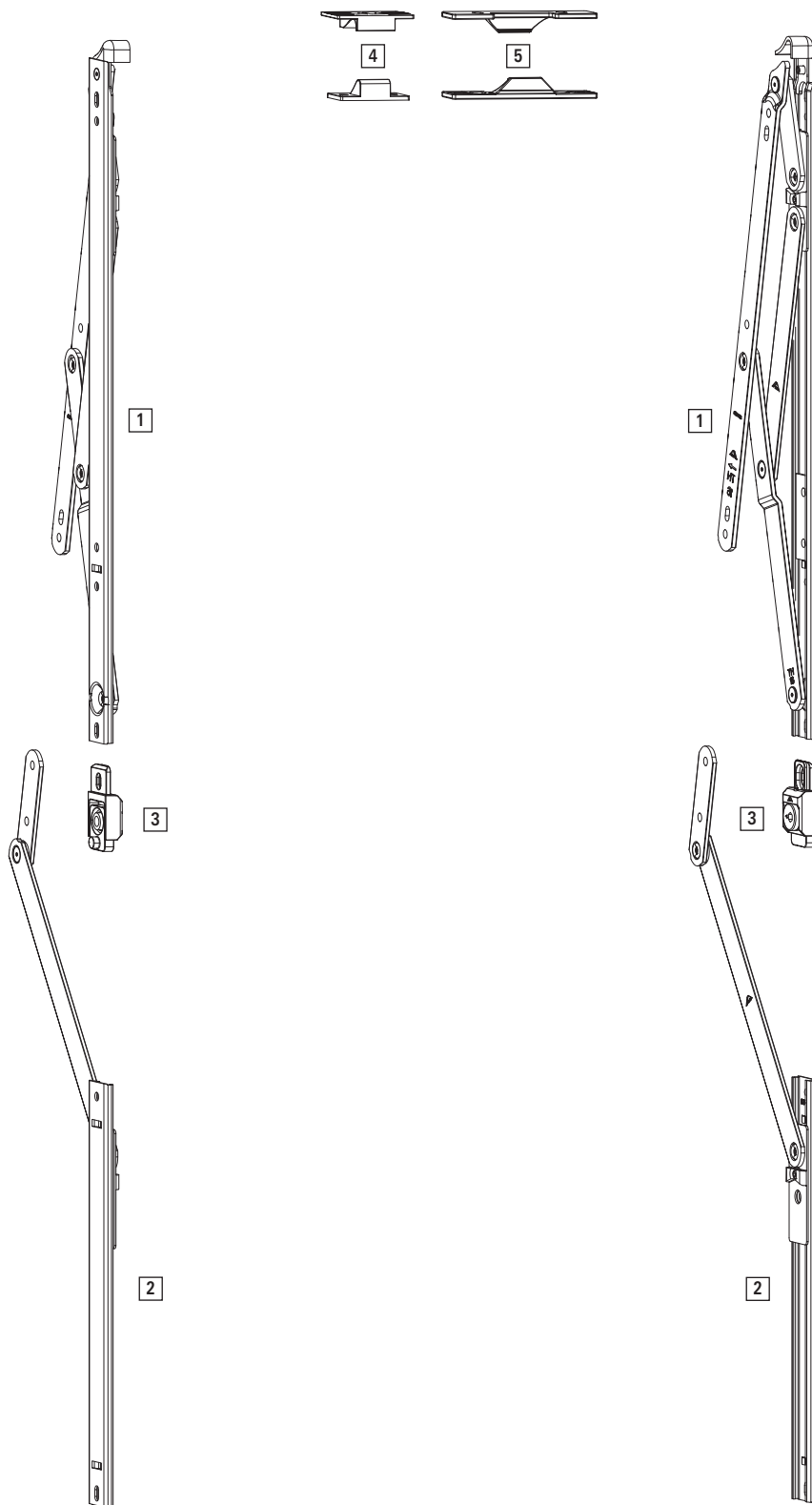
Roto Con Orders

Efficient online hardware configurator for the custom configuration of individual window and door hardware components. All conventional shapes and opening types can be automatically configured quickly and easily. Individual parts lists, including application ranges and an exemplary hardware overview, can be ordered from your responsible sales representative.



www.roto-frank.com

4.1 Top-Hung





[1] Friction stay

HX

								Nº
HX TH / SH 8	212	23	16	300 – 450	35 kg	50	25 Pair(s)	785740
HX TH 10	261	23	16	300 – 650	35 kg	40	25 Pair(s)	823192
HX TH 12	305	23	16	450 – 800	45 kg	40	25 Pair(s)	823193
HX TH 14	353	23	16	600 – 950	50 kg	40	20 Pair(s)	823194
HX TH 16	414	23	16	750 – 1250	65 kg	50	20 Pair(s)	823195
HX TH 22	565	23	16	1100 – 1500	100 kg	20	20 Pair(s)	823196
HX TH 24	613	23	16	1200 – 1800	120 kg	20	10 Pair(s)	823197
HX TH 26	666	23	16	1450 – 2500	180 kg	20	10 Pair(s)	823198

Opening width of 500 mm from HX TH 22

LB

								Nº
LB TH 08-F	209	18	13	200 – 350	12 kg	65	25 Pair(s)	318423
LB TH 08-F-S16	209	18	16	200 – 350	12 kg	65	25 Pair(s)	318431
LB TH 10-F	259	18	13	275 – 400	16 kg	80	25 Pair(s)	318424
LB TH 10-F-S16	259	18	16	275 – 400	16 kg	80	25 Pair(s)	318432
LB TH 12-F	310	18	13	350 – 550	20 kg	80	25 Pair(s)	318425
LB TH 12-F-S16	310	18	16	550 – 350	20 kg	80	25 Pair(s)	318433
LB TH 16-F	412	18	13	500 – 780	21 kg	80	25 Pair(s)	318426
LB TH 16-F-S16	412	18	16	500 – 780	21 kg	80	25 Pair(s)	318434
LB TH 20-F	513	18	13	700 – 1100	26 kg	50	25 Pair(s)	318427
LB TH 20-F-S16	513	18	16	700 – 1100	26 kg	50	25 Pair(s)	318435
LB TH 24-F	615	18	13	850 – 1300	40 kg	38	25 Pair(s)	318428
LB TH 24-F-S16	615	18	16	850 – 1300	40 kg	38	25 Pair(s)	318436

[2] Opening restrictor

RH opening restrictor

				Nº
249	23	16	50 Piece(s)	785746

RD comfort opening restrictor

					Nº
RD TS 06	200	18	16	50 Piece(s)	485433
RD TS 08	200	18	16	50 Piece(s)	485439
Release key	–	–	–	100 Piece(s)	485440

RL opening restrictor

					Nº
RL TS 06-F	150 mm	18	13	50 Piece(s)	318474

SOR opening restrictor

					Nº
SOR 150	150	23	16	50 Piece(s)	799785
SOR 300	300	23	16	40 Piece(s)	799786
SOR 400	400	23	16	20 Piece(s)	799787

[3] Height adjustment

		Nº
Height adjustment	50 Bag	857579



INFO

Installation only in combination with HX friction stays.

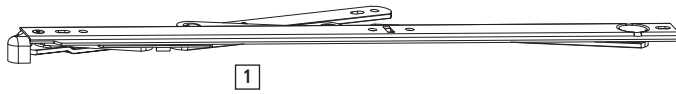
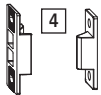
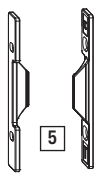
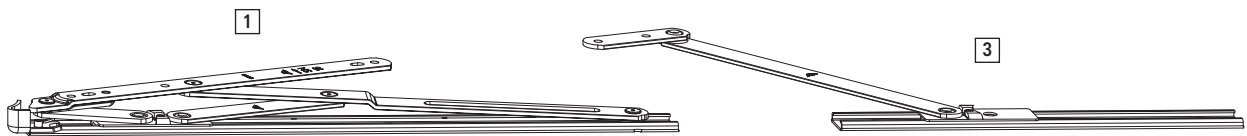
[4] Concealed lock

		Nº
Set 1: for sash and frame profile with groove	1 Set(s)	771865
Set 2: for sash profile with groove and frame profile without groove	1 Set(s)	771866
Set 3: for sash and frame profile without groove	1 Set(s)	771867

[5] Anti-lifting device

		Nº
Anti-jemmy device, 13 mm	50 Set(s)	485599
Anti-jemmy device, 16 mm	50 Set(s)	485600

4.2 Side-Hung





[1] Friction stay

HX

								Nº
HX TH / SH 8	212	23	16	300 – 400	35 kg	50	25 Pair(s)	785740
HX SH 10	261	23	16	350 – 450	40 kg	87	25 Pair(s)	823188
HX SH 12	312	23	16	380 – 570	40 kg	87	25 Pair(s)	823189
HX SH 14	357	23	16	500 – 600	40 kg	87	20 Pair(s)	823190
HX SH 16	413	23	16	550 – 750	45 kg	87	20 Pair(s)	823191

LB

								Nº
LB SH 12-F	310	18	13	300 – 600	22 kg	60	25 Pair(s)	318429
LB SH 12-F-S16	310	18	16	300 – 600	22 kg	60	25 Pair(s)	318437
LB SH 16-F	412	18	13	400 – 700	24 kg	60	25 Pair(s)	318430
LB SH 16-F-S16	412	18	16	400 – 700	24 kg	60	25 Pair(s)	318438

LM

								Nº
LM SH 12	310	18	13	300 – 600	22 kg	80	25 Pair(s)	318470
LM SH 16	413	18	13	400 – 700	24 kg	90	25 Pair(s)	318471

[2] Opening restrictor

RH opening restrictor

				Nº
249	23	16	50 Piece(s)	785746

RD comfort opening restrictor

					Nº
RD TS 06	200	18	16	50 Piece(s)	485433
RD TS 08	200	18	16	50 Piece(s)	485439
Release key	–	–	–	100 Piece(s)	485440

RL opening restrictor

					Nº
RL TS 06-F	150 mm	18	13	50 Piece(s)	318474

SOR opening restrictor

					Nº
SOR 150	150	23	16	50 Piece(s)	799785
SOR 300	300	23	16	40 Piece(s)	799786
SOR 400	400	23	16	20 Piece(s)	799787

RC opening width restrictor

					Nº
Side-Hung	–	Sash	Left	–	25 Piece(s) 485441
	–	Sash	Right	–	25 Piece(s) 485442
Positioning pin, 13 mm	–	Frame	–	9.5	25 Piece(s) 485443
Positioning pin, 16 mm	–	Frame	–	13.5	25 Piece(s) 485444

[4] Concealed lock

		Nº
Set 1: for sash and frame profile with groove	1 Set(s)	771865
Set 2: for sash profile with groove and frame profile without groove	1 Set(s)	771866
Set 3: for sash and frame profile without groove	1 Set(s)	771867

[5] Anti-lifting device

		Nº
Anti-jemmy device, 13 mm	50 Set(s)	485599
Anti-jemmy device, 16 mm	50 Set(s)	485600

5 Installation

5.1 Processing instructions

Friction stay

Positioning and rebate clearance

- The Roto FS Kempton friction stays are designed to be installed between two parallel, fixed surfaces with a correct rebate clearance distance.
- The retraction mechanism of the friction stays must be placed in the inner corner of the frame rebate unless adaptation is required.
The friction stays are positioned in the inner corners of the frame.
- If the profile does not have any parallel surfaces for mounting the scissor stays, use packer strips or adapters to fill the gap and adapt the scissor stay space in accordance with requirements → 5.3 "Reference surfaces" from page 51.
- The installation space for the friction stays must meet the requirements defined in this document.

Sash formats

- Refer to the specifications of the friction stays for the maximum permitted sash heights and widths.
- Do not exceed the maximum permitted sash weight → 3.7 "Application diagrams" from page 31.
The component with the lowest permitted load bearing capacity determines the maximum permitted sash weight.
- Before using electronic data records and implementing them in window fabrication programs in particular, check that they match the specifications, application diagrams and component assignments.

Limiting the opening width

- Additional hardware components (such as opening restrictors) may be required to hold sashes in a specific position.
This applies particularly to large formats, very small opening angles (10° or less) or in areas exposed to wind.
- Windows with Top-Hung friction stays of sizes 10" to 26" are equipped with an internal opening width restrictor. An additional opening restrictor can be installed if necessary → 3.7 "Application diagrams" from page 31.
- Installation or maintenance work may require opening angles that exceed the nominally permitted opening angles of the friction stays. These opening angles must not be used in regular operation. For this reason, take suitable measures (such as integrated opening restrictor or additional opening restrictor) to limit the sashes to the maximum permitted opening angle.

Specifications from profile manufacturers

- The window and balcony door manufacturer must comply with all specified system dimensions (e.g. gasket gap dimensions or locking distances).
- They must continue to ensure and check this on a regular basis, especially when new hardware components are used for the first time, during production and on a continuous basis, up to and including window installation.



INFO

The hardware components are always designed in such a way that any system dimensions affected by the hardware can be adjusted. The hardware manufacturer shall not be liable for any additional expenses incurred if a deviation from these dimensions is not discovered until after the windows have been installed.

Combining hardware

- Windows and balcony doors for wet rooms and those for use in environments with aggressive, corrosive constituents in the air require hardware that meets special requirements.
- The resistance of windows and balcony doors to wind loads when they are closed and locked depends on the individual design of the windows and balcony doors. The hardware system is capable of handling wind loads specified by legislation and standards (for example in accordance with EN 12210 – especially test pressure P3).



- Coordinate suitable hardware combinations and installation procedures in windows and balcony doors with the hardware manufacturer and profile manufacturer for the areas listed above, and conclude a separate agreement for them.



INFO

The hardware manufacturer's specifications on the combination of hardware (e.g. the use of additional scissor stays, the design of hardware for burglar-inhibiting window sashes and balcony door sashes) are binding.

Opening restrictor

Positioning and rebate clearance

- All Roto FS Kempton opening restrictors are designed to be installed between two parallel, fixed surfaces whose dimensions correspond to the specifications in this document.
- The scissor stay space between the sash and outer frame or upstand must meet the requirements for opening restrictors defined in this document (see drawings) .
- The closer the opening restrictor and the friction stay are to one another, the larger the sash opening angle; accordingly, installing the opening restrictor further away from the friction stay reduces the opening angle.

Using the opening restrictor

Depending on the rigidity of the window sash, one opening restrictor at the bottom or two opening restrictors (at the top and bottom) may be used for Side-Hung sashes. For Top-Hung sashes, two opening restrictors must always be used as required.



INFO

The opening width depends on:

- the positioning of the opening restrictor,
- the friction stay used,
- the sash size,
- the window profile.

- The window profile must match the requirements of the opening restrictor.
- The opening restrictors must be fitted on both sides (Top-Hung) or at the top and bottom (Side-Hung).



INFO

If there is insufficient space available for installing opening restrictors and friction stays, Roto provides assistance with the generally recommended profile assessments.

5.2 General information on drill holes

Drilling diameter



INFO

If the corner connector has any raised sections in the area of the drill hole, drill holes with suitable aids (such as drilling jig, two-flute cutter).

Aluminium profile

Drilling diameter:

Ø 4.2 mm in the area of the corner connector

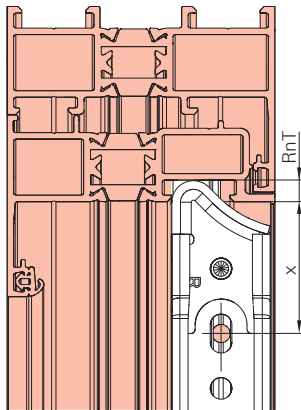
Ø 3.9 mm in the aluminium profile

Timber and PVC profile

Drilling diameter: Ø 3.0 mm

Frame

Profile with frame groove
(figure shows an aluminium profile)



$$x = 35.4 \text{ mm} - \text{FgD} + \text{HA}$$

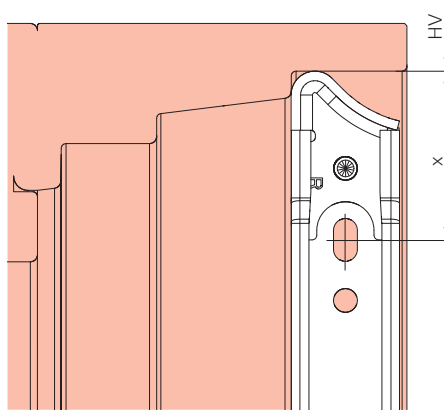
FgD = frame groove insertion depth

Standard values

HA = 0, no height adjustment

HA = 2.0 with height adjustment.

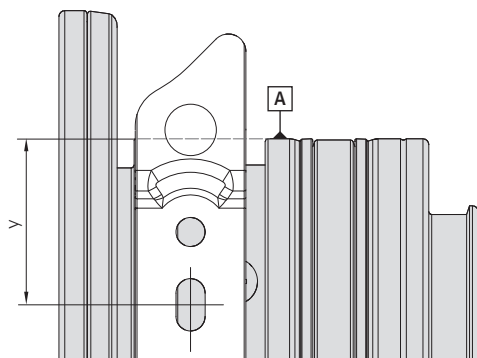
Profile without frame groove
(figure shows a timber profile)



$$x = 35.4 \text{ mm} + \text{HA}$$

Sash

Profile with sash groove
(figure shows an aluminium profile)



$$y = 49.5 \text{ mm} - \text{RC} - \text{FgD} + \text{HA}$$

RC = rebate clearance

FgD = frame groove insertion depth

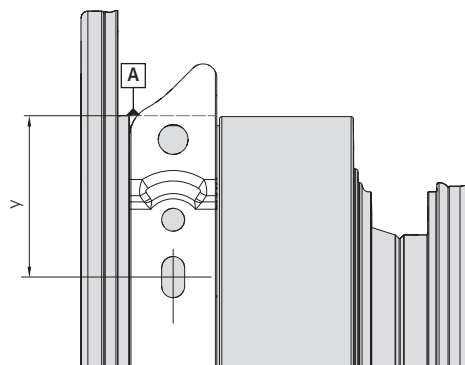
A = reference surface

Standard values

HA = 0, no height adjustment

HA = 2.0 with height adjustment.

Profile without sash groove
(figure shows a timber profile)



$$y = 49.5 \text{ mm} - \text{RC} - \text{FgD} + \text{HA}$$

(in this figure, FgD = 0)



5.3 Reference surfaces

Reference surfaces are the surfaces on which the friction stays are installed.

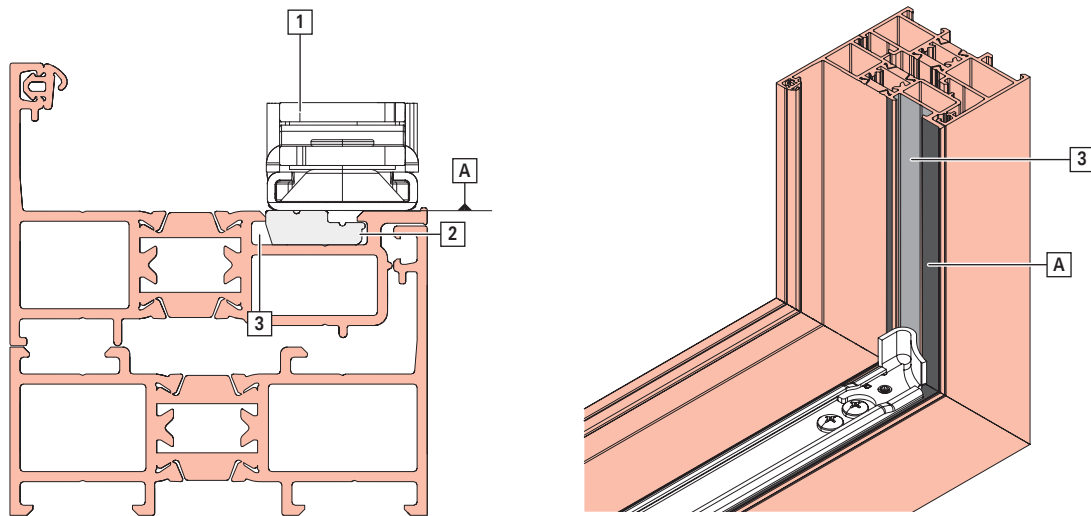


INFO

Profiles with frame / sash groove: packer strips must be installed.

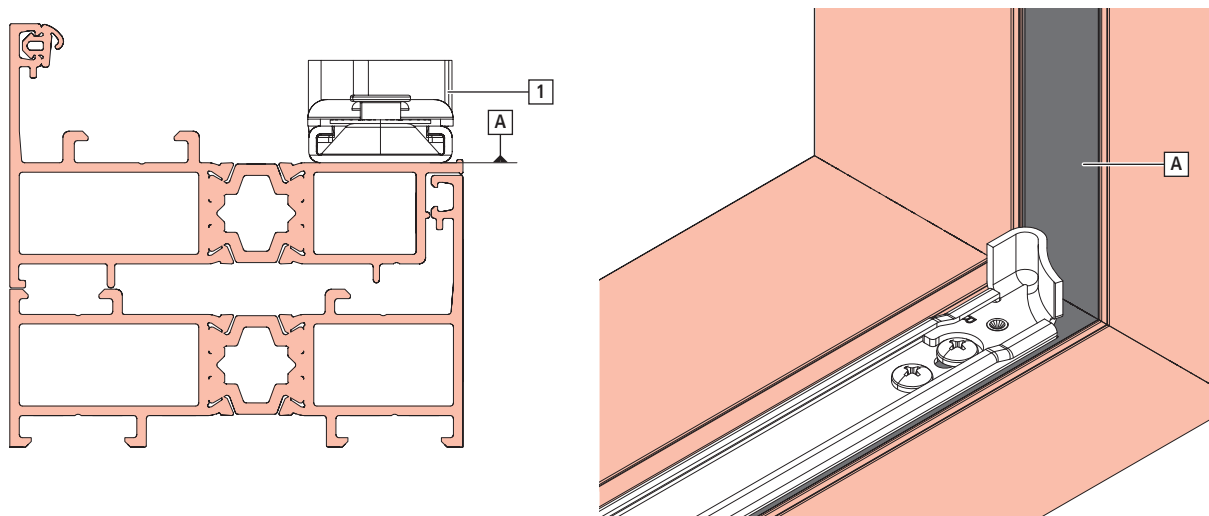
Profiles without frame / sash groove: friction stays can be installed directly.

Frame profile with groove



- [1] Friction stay
- [2] Packer strip
- [3] Frame groove
- [A] Reference surface

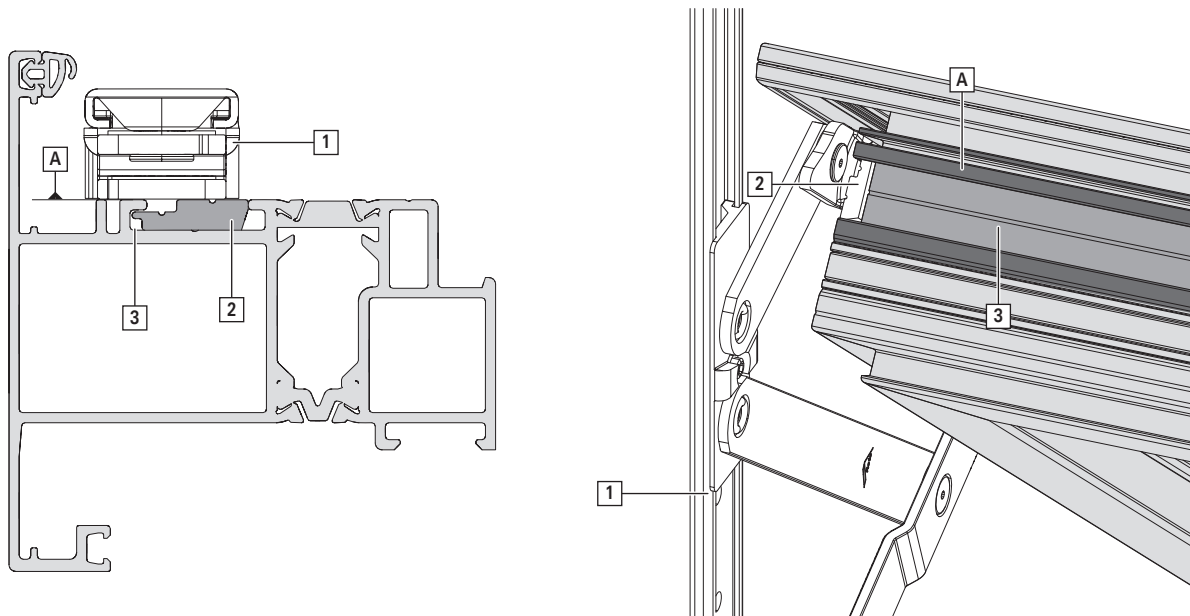
Frame profile without groove



- [1] Friction stay

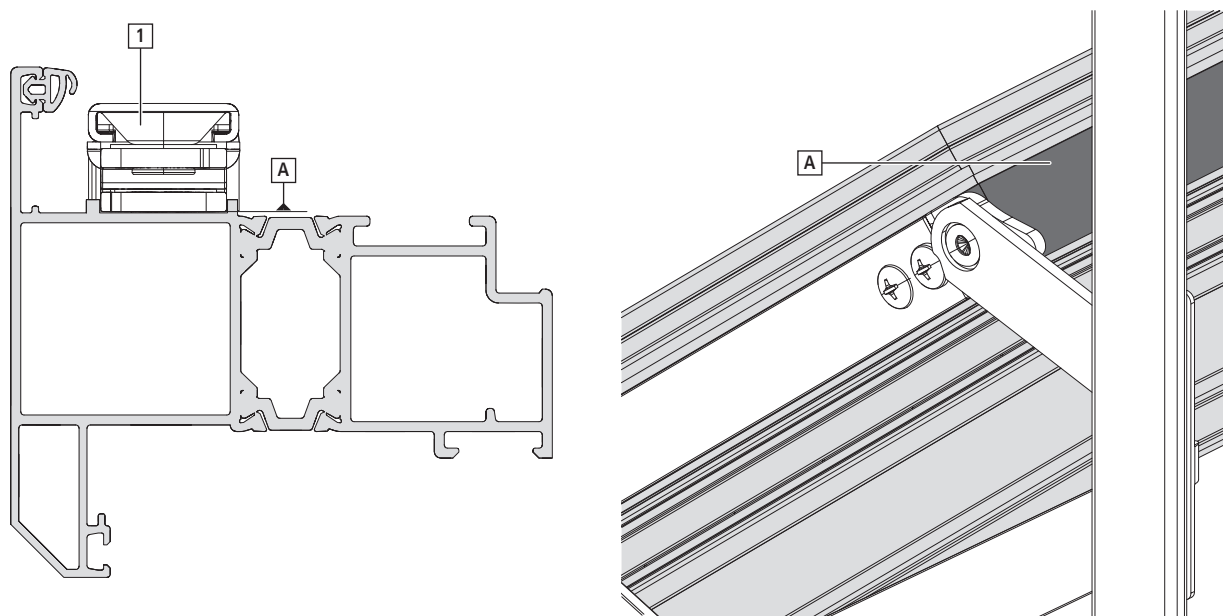
[A] Reference surface

Sash profile with groove



- [1] Friction stay
- [2] Packer strip
- [3] Sash groove
- [A] Reference surface

Sash profile without groove

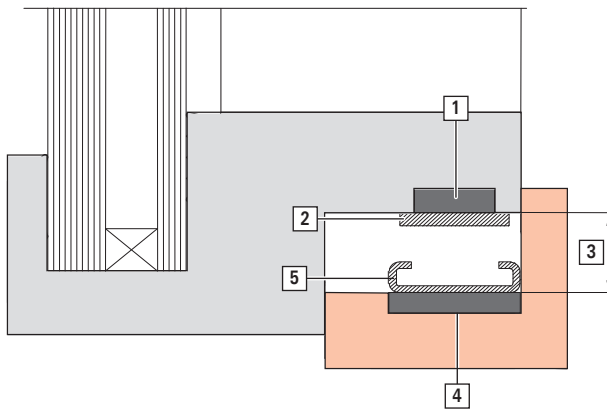


- [1] Friction stay
- [A] Reference surface



5.4 Profile related packer

If the profile does not have two parallel surfaces, packer strips must be used.



- [1] Packer strip on the sash side
- [2] Scissor stay arm
- [3] Stack height
- [4] Packer strip on the frame side
- [5] Guide track

5.5 Screw connections



DANGER

Incorrectly installed or screwed-in hardware components present a risk of death.

Incorrectly installed and screwed-in hardware components may lead to hazardous situations and cause serious or fatal accidents.

- ▶ During installation and screwdriving work, observe the specifications provided by the profile manufacturer; contact the profile manufacturer if necessary.
- ▶ Use the recommended screws.
- ▶ Select the length of the screws according to the profiles used.
- ▶ Ensure that the hardware components are adequately secured; contact the screw manufacturer if necessary.



ATTENTION

Using incorrect screw material may cause property damage.

Using the wrong screws may damage the components.

- ▶ Only use galvanised zinc-plated and passivated steel screws.
- ▶ Use screws with additional sealing in more challenging climatic conditions.
- ▶ Use stainless-steel screws on stainless-steel components only.
- ▶ For aluminium components, use screws made of steel (coated with zinc-nickel or zinc flakes) or stainless steel.



ATTENTION

Improper screw fixings may cause property damage.

Improper screw fixings may damage the components and the element as a whole, and stop them from working properly.

- ▶ Unless stated otherwise, turn screws in straight.
- ▶ Tighten screw heads until they are flush with the surface.
- ▶ Do not over-tighten screws. Note the torque. Choose a torque that will not deform the hardware and profile. Define profile-specific torques on the basis of the demo assembly.
- ▶ Use the recommended screws.
- ▶ Select the length of the screws according to the profiles used.

Aluminium profile



INFO

The length of the fixing screws (e.g. ST 4.8 x 16 or ST 4.8 x 25) must be selected according to the profiles used.



INFO

Drilling diameter:

Ø 4.2 mm in the area of the corner connector

Ø 3.9 mm in the aluminium profile

Timber and PVC profile



INFO

The length of the fixing screws (e.g. ST 4 x 40, etc.) must be selected according to the profiles used.



INFO

Drilling diameter: Ø 3.0 mm

Installation space

Tallow-drop screw on the sash side		Countersunk-head screw on the sash side
On the frame side		

Screws made from austenitic steel have greater corrosion resistance and are therefore suitable for use in the industrial sector or in coastal regions.



5.6 Top-Hung

5.6.1 Drilling and routing dimensions

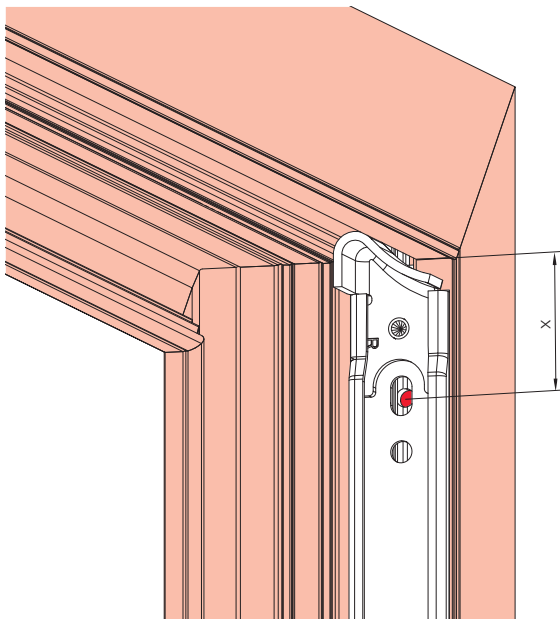
5.6.1.1 Calculation of first drilling position

Profile with frame groove



INFO

Packer strips supplied with the system come with compatible drilling patterns.



[x] Dimension for making the first drill hole

If the packer strip supplied with the system is not being used, the position has to be calculated.

Profile with frame groove

$$x = 35.4 \text{ mm} - \text{FgD} + \text{HA}$$

Profile without frame groove

$$x = 35.4 \text{ mm} + \text{HA}$$

→ 5.2 "General information on drill holes" from page 49

FgD = frame groove insertion depth

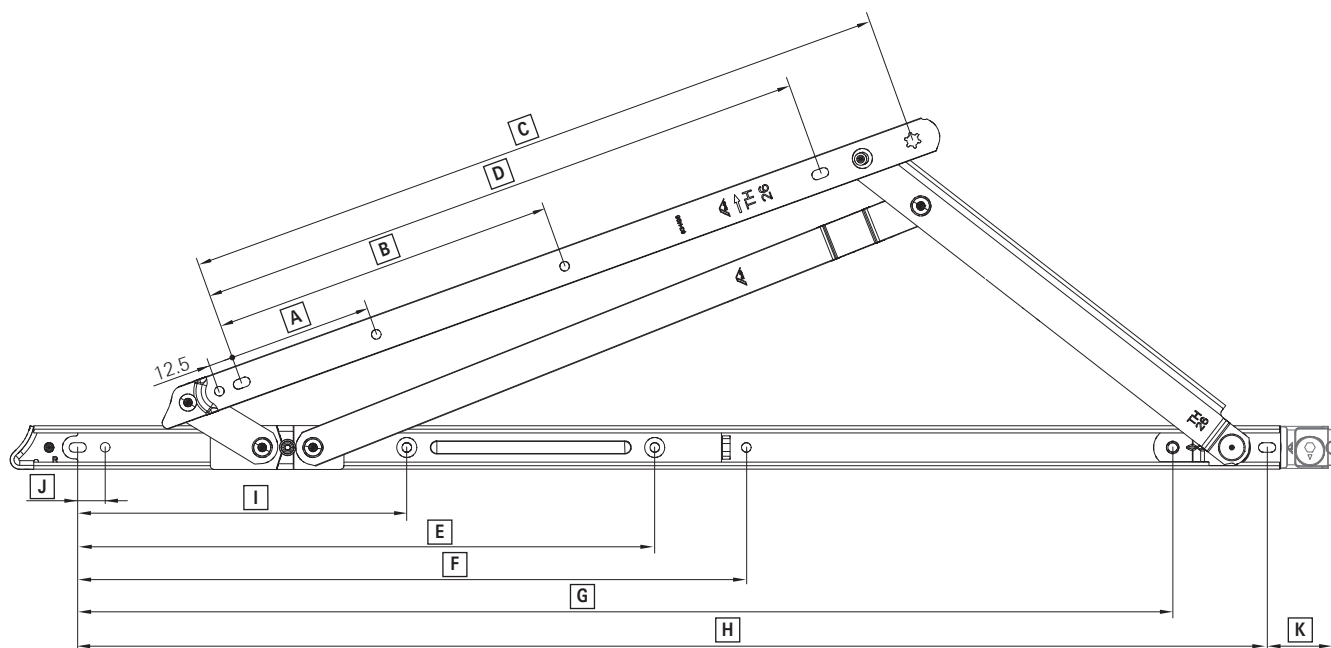
HA = height adjustment

Standard values

HA = 0, no height adjustment

HA = 2.0 with height adjustment.

5.6.1.2 HX drilling dimensions



Size	A	B	C	D	E	F	G	H	I	J	K
8	–	–	–	123.5	102.5	125.5	–	170	–	–	–
10	45	–	157.5	145	153	176	–	218.5	–	–	–
12	65	–	182.5	170	191	214	–	262.5	–	12.7	–
14	90	–	207.5	195	244.5	267.5	–	310	–	12.7	–
16	118	–	247.5	235	263.5	286.5	–	371	–	12.7	–
22	90	–	248.5 ^[1]	197	280	323	473.5	523	160	12.7	36
24	120	–	292 ^[1]	240.5	274.5	322.5	521.5	571	144.5	–	36
26	75	180	374 ^[1]	322.5	302.5	350.5	574	623.5	172.5	–	36

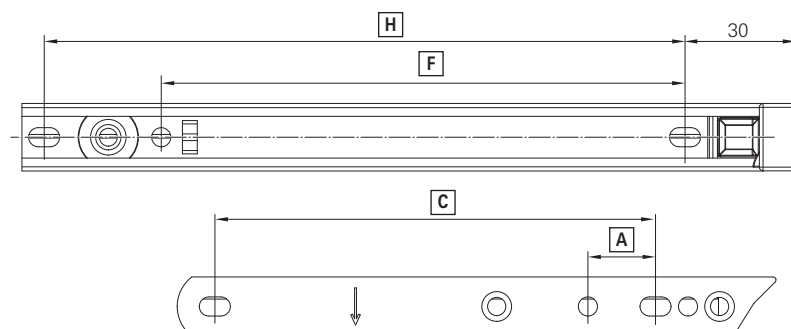
^[1] Use a countersunk-head screw → *from page 53*



INFO

All mounting holes and grooves must be used for optimum implementation and sealing.

5.6.1.3 LB drilling dimensions



Size	A	C	F	H
08-F	18.2	118.6	141	172.5
10-F	32.3	152.8	179.9	223.2



Size	A	C	F	H
12-F	47.3	188.3	209.5	274
16-F	106	228.6	281.2	375.6
20-F	171	271.8	246.8	477.2
24-F	221	322.5	195	578.8

Size	A	C	F	H
08-F-S16	18.2	95	141	172.5
10-F-S16	18.2	119.6	179.9	223.2
12-F-S16	95	152.8	209.5	274
16-F-S16	152.8	220.5	281.2	375.6
20-F-S16	220.5	271.8	246.8	477.2
24-F-S16	271.8	322.5	195	578.8



INFO

All mounting holes and grooves must be used for optimum implementation and sealing.

5.6.2 Frame

5.6.2.1 Friction stay



INFO

The figure shows installation on an aluminium profile. The installation process is the same for timber and PVC profiles.

1. Ensure that the frame and sash are securely joined.



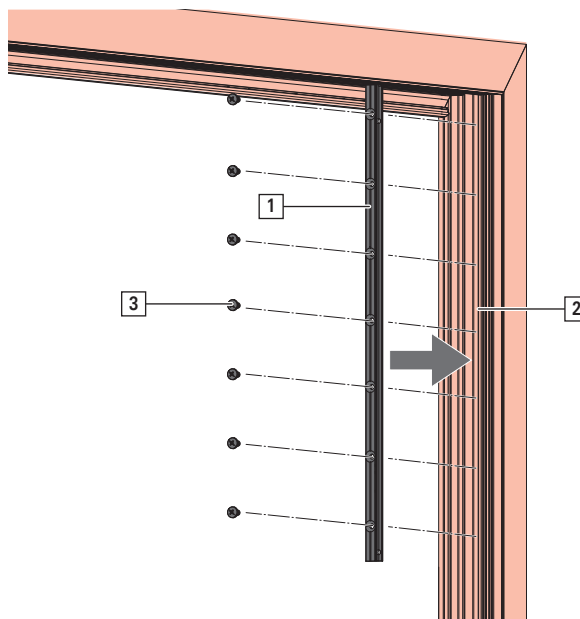
INFO

Ensure that the installation surface is level.

The figure and installation steps below apply to profiles with a frame groove.

Packer strips are not required for profiles without a frame groove.

Position the packer strip [1] in the frame groove [2] on the stop.



2. Fasten with screws [3]. The number of screws depends on the size of the packer strip.
3. **Optional:** fit the height adjustment [4] to the friction track [5].



INFO

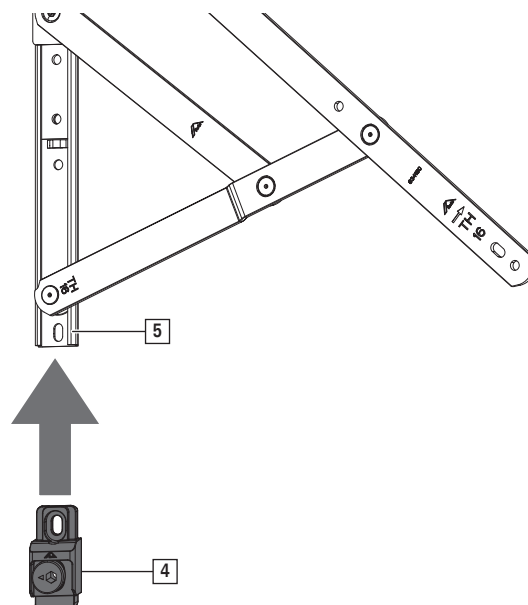
Height adjustment is recommended for $S.kg \geq 100$ kg. Profile assessment required.



INFO

Installation only in combination with HX friction stays.

The two slots must be positioned above one another.





4. When using height adjustment

Predrill the hole for height adjustment [7].

Drilling diameter: $\varnothing$ 7.0 mm

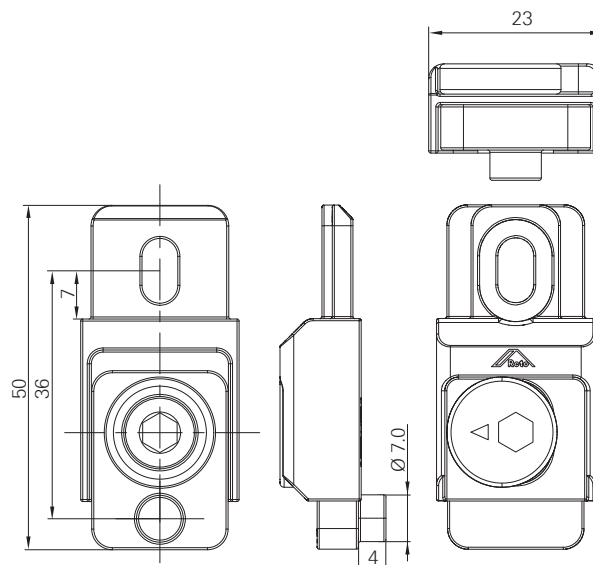
Drilling depth: $\geq$ 4 mm

Adjustment distance: $\pm$ 2.0 mm



INFO

Height adjustment is in the neutral position when delivered, see image.

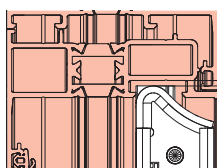
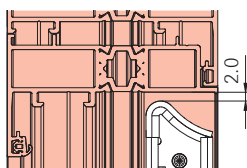


- Position the friction stay in the open position on the reference surface → 5.3 "Reference surfaces" from page 51.

When using height adjustment

Profile with frame groove

Profile without frame groove



- Mark the position of the first slot [6] and predrill it. When using packer strips, the first position may be prespecified.

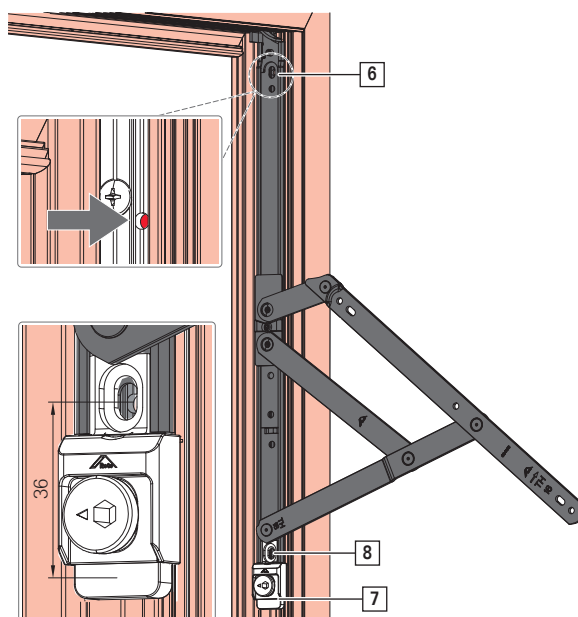
Profile with frame groove

$x = 35.4 \text{ mm} - \text{FgD} + \text{HA}$

Profile without frame groove

$x = 35.4 \text{ mm} + \text{HA}$

→ 5.2 "General information on drill holes" from page 49



- Refer to the table → from page 56 for the position of the second slot [8] and predrill it → 5.2 "General information on drill holes" from page 49.

8. Drill all other holes after aligning the sash.



5.6.3 Sash

5.6.3.1 Friction stay



INFO

The figure shows installation on an aluminium profile. The installation process is the same for timber and PVC profiles.

1. Ensure that the frame and sash are securely joined.



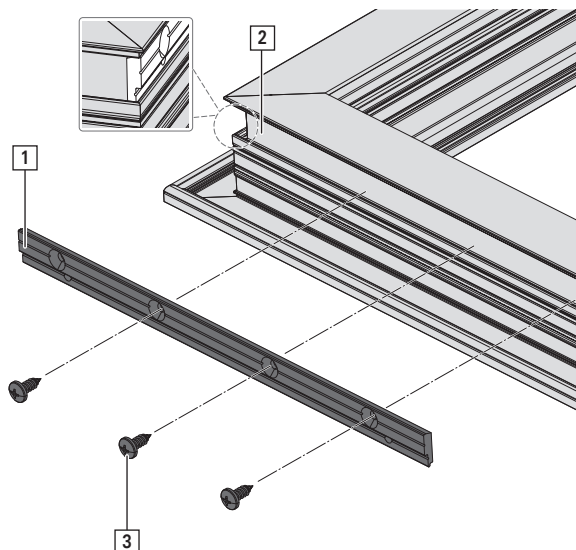
INFO

Ensure that the installation surface is level.

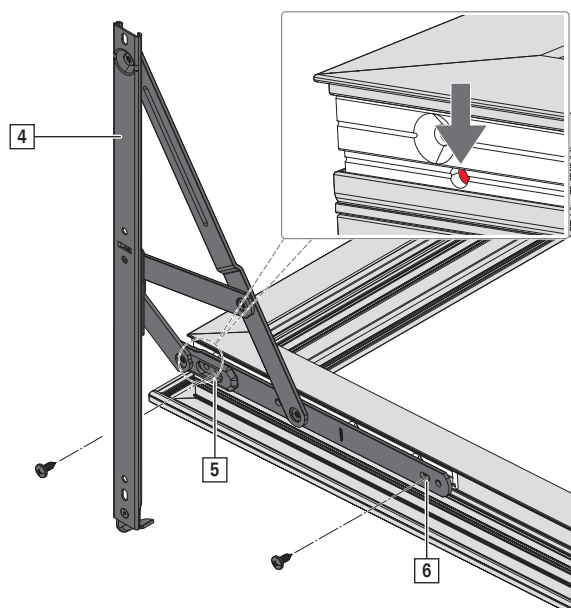
The figure and installation steps below apply to profiles with a sash groove.

Packer strips are not required for profiles without a sash groove.

Position the packer strip [1] in the sash groove [2] on the stop.



2. Fasten with screws [3]. The number of screws depends on the size of the packer strip.
3. Position the friction stay [4] in the open position on the reference surface → 5.3 "Reference surfaces" from page 51.



4. Mark the position of the first slot [5] and predrill it. When using packer strips, the first position may be prespecified.

Profile with sash groove

$$y = 49.5 \text{ mm} - \text{RC} - \text{FgD} + \text{HA}$$

Profile without sash groove

$$y = 49.5 \text{ mm} - \text{RC} - \text{FgD} + \text{HA}$$

→ 5.2 "General information on drill holes" from page 49

FgD = frame groove insertion depth

HA = height adjustment

RC = rebate clearance

Standard values

HA = 0, no height adjustment

HA = 2.0 with height adjustment.

5. Refer to the table → 5.7.1.2 "HX drilling dimensions" from page 69 for the position of the second slot [6] and predrill it → 5.2 "General information on drill holes" from page 49.
6. Drill all other holes after aligning the sash.



5.6.4 Joining the sash and frame



WARNING

Heavy loads pose the risk of injury and property damage.

Lifting and carrying heavy loads in an uncontrolled manner may lead to physical injury and property damage.

- ▶ Transport and installation must be carried out by at least two people.
- ▶ Use transportation means. → 11 "Transport" from page 122

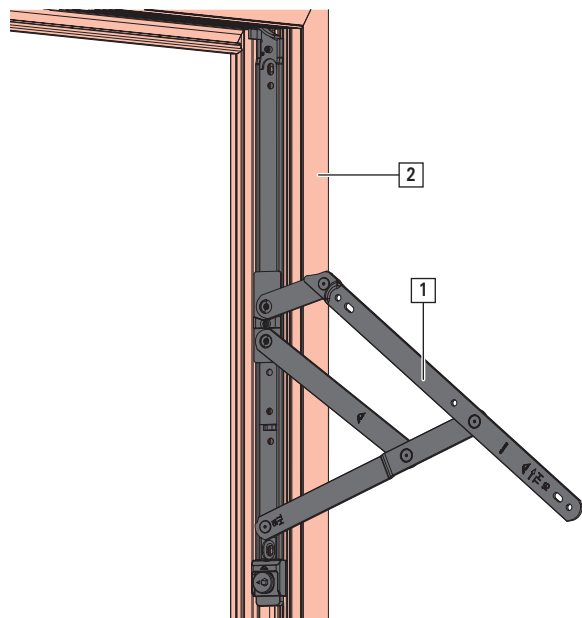
5.6.4.1 Friction stay



INFO

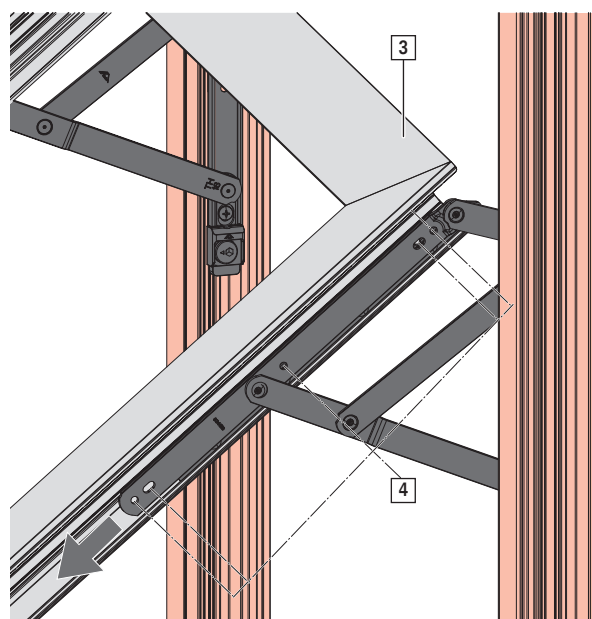
The figure shows installation on an aluminium profile. The installation process is the same for timber and PVC profiles.

1. Open the friction stays [1] on the frame [2] as far as possible.

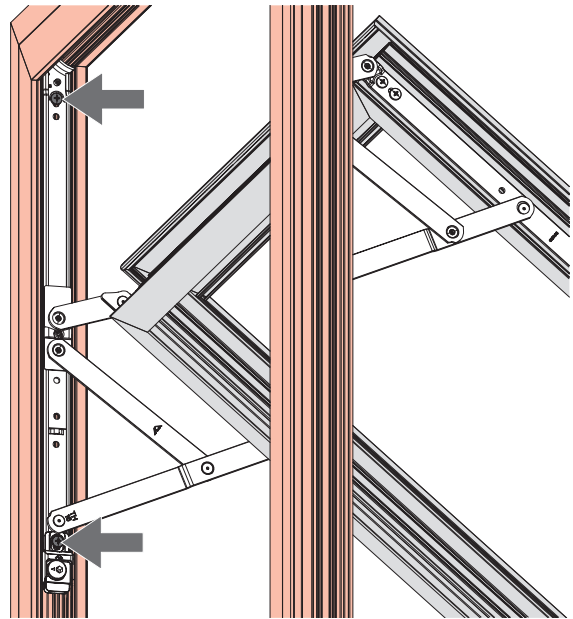


2. Position the friction stays parallel on the sash [3] and fasten with screws [4].

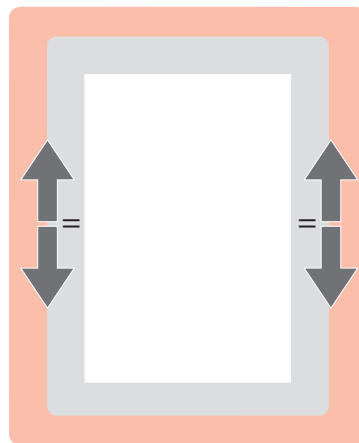
Number of screws → from page 56



3. Undo the screws in the slots on the frame.

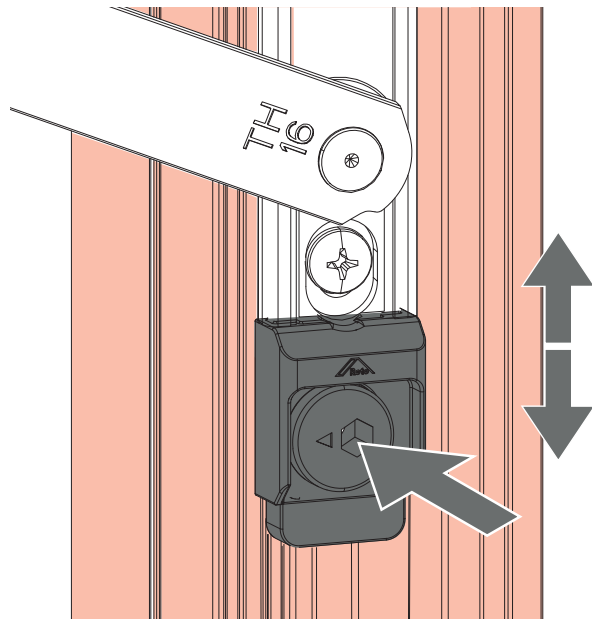


4. Align the sash and frame so they are parallel.





5. When using height adjustment
Adjustment ± 2 mm
Tool: hex key size 5



6. Fasten the screws in the slots on the frame.
7. Drill the rest of the holes on the frame → *from page 56*.
Tighten the screws → 5.2 "General information on drill holes" from page 49.



INFO
Aluminium profile

If the screw fixing is created in the sash profile itself, rivet nuts must be inserted and the scissor stay must be fastened with metric screws.

5.6.4.2 Setting the brake force



WARNING

Uncontrolled movement of the sash poses a risk of injury.

Windows may start moving by themselves and open or close in an uncontrolled manner.

- ▶ Set the brake force of the friction stays.
- ▶ Also install an opening restrictor with friction brake.



INFO

Unfavourable profile geometries may make subsequent adjustment of the brake impossible. Set the brake before installation.



INFO

In the delivery state, the threaded pin is only attached. The brake has no braking effect whatsoever.

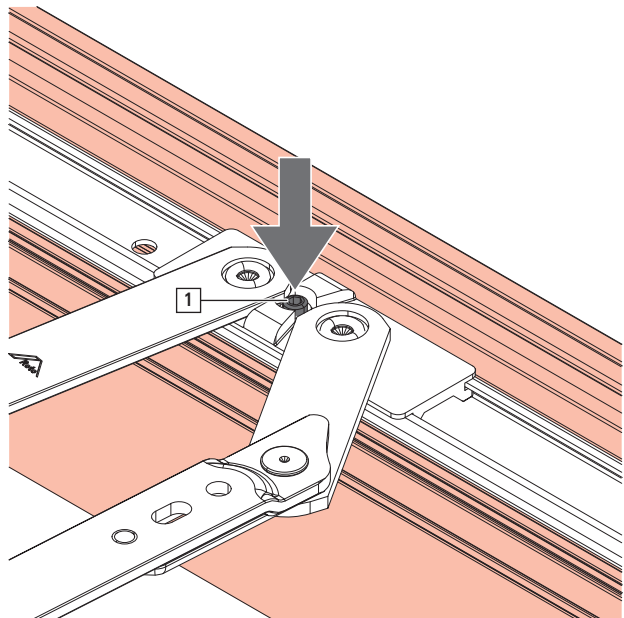
1. Turn in the screw [1] clockwise until the required brake force is achieved.

Tool: hex key size 2.5



INFO

Always set the same brake force on both friction stays. The sash must run in and out evenly.



ATTENTION

A blocking friction stay may cause property damage

If excessive force is used to apply the brake, the individual links may bend.

- ▶ Tighten the threaded pin so that the friction stay moves evenly.

When unscrewing anticlockwise, ensure that the threaded pin does not fall out.



INFO

If the opening width is reduced, it may not be possible to adjust the friction brake, depending on the profile. Set the friction brake before installing the internal opening restrictor.



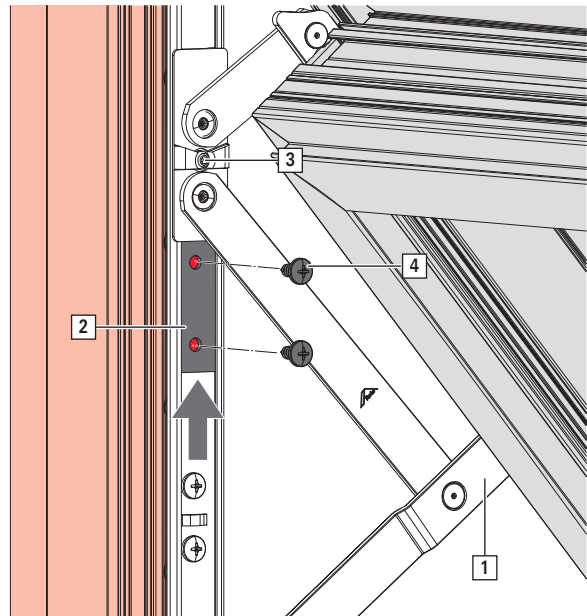
5.6.4.3 Adjusting the variable end stop

1. Set the required opening width on the friction stay [1].
2. Push the variable end stop [2] towards the brake [3].



INFO

Always ensure the settings of the variable end stop on both friction stays are the same.



3. Drill holes.
4. Secure with two screws [4].
Insert screws into all screw holes if possible.

5.7 Side-Hung

5.7.1 Drilling and routing dimensions

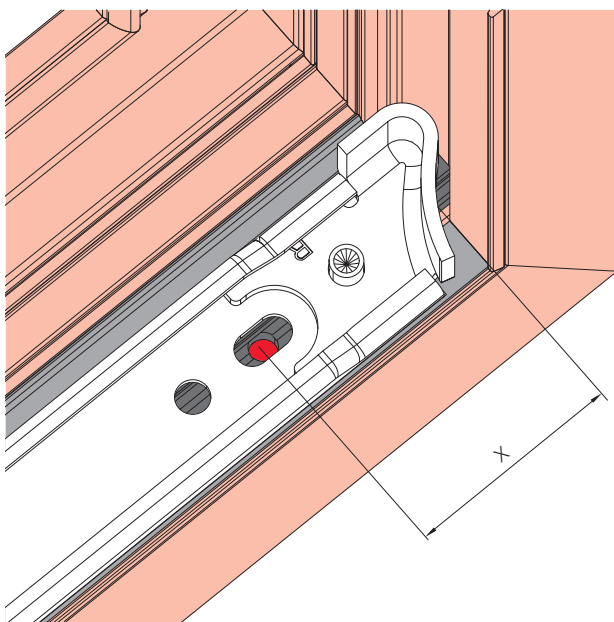
5.7.1.1 Calculation of first drilling position

Profile with groove



INFO

Packer strips supplied with the system come with compatible drilling patterns.



[X] Dimension for making the first drill hole

If the packer strip supplied with the system is not being used, the position has to be calculated.

Profile with frame groove

$x = 35.4 \text{ mm} - \text{FgD}$

Profile without frame groove

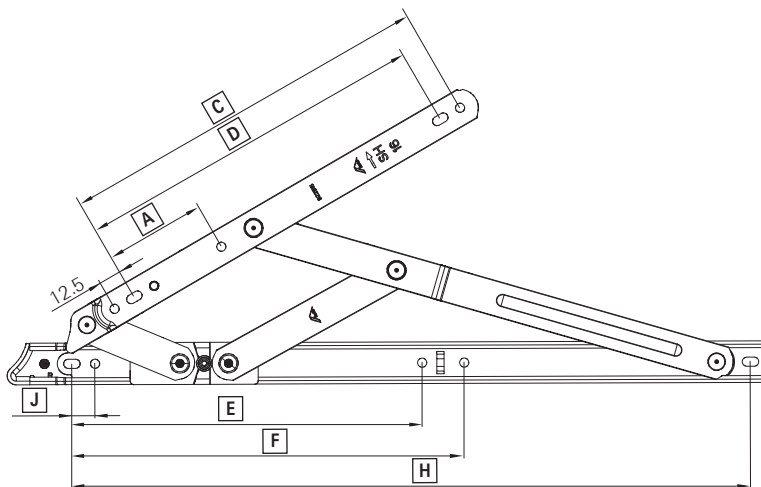
$x = 35.4 \text{ mm}$

→ 5.2 "General information on drill holes" from page 49

FgD = frame groove insertion depth



5.7.1.2 HX drilling dimensions



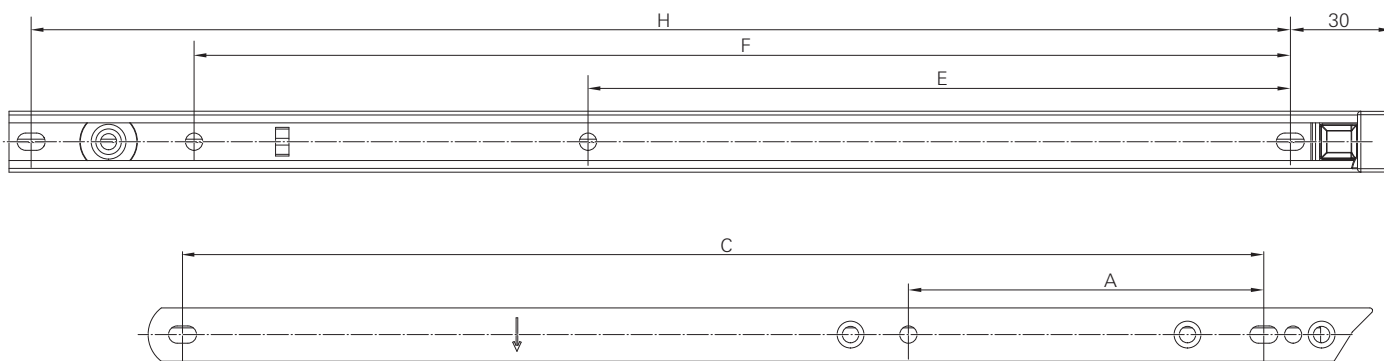
Size	A	C	D	E	F	H	J
8	–	–	123.5	–	125.5	170	–
10	–	163.5	151	–	176.5	218.5	12.7
12	37.5	189	176.5	–	214	269.5	12.7
14	55	218.5	206	–	240	314	12.7
16	55	206	193.5	–	214.5	371	12.7



INFO

All mounting holes and grooves must be used for optimum implementation and sealing.

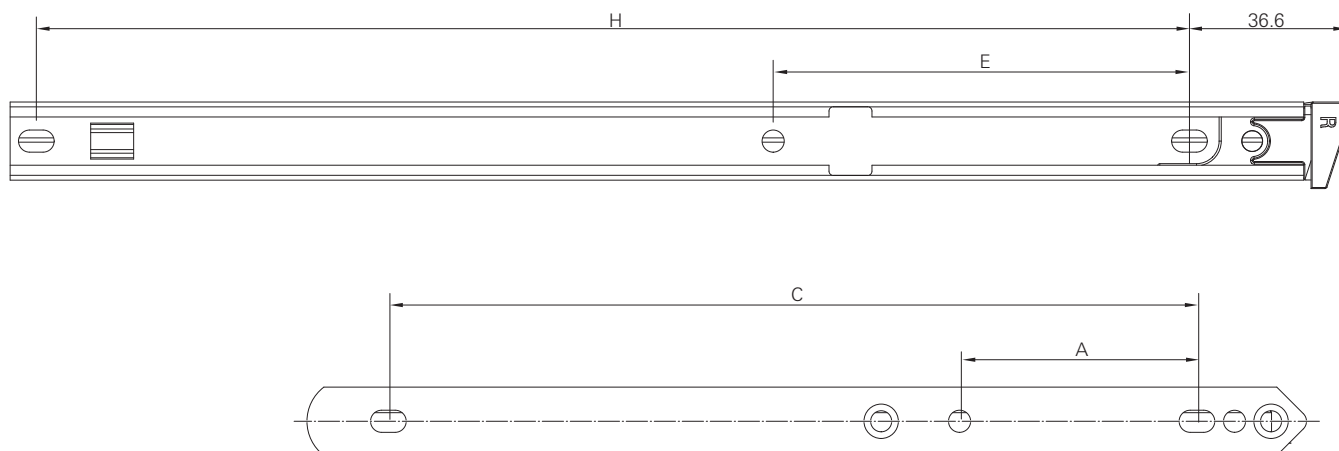
5.7.1.3 LB drilling dimensions



Size	A	C	E	F	H
12-F	230.8	245	–	195	274
16-F	106	322.5	209.5	327	375.6

Size	A	C	E	F	H
12-F-S16	119.6	88.3	–	195	274
16-F-S16	152.8	220.5	209.5	327	375.6

5.7.1.4 LM drilling dimensions



Size	A	C	E	H
12	55.3	188.2	96.9	268.4
16	108.8	322.5	96.9	370



5.7.2 Frame

5.7.2.1 Friction stay



INFO

The figure shows installation on an aluminium profile. The installation process is the same for timber and PVC profiles.

1. Ensure that the frame and sash are securely joined.



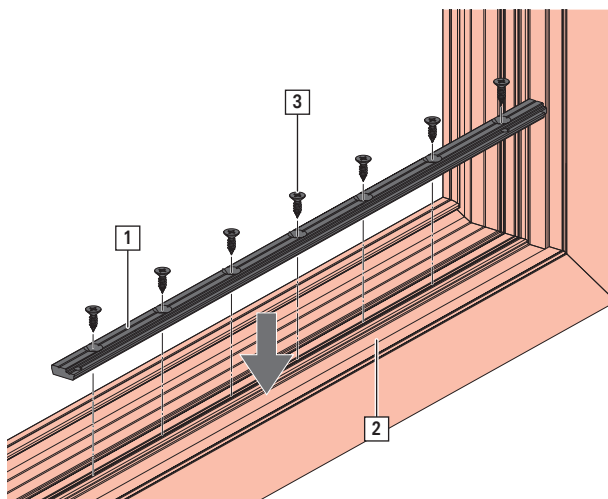
INFO

Ensure that the installation surface is level.

The figure and installation steps below apply to profiles with a frame groove.

Packer strips are not required for profiles without a frame groove.

Position the packer strip [1] in the frame groove [2] on the stop.



2. Fasten with screws [3]. The number of screws depends on the size of the packer strip.
3. Position the friction stay [4] in the open position on the reference surface → 5.3 "Reference surfaces" from page 51.

4. Mark the position of the first slot [5] and predrill it. When using packer strips, the first position may be prespecified.

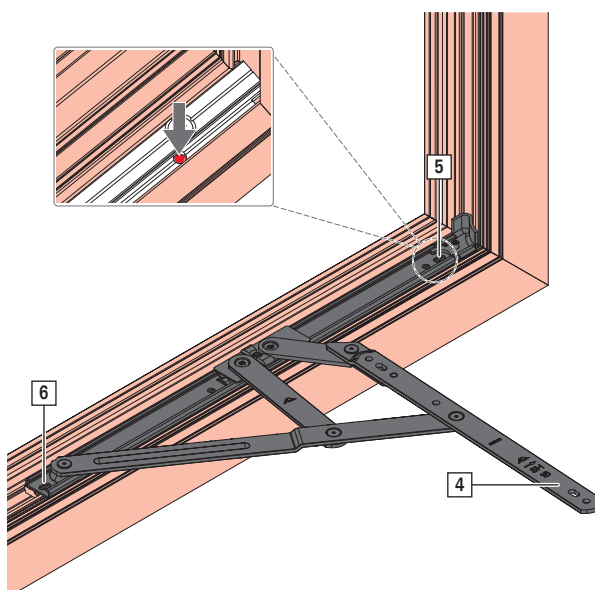
Profile with frame groove

$x = 35.4 \text{ mm} - \text{FgD}$

Profile without frame groove

$x = 35.4 \text{ mm}$

→ 5.2 "General information on drill holes" from page 49



5. Refer to the table → 5.7.1.2 "HX drilling dimensions" from page 69 for the position of the second

slot [6] and predrill it → 5.2 *“General information on drill holes” from page 49.*

6. Drill all other holes after aligning the sash.



5.7.3 Sash

5.7.3.1 Friction stay



INFO

The figure shows installation on an aluminium profile. The installation process is the same for timber and PVC profiles.

1. Ensure that the frame and sash are securely joined.



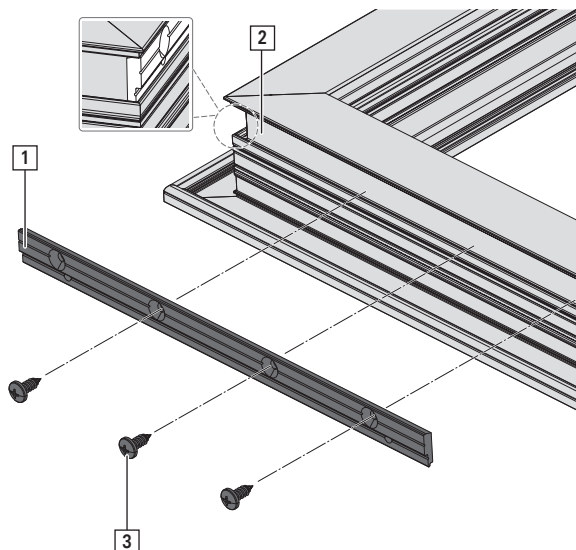
INFO

Ensure that the installation surface is level.

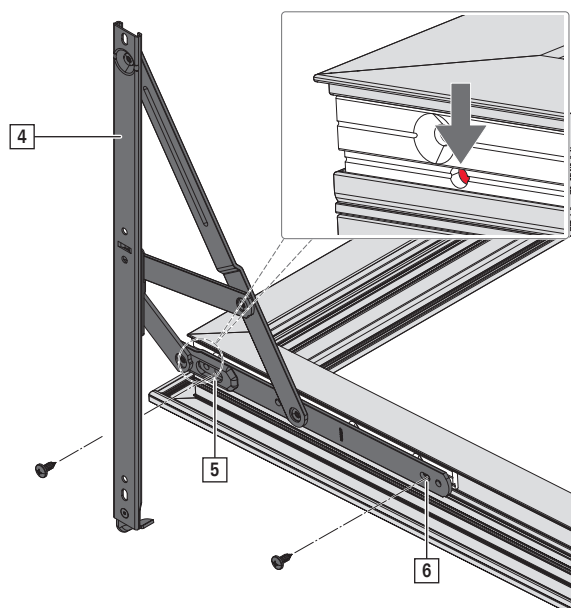
The figure and installation steps below apply to profiles with a sash groove.

Packer strips are not required for profiles without a sash groove.

Position the packer strip [1] in the sash groove [2] on the stop.



2. Fasten with screws [3]. The number of screws depends on the size of the packer strip.
3. Position the friction stay [4] in the open position on the reference surface → *5.3 "Reference surfaces" from page 51.*



4. Mark the position of the first slot [5] and predrill it. When using packer strips, the first position may be prespecified.

Profile with sash groove

y = 49.5 mm - RC - FgD

Profile without sash groove

y = 49.5 mm - RC - FgD

→ 5.2 "General information on drill holes" from page 49

5. Refer to the table → 5.7.1.2 "HX drilling dimensions" from page 69 for the position of the second slot [6] and predrill it → 5.2 "General information on drill holes" from page 49.
6. Drill all other holes after aligning the sash.



5.7.4 Joining the sash and frame



WARNING

Heavy loads pose the risk of injury and property damage.

Lifting and carrying heavy loads in an uncontrolled manner may lead to physical injury and property damage.

- ▶ Transport and installation must be carried out by at least two people.
- ▶ Use transportation means. → 11 "Transport" from page 122

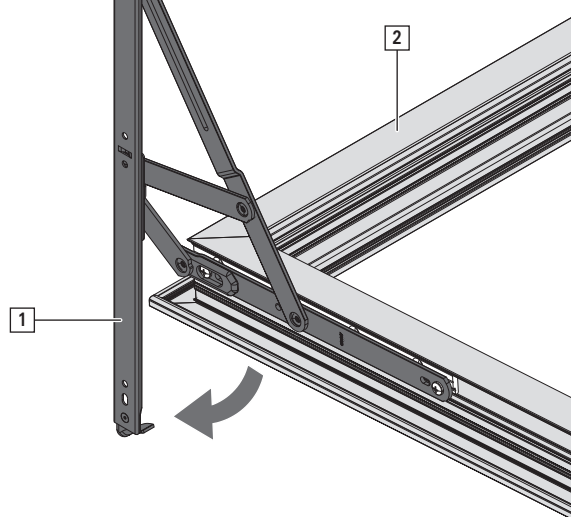
5.7.4.1 Friction stay



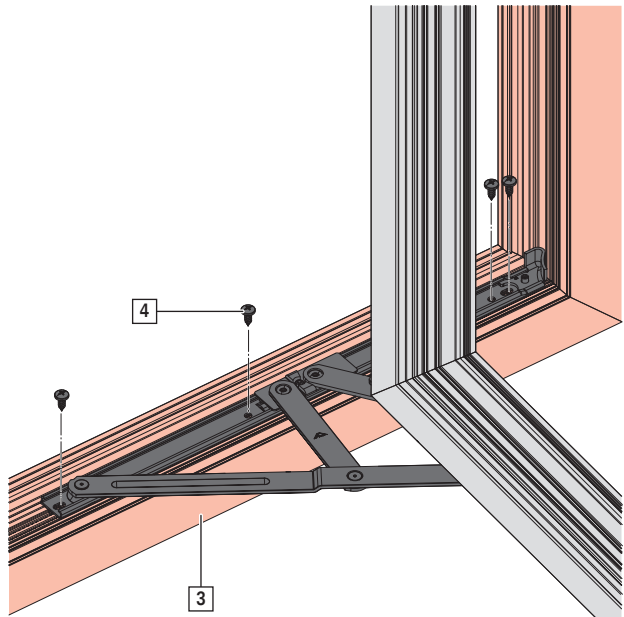
INFO

The figure shows installation on an aluminium profile. The installation process is the same for timber and PVC profiles.

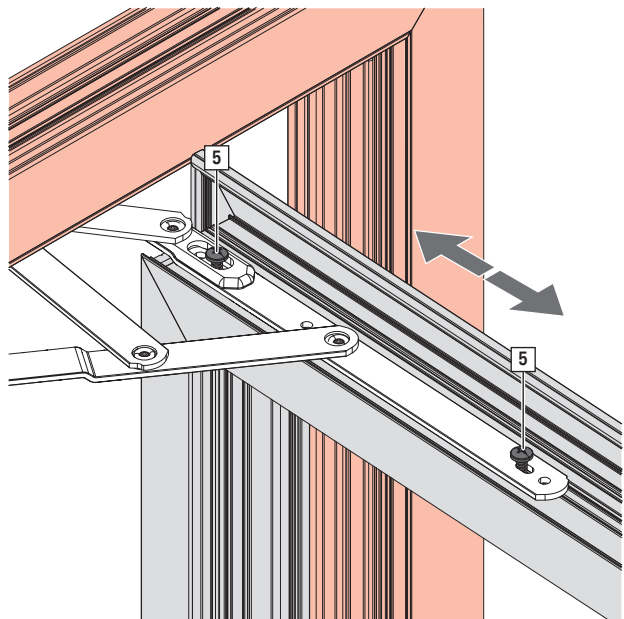
1. Open the friction stay [1] at the bottom of the sash [2].



2. Position the lower friction stay on the frame [3] and fasten with screws [4].

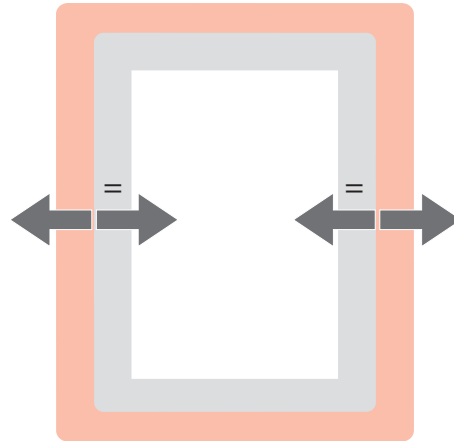


3. Open the friction stay at the top of the sash.
4. Position the friction stay on the frame and fasten with screws.
5. Undo the screws in the slot [5] on the sash.





6. Align the sash so that it is parallel with the frame.



7. Fasten the screws in the slot on the sash.
8. Drill the rest of the holes on the sash → *from page 69*.
Tighten the screws → 5.2 “General information on drill holes” from page 49.



INFO
Aluminium profile

If the screw fixing is created in the sash profile itself, rivet nuts must be inserted and the scissor stay must be fastened with metric screws.

5.7.4.2 Setting the brake force



WARNING

Uncontrolled movement of the sash poses a risk of injury.

Windows may start moving by themselves and open or close in an uncontrolled manner.

- ▶ Set the brake force of the friction stays.
- ▶ Also install an opening restrictor with friction brake.



INFO

Unfavourable profile geometries may make subsequent adjustment of the brake impossible. Set the brake before installation.



INFO

In the delivery state, the threaded pin is only attached. The brake has no braking effect whatsoever.

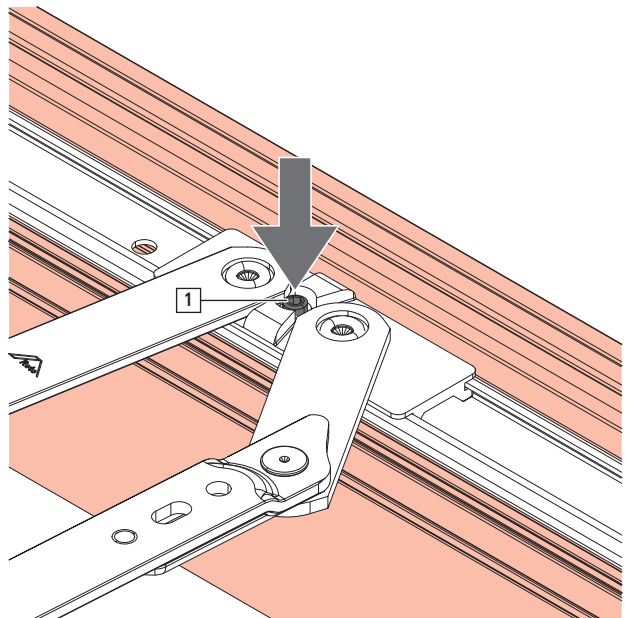
1. Turn in the screw [1] clockwise until the required brake force is achieved.

Tool: hex key size 2.5



INFO

Always set the same brake force on both friction stays. The sash must run in and out evenly.



ATTENTION

A blocking friction stay may cause property damage

If excessive force is used to apply the brake, the individual links may bend.

- ▶ Tighten the threaded pin so that the friction stay moves evenly.

When unscrewing anticlockwise, ensure that the threaded pin does not fall out.



INFO

If the opening width is reduced, it may not be possible to adjust the friction brake, depending on the profile. Set the friction brake before installing the internal opening restrictor.

5.8 Accessories



INFO

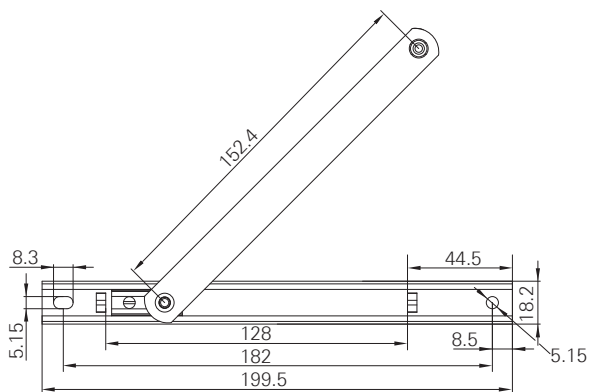
The figure shows installation on an aluminium profile. The installation process is the same for timber and PVC profiles.



5.8.1 RD opening restrictor

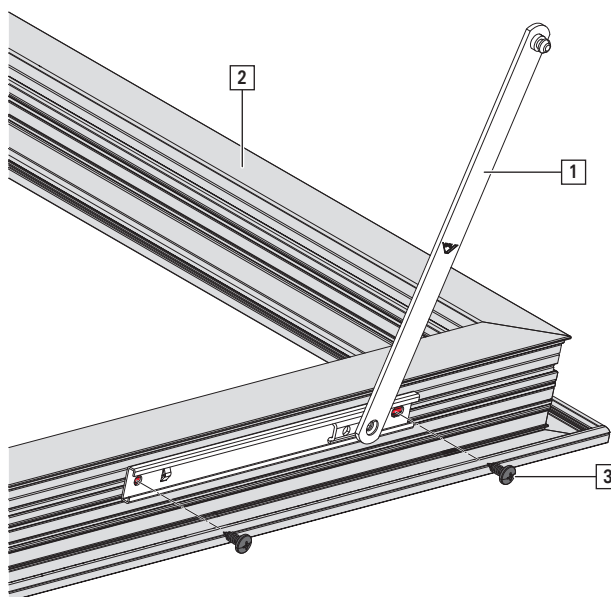
5.8.1.1 Sash component

Dimensions



Installation

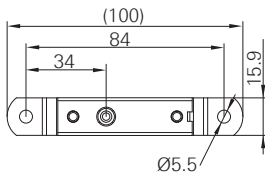
1. Position the opening restrictor [1] on the sash [2].



2. Fasten with two screws [3].

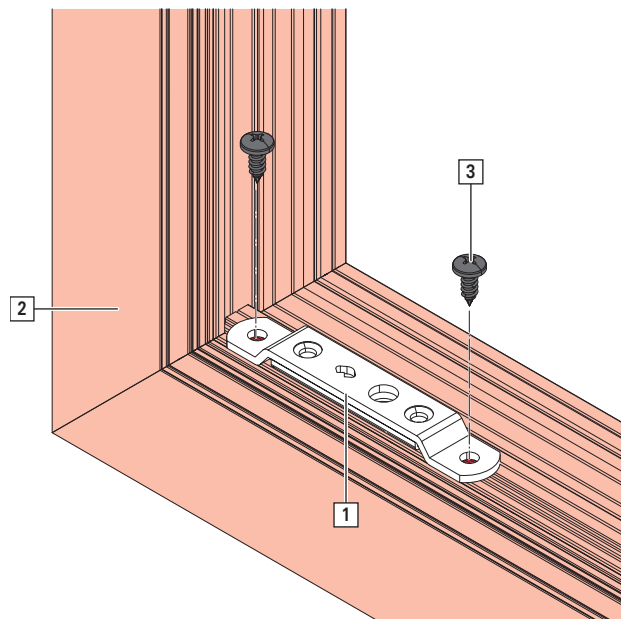
5.8.1.2 Frame component

Dimensions



Installation

1. Position the frame component [1] in the frame [2].

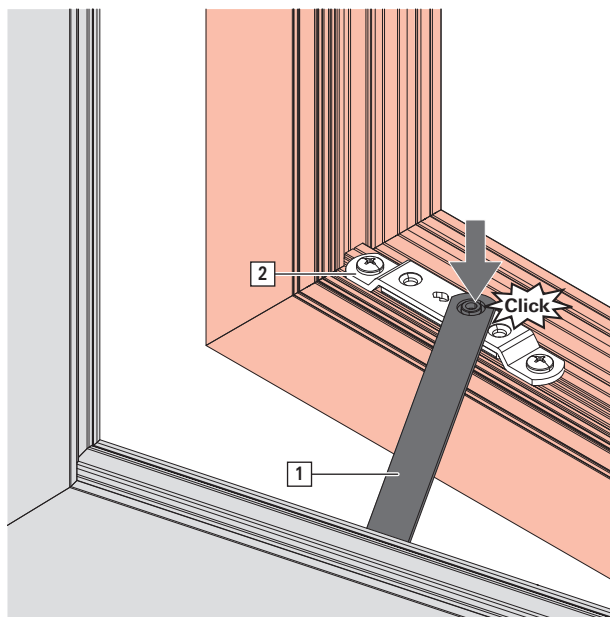


2. Fasten with two screws [3].



5.8.1.3 Joining the sash and frame components

1. Place the arm [1] above the frame component [2].



2. Push downwards until the arm engages and a click can be heard.

Setting the brake force

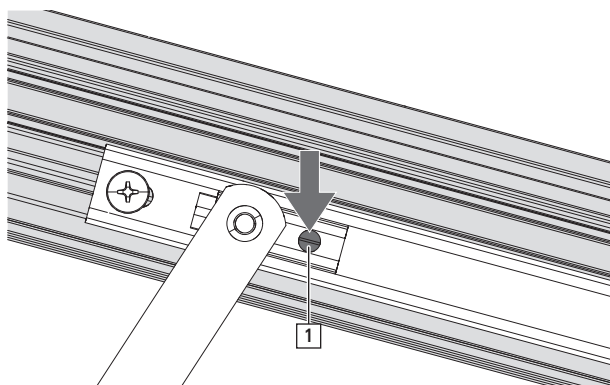
1. Turn in the screw [1] clockwise until the required brake force is achieved.

Tool: slotted screwdriver



INFO

When using two opening restrictors, always set both to the same brake force. The sash must run in and out evenly.



ATTENTION

A blocked opening restrictor may cause property damage

If excessive force is used to apply the brake, the individual links may bend.

- Tighten the threaded pin so that the opening restrictor moves evenly.

When unscrewing anticlockwise, ensure that the threaded pin does not fall out.

5.8.2 RH opening restrictor

5.8.2.1 Sash

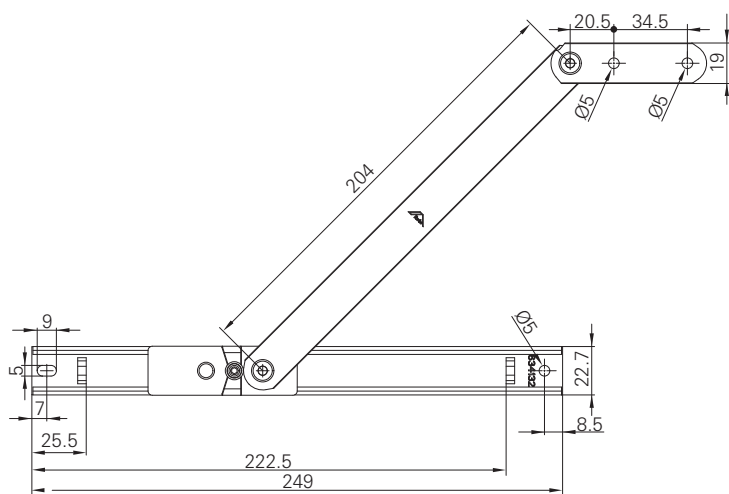


INFO

Side-Hung: install the opening restrictor at the bottom. Install a second opening restrictor at the top if necessary.

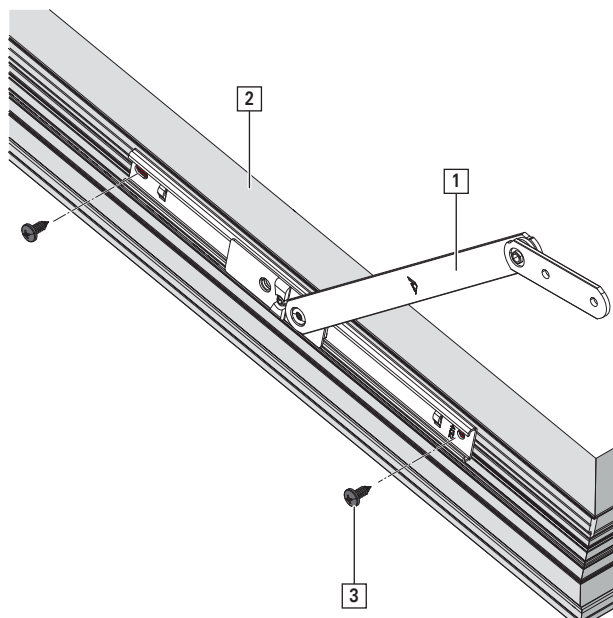
Top-Hung: install opening restrictors on the right- and left-hand side.

Dimensions



Installation

1. Position the opening restrictor [1] on the sash [2].

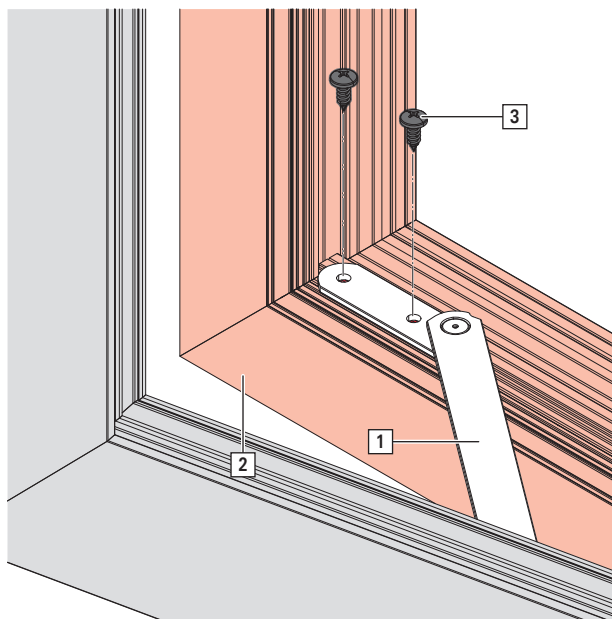


2. Fasten with two screws [3].



5.8.2.2 Frame

1. Position the opening restrictor [1] in the frame [2].



2. Fasten with two screws [3].

Setting the brake force

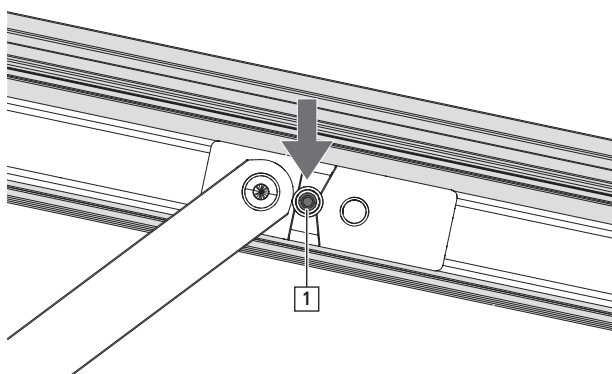
1. Turn in the screw [1] clockwise until the required brake force is achieved.

Tool: hex key size 2.5



INFO

When using two opening restrictors, always set both to the same brake force. The sash must run in and out evenly.



ATTENTION

A blocked opening restrictor may cause property damage

If excessive force is used to apply the brake, the individual links may bend.

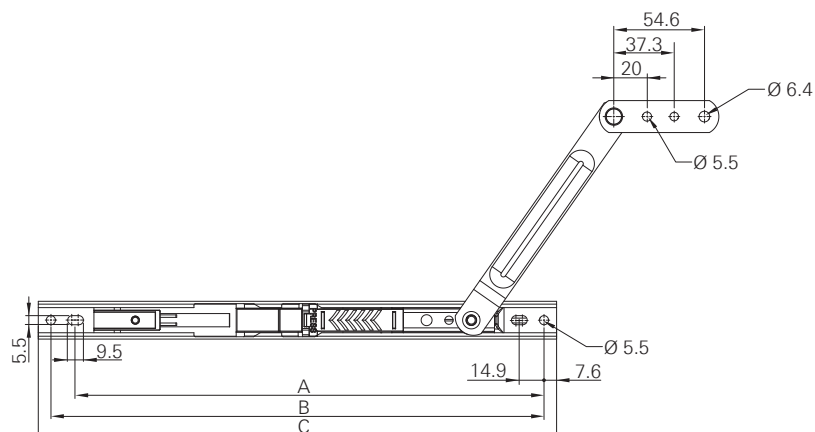
- Tighten the threaded pin so that the opening restrictor moves evenly.

When unscrewing anticlockwise, ensure that the threaded pin does not fall out.

5.8.3 SOR opening restrictor

5.8.3.1 Sash component

Dimensions



	A	B	C
SOR 150	282.9	334.9	424.9
SOR 300	297.8	349.8	439.8
SOR 400	313	365	455

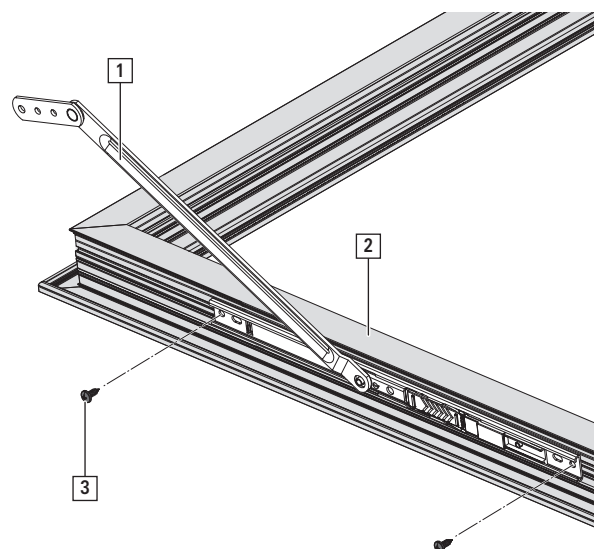
Installation



INFO

Can be combined with friction stays from series: HX TH from size 16.

1. Position the opening restrictor [1] on the sash [2].

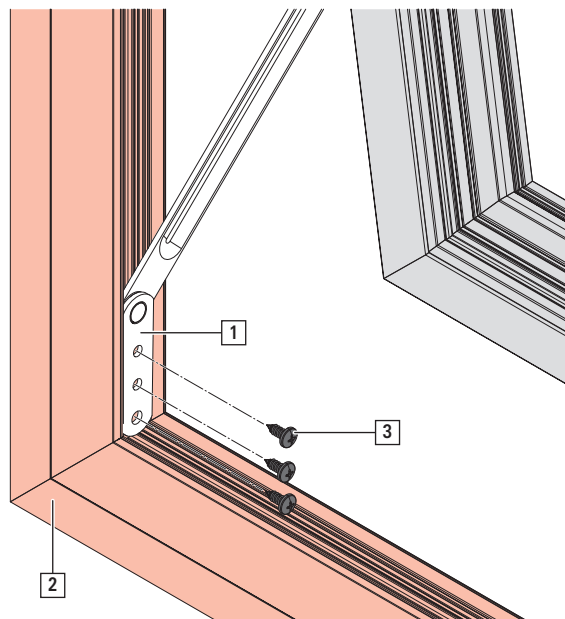


2. Fasten with two screws [3].



5.8.3.2 Frame component

1. Position the opening restrictor [1] in the frame [2].

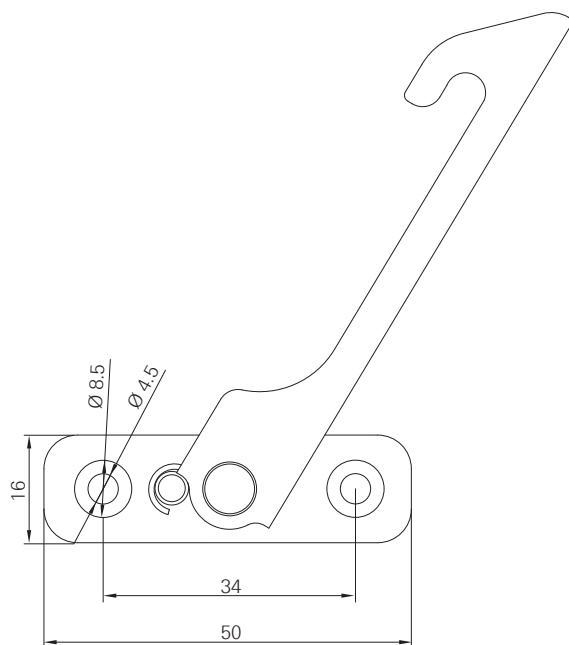


2. Fasten with three screws [3].

5.8.4 RC opening restrictor

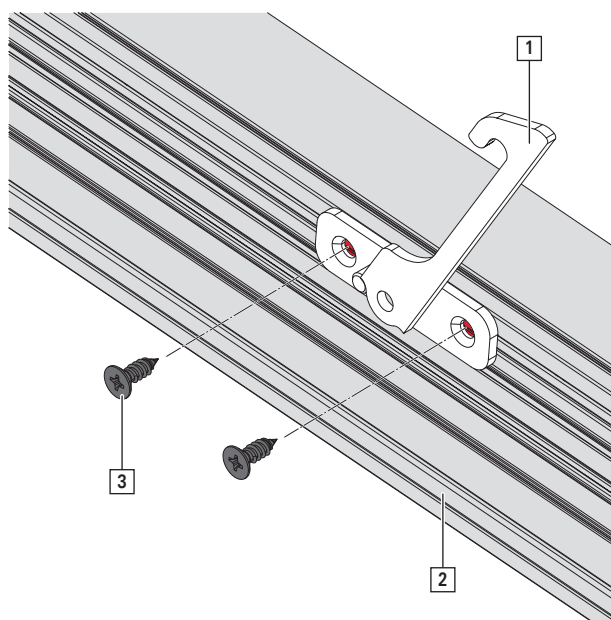
5.8.4.1 Sash component

Dimensions



Installation

1. Position the sash component [1] on the sash [2].

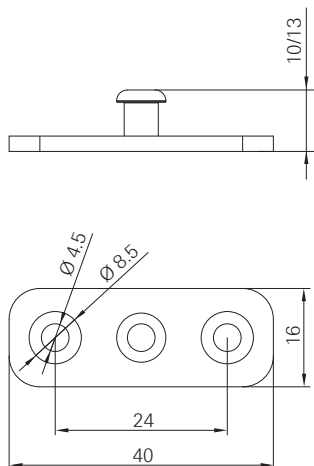


2. Fasten with two screws [3].



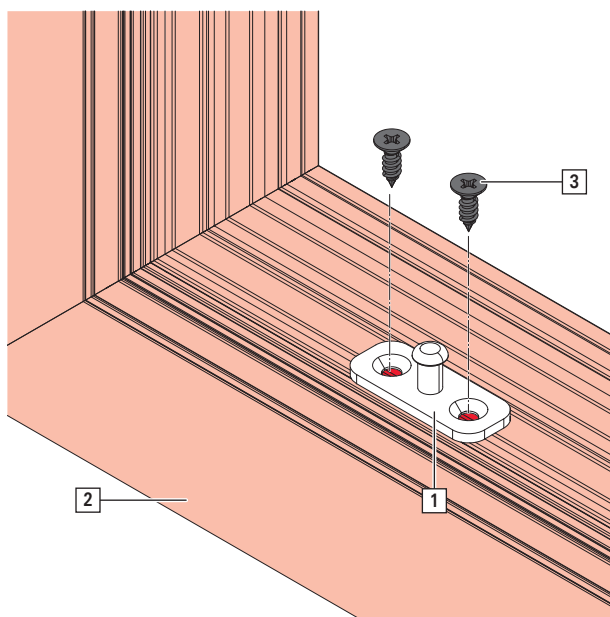
5.8.4.2 Frame component

Dimensions



Installation

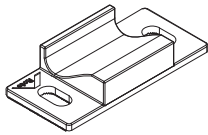
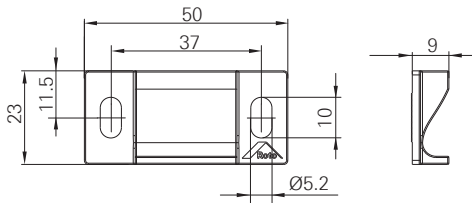
1. Position the frame component [1] in the frame [2].

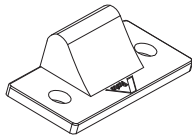
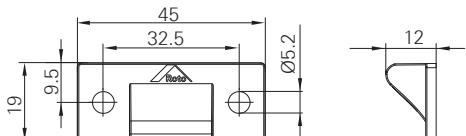
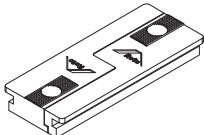
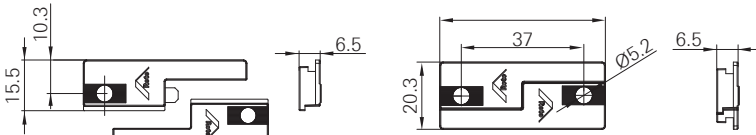
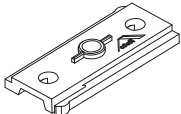
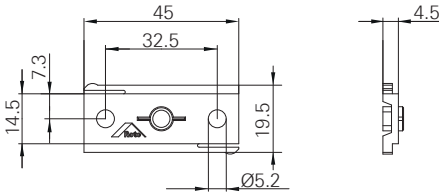
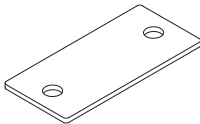
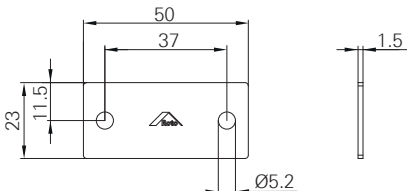


2. Fasten with two screws [3].

5.8.5 Concealed lock

5.8.5.1 Combinations

Concealed lock		
Frame component		

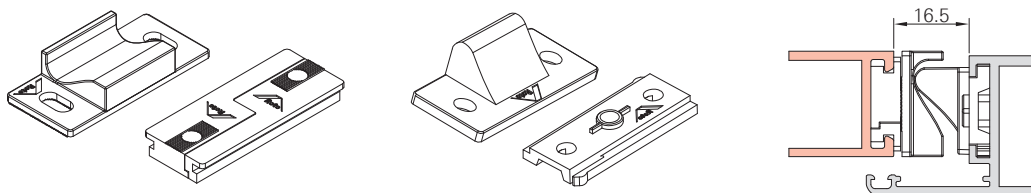
Concealed lock			
Sash component			
Packers			
For frame profile with groove			
For sash profile with groove			
For frame profile without groove			



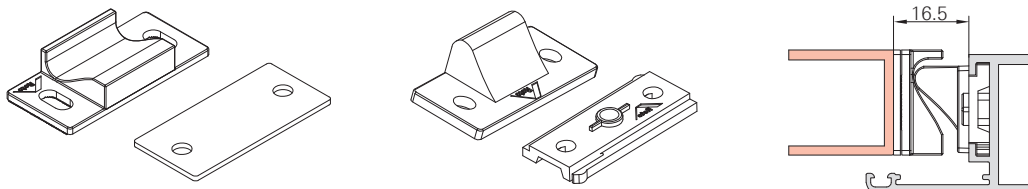
INFO

Do not use on sash profiles without C-groove packer.

Set 1



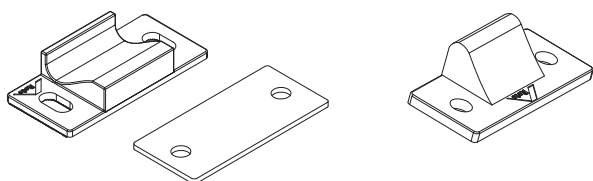
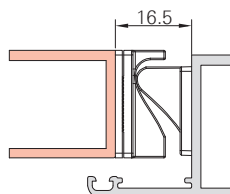
Set 2



With a larger rebate clearance, fit additional packers.



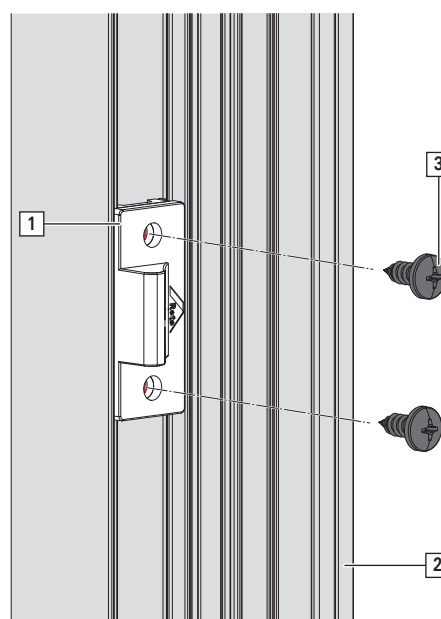
Set 3



With a larger rebate clearance, fit additional packers.

5.8.5.2 Sash component

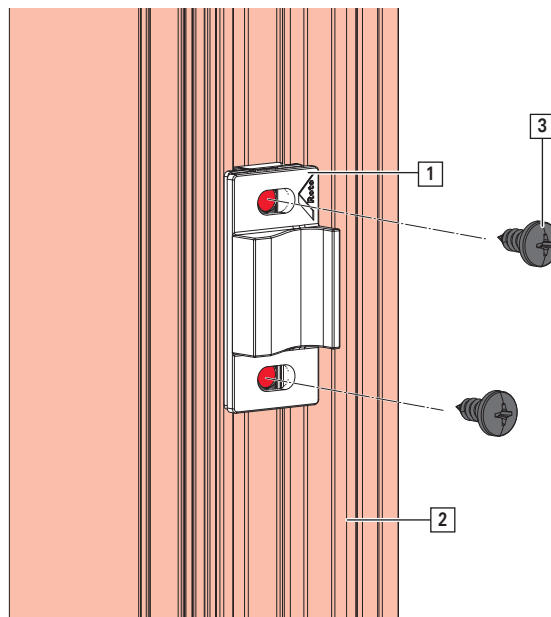
1. Position the sash component [1] on the sash [2].



2. Fasten with two screws [3].

5.8.5.3 Frame component

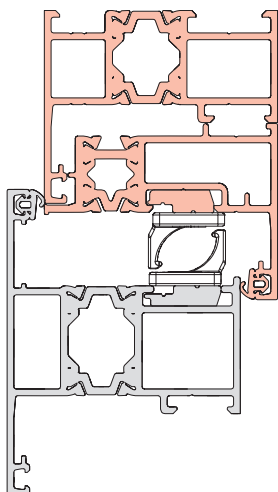
1. Position the frame component [1] on the frame [2].



2. Fasten with two screws [3].

5.8.6 Anti-jemmy device

5.8.6.1 Overview



INFO

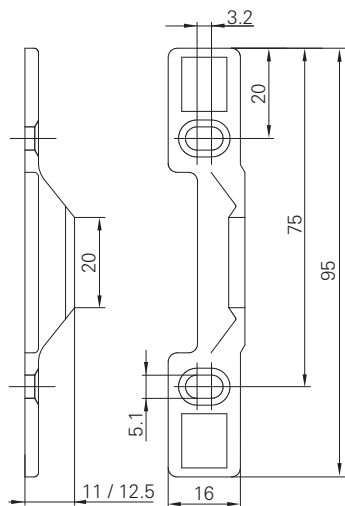
Note the turning curve. Prevent the anti-lifting device colliding.

The turning curve of the friction stays can be adapted by moving the screws in the slots.



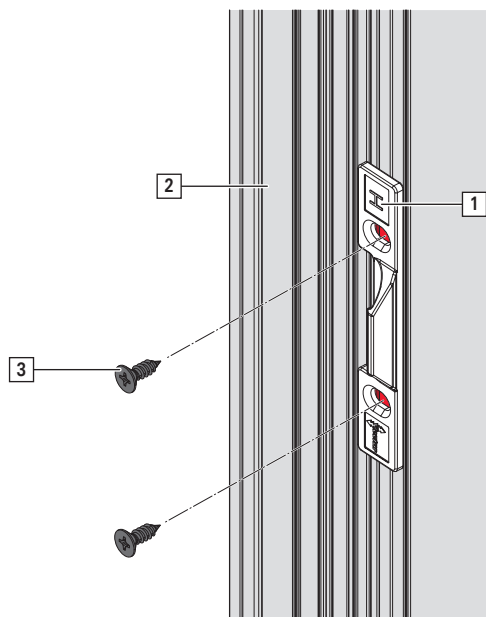
5.8.6.2 Sash component

Dimensions



Installation

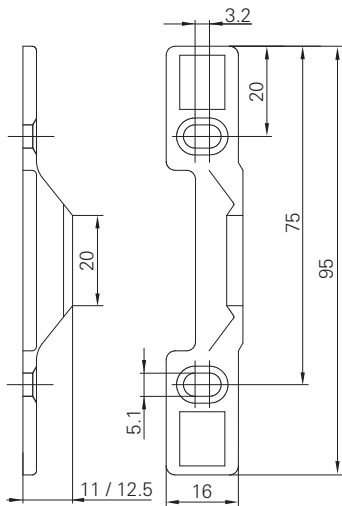
1. Position the sash component [1] on the sash [2].



2. Fasten with two screws [3].

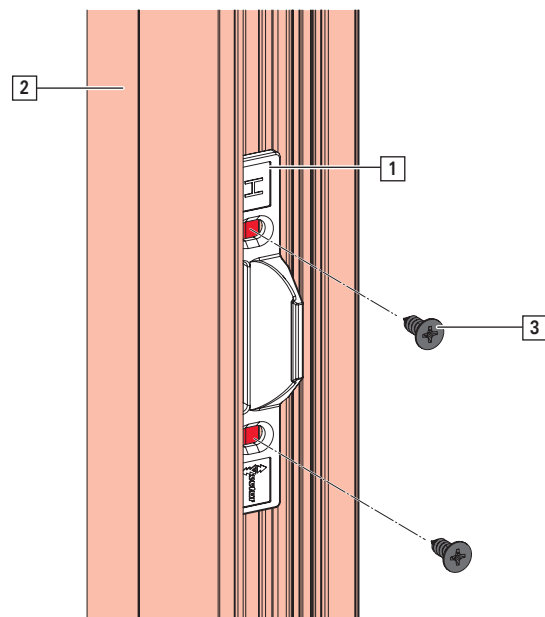
5.8.6.3 Frame component

Dimensions



Installation

1. Position the frame component [1] in the frame [2].



2. Fasten with two screws [3].



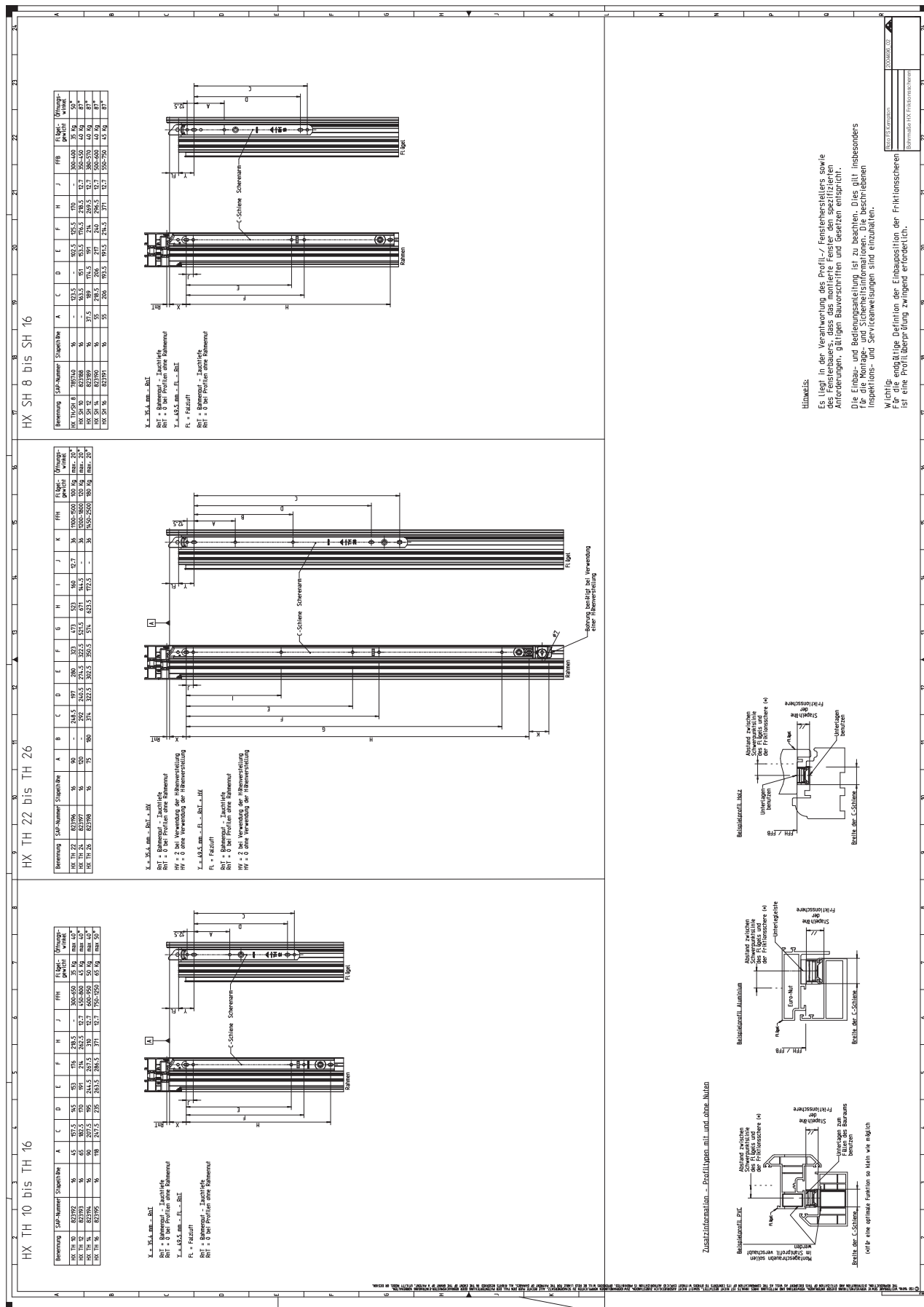
6 Installation drawings

6.1 Explanation

The following markings are used in the installation drawings to emphasise references and other elements:

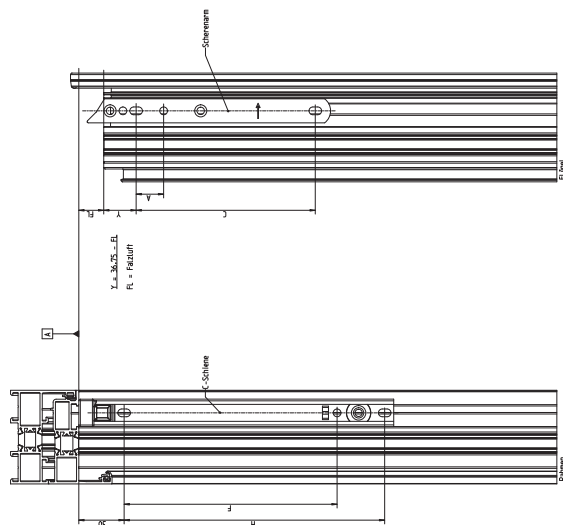
Marking	Translation
Abstand zwischen Schwerpunktlinie des Flügels und der Friktionsschere	Distance between the centre of mass line of the sash and the friction stay
Beispielprofil Aluminium	Example aluminium profile
Beispielprofil Holz	Example timber profile
Beispielprofil PVC	Example PVC profile
Bohrung benötigt bei Verwendung einer Höhenverstellung	Drill hole required when using height adjustment
Breite der C-Schiene	C-track width
C-Schiene	C-track
Die Einbau- und Bedienungsanleitung ist zu beachten. Dies gilt insbesondere für die Montage- und Sicherheitsinformationen. Die beschriebenen Inspektions- und Serviceanweisungen sind einzuhalten.	The installation and operation instructions must be followed. This applies to the installation and safety information in particular. The inspection and service instructions described must be followed.
Euro-Nut	Euro-groove
FL = Falzluft	RC = rebate clearance
Flügel	Sash
Flügelgewicht	Sash weight
Hinweis: Es liegt in der Verantwortung des Profil-/ Fensterherstellers sowie des Fensterbauers, dass das montierte Fenster den spezifizierten Anforderungen, gültigen Bauvorschriften und Gesetzen entspricht.	Note: it is the responsibility of the profile / window manufacturer and window constructor to ensure that the installed window fulfils the specified requirements, applicable building regulations and legislation.
HV = 0 ohne Verwendung der Höhenverstellung	HA = 0 when height adjustment is not used
HV = 2 bei Verwendung der Höhenverstellung	HA = 2 when height adjustment is used
Montageschrauben sollen im Stahlprofil verschraubt werden	Mounting screws should be screwed into the steel profile
Öffnungswinkel	Opening angle
Rahmen	Frame
RnT = 0 bei Profilen ohne Rahmennut	FgD = 0 for profiles without frame groove
RnT = Rahmennut - Tauchtiefe	FgD = frame groove insertion depth
Scherenarm	Scissor stay arm
Stapelhöhe	Stack height
Stapelhöhe der Friktionsschere	Friction stay stack height
Unterlagen benutzen	Use packers
Unterlagen zum Füllen des Bauraums benutzen	Use packers to fill the installation space
Unterlegleiste	Packer strip
Wichtig: Für die endgültige Definition der Einbauposition der Friktionsscheren ist eine Profilüberprüfung zwingend erforderlich	Important: a profile assessment is mandatory for a definitive definition of the installation position of the friction stays
Zusatzinformation - Profiltypen mit und ohne Nuten	Additional information – profile types with and without grooves
(*) für eine optimale Funktion so klein wie möglich	(*) As small as possible for optimum operation

6.2 HX

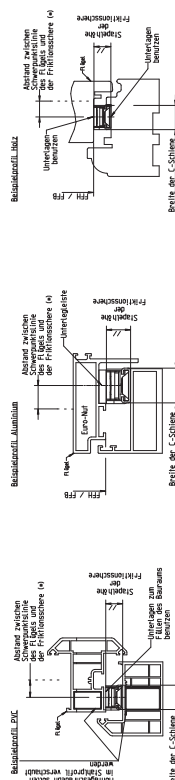


LB TH 8 bis 24

Experiment	LSR Number	Species No.	A	E	F	FR	F ₁ Genotype	Mean weight
(Bb 1b 1b 2-2-5)	33641-1	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-2	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-3	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-4	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-5	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-6	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-7	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-8	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-9	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-10	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-11	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-12	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-13	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-14	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-15	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-16	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-17	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-18	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-19	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-20	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-21	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-22	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-23	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-24	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-25	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-26	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-27	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-28	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-29	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-30	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-31	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-32	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-33	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-34	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-35	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-36	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-37	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-38	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-39	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-40	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-41	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-42	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-43	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-44	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-45	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-46	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-47	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-48	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-49	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-50	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-51	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-52	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-53	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-54	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-55	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-56	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-57	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-58	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-59	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-60	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-61	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-62	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-63	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-64	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-65	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-66	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-67	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-68	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-69	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-70	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-71	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-72	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-73	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-74	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-75	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-76	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-77	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-78	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-79	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-80	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-81	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-82	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-83	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-84	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-85	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-86	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-87	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-88	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-89	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-90	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-91	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-92	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-93	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-94	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-95	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-96	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-97	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-98	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-99	9	82.5	88.5	101.5	105.5	95.5	65
(Bb 1b 1b 2-2-5)	33641-100	9	82.5	88.5	101.5	105.5	95.5	65



Wichtig:
Für die endgültige Definition der Einbauposition der Friktionsschere ist eine Profilüberprüfung zwingend erforderlich.





7 Locking systems

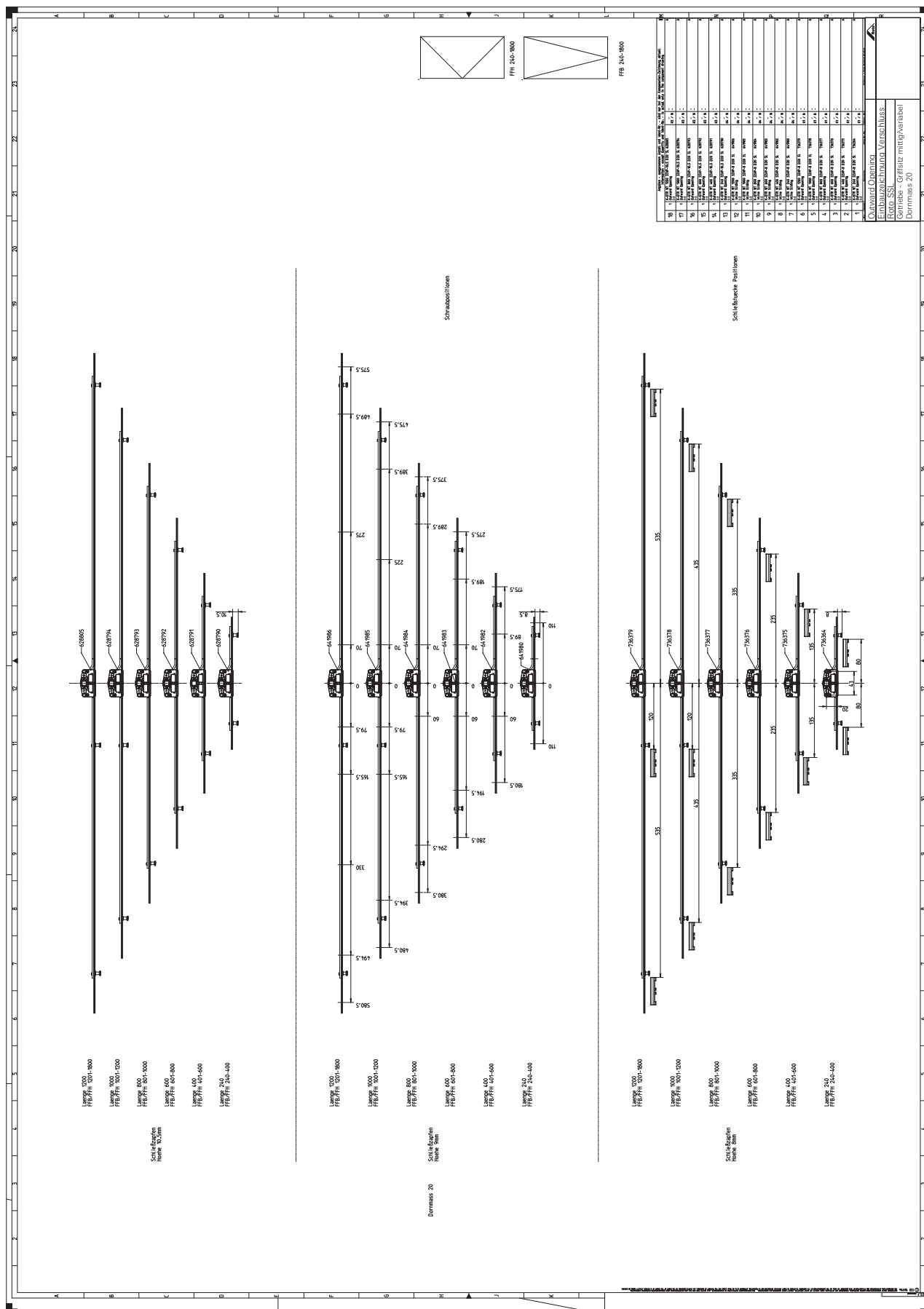
7.1 Roto SSL

7.1.1 Explanation

The following markings are used in the installation drawings to emphasise references and other elements:

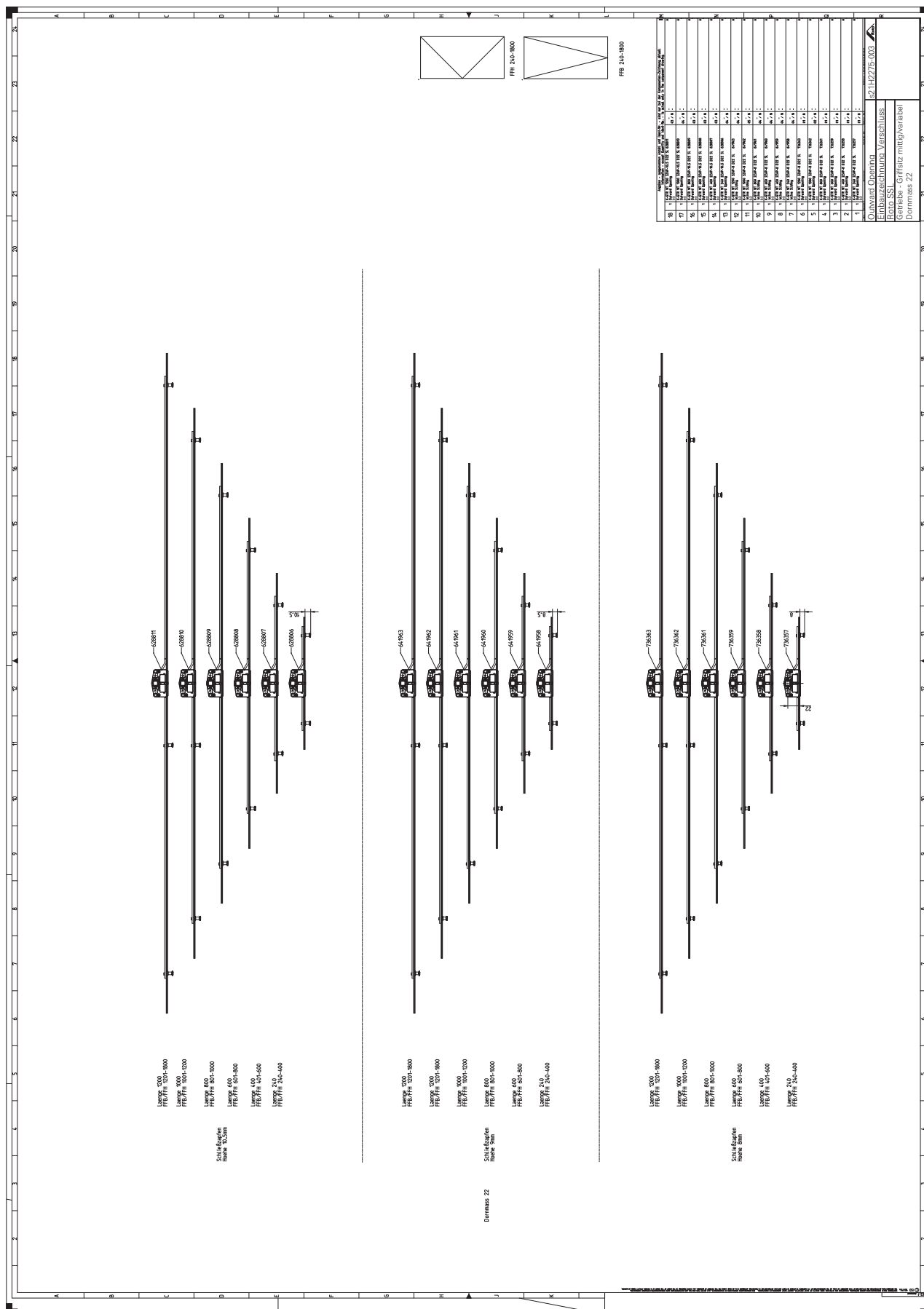
Marking	Translation
Angaben - ausgenommen Anzahl und Ident-Nr. - sind nur bei der Komponenten-Zeichnung aktuell	The specifications – with the exception of quantity and ID no. – are only current for the component drawing
Dornmass	Backset
Einbauzeichnung Verschluss	Installation drawing of locking
Getriebe - Griffsitz mittig/variabel	Espagnolette – centred / variable handle height
Höhe	Height
Laenge	Length
Schließstück	Striker
Schließzapfen	Locking cam

7.1.2 Espagnolette – centred / variable handle height, backset 20





7.1.3 Espagnolette – centred / variable handle height, backset 22



7.2 Roto TSL

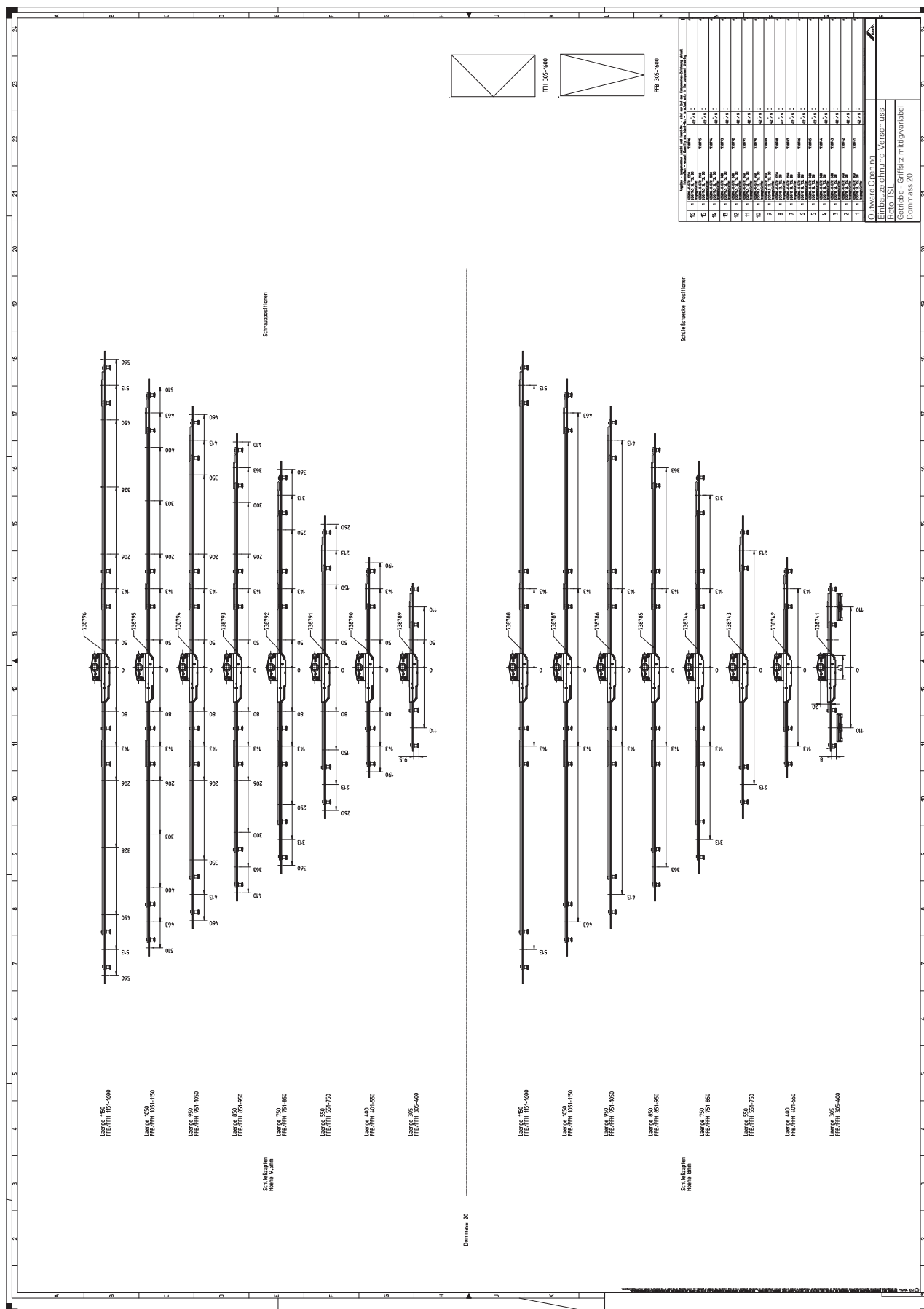
7.2.1 Explanation

The following markings are used in the installation drawings to emphasise references and other elements:

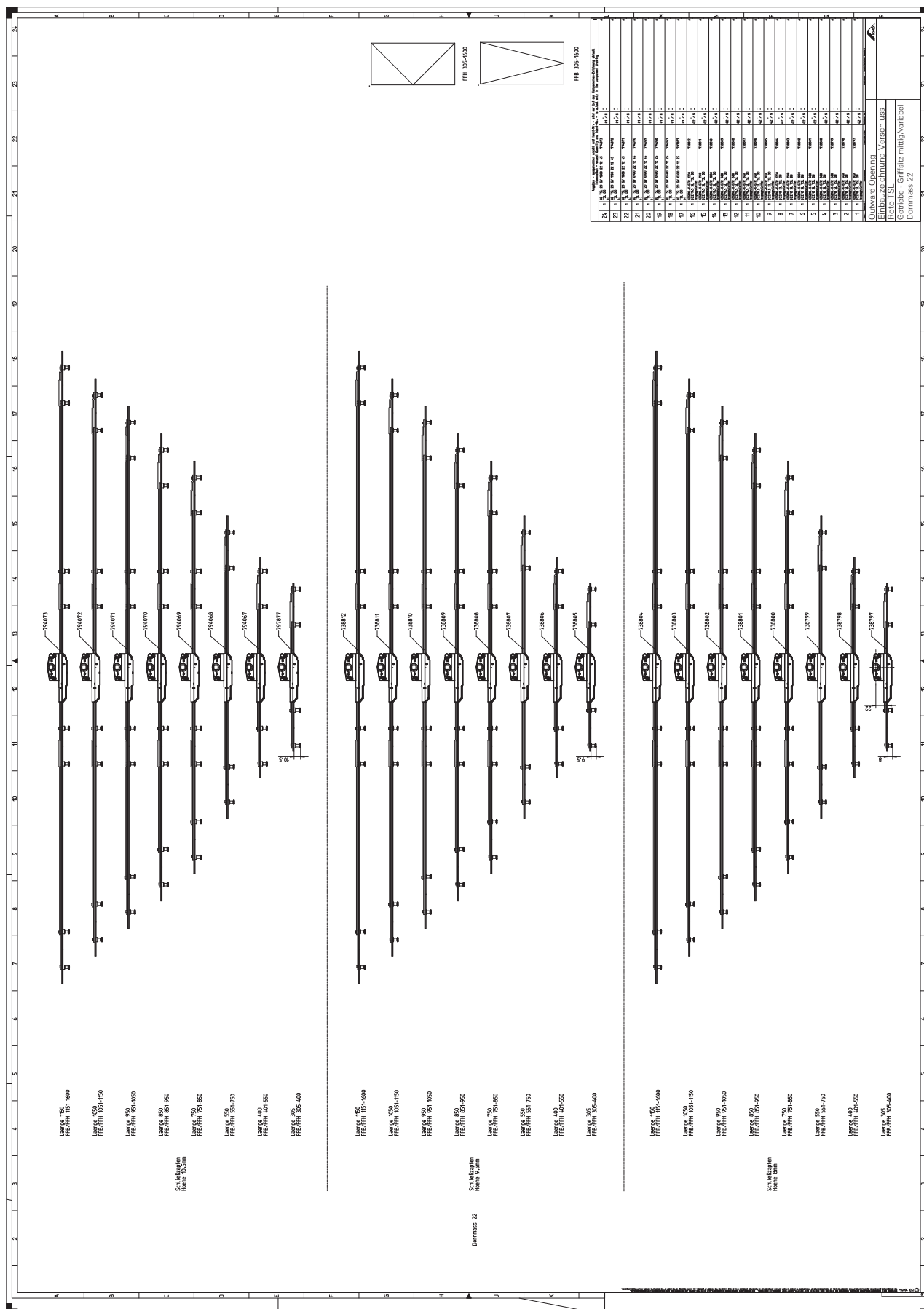
Marking	Translation
Angaben - ausgenommen Anzahl und Ident-Nr. - sind nur bei der Komponenten-Zeichnung aktuell	The specifications – with the exception of quantity and ID no. – are only current for the component drawing
Dornmass	Backset
Einbauzeichnung Verschluss	Installation drawing of locking
Getriebe - Griffsitz mittig/variabel	Espagnolette – centred / variable handle height
Getriebe - Griffsitz konstant	Espagnolette – fixed handle height
Hoehe	Height
Laenge	Length
Schließstück	Striker
Schließstuecke Position	Striker position
Schließzapfen	Locking cam
Schraubposition	Screw position



7.2.2 Espagnolette – centred / variable handle height, backset 20



7.2.3 Espagnolette – centred / variable handle height, backset 22





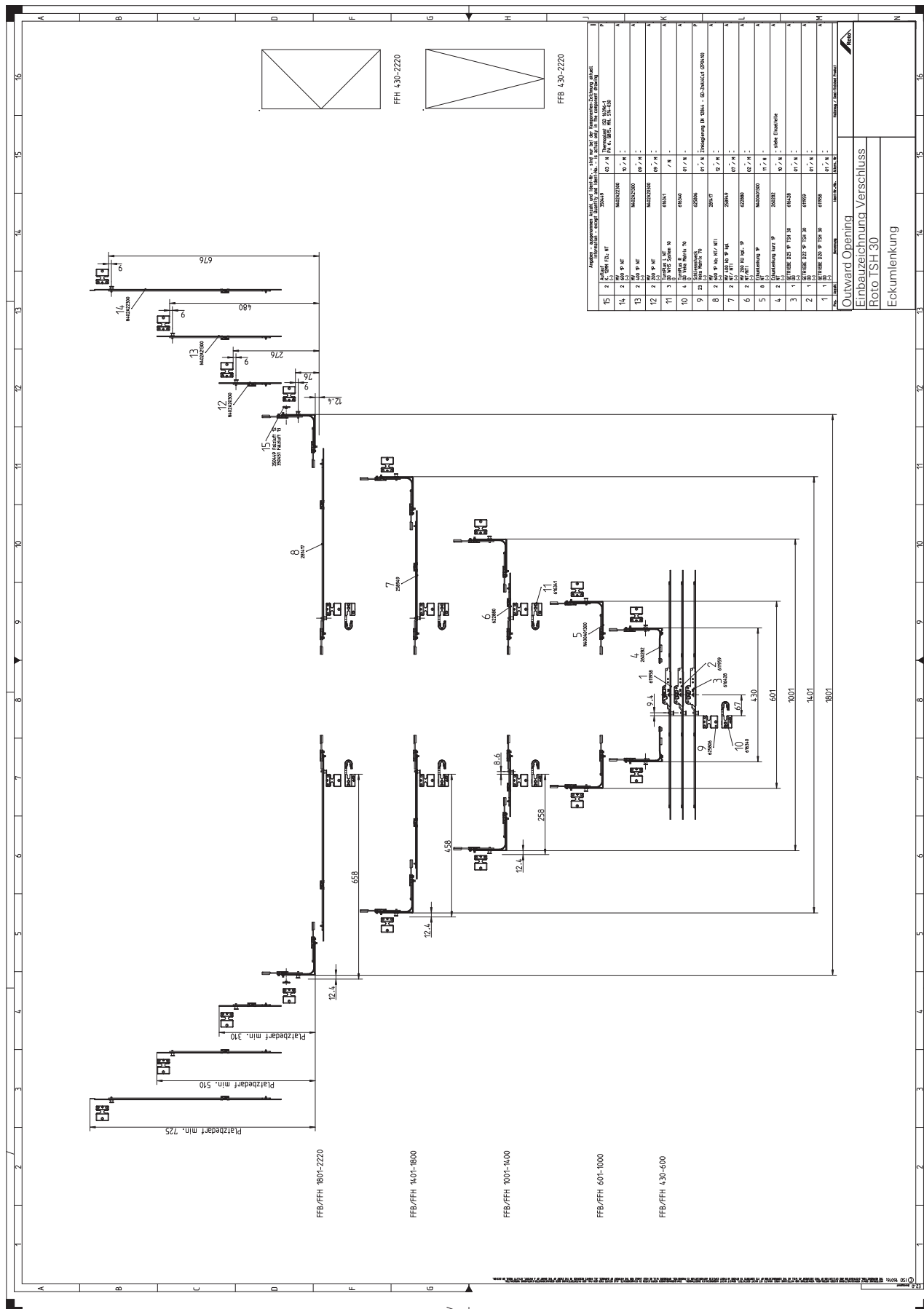
7.3 Roto TSH

7.3.1 Explanation

The following markings are used in the installation drawings to emphasise references and other elements:

Marking	Translation
Angaben - ausgenommen Anzahl und Ident-Nr. - sind nur bei der Komponenten-Zeichnung aktuell	The specifications – with the exception of quantity and ID no. – are only current for the component drawing
Dornmass	Backset
Eckumlenkung	Corner drive
Einbauzeichnung Verschluss	Installation drawing of locking
Falzluf	Rebate clearance
Getriebeanschluss	Espagnolette connector
Kantenriegel	Shootbolt
Mittelverschluss gegenläufig	Centre lock, reverse-action
Mittelverschluss mit Kreiszunge	Centre lock with hook
Platzbedarf min.	Min. space requirement
Schliessblech, kein Roto-Artikel, anwenderseitig zu erstellen	Striker plate, not a Roto item, must be created in another way

7.3.2 Corner drive





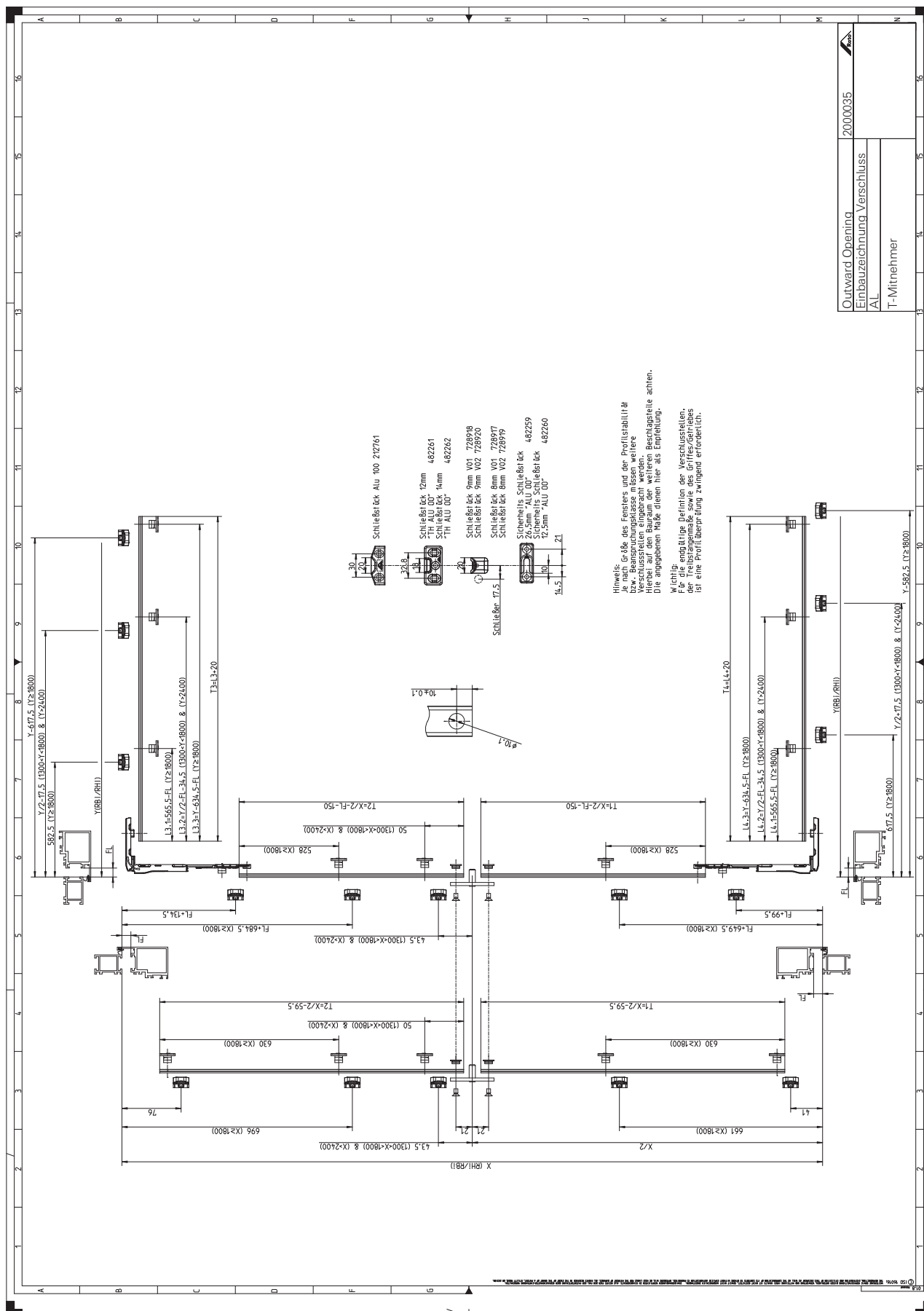
7.4 Roto AL

7.4.1 Explanation

The following markings are used in the installation drawings to emphasise references and other elements:

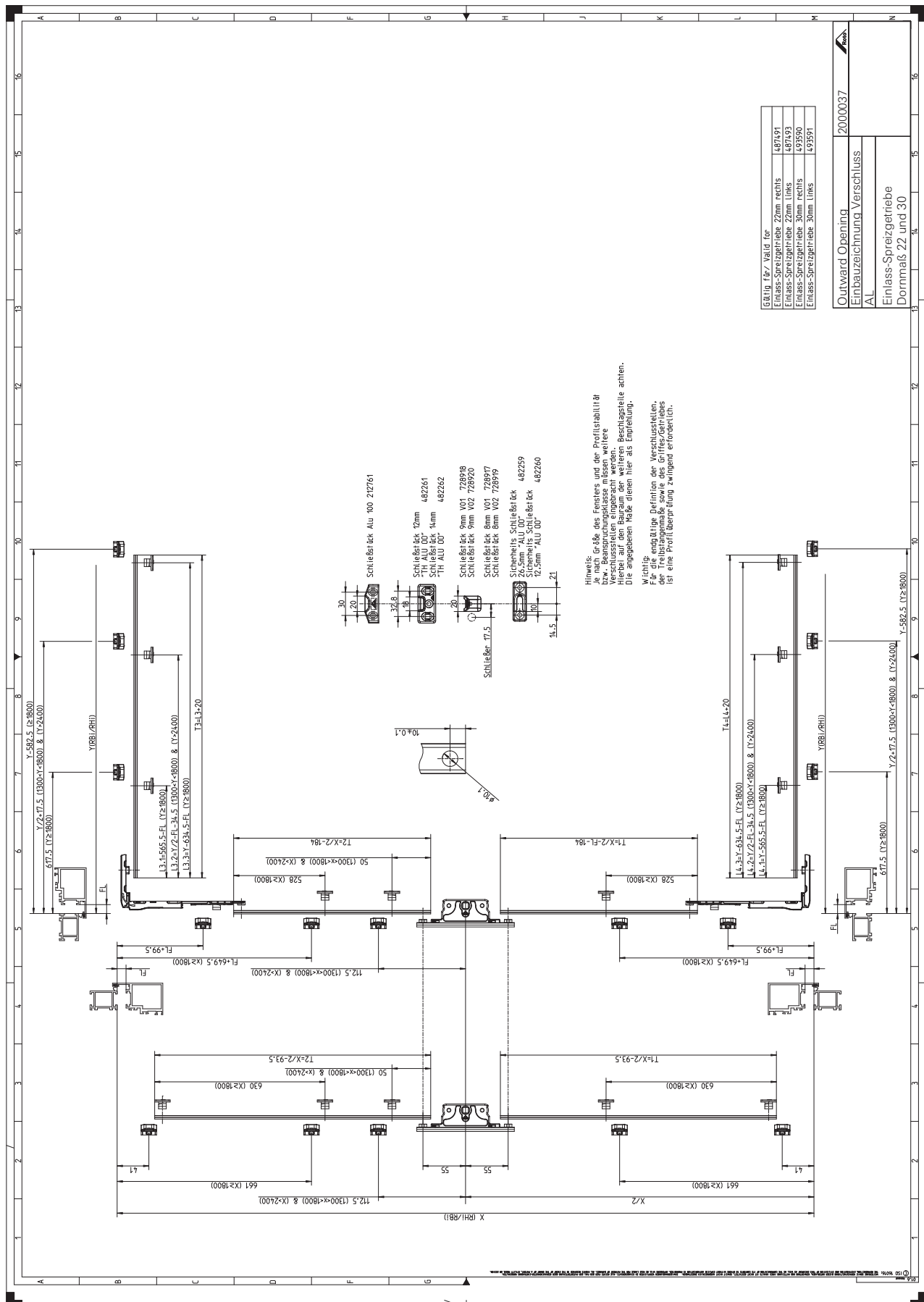
Marking	Translation
Die angegebenen Maße dienen hier als Empfehlung.	The specified dimensions are a recommendation only.
Einbauzeichnung Verschluss	Installation drawing of locking
Einlass-Spreizgetriebe	Flush-encased reverse-action espagnolette
FL	Rebate clearance
Gültig für	Applicable for
Hinweis: Je nach Größe des Fensters und der Profilstabilität bzw. Beanspruchungsklasse müssen weitere Verschlussstellen eingebracht werden. Hierbei auf den Bauraum der weiteren Beschlagsteile achten.	Note: depending on the size of the window and the profile stability or loading class, it must be necessary to insert additional locking points. Pay attention to the installation space of the other hardware components.
links	Left
RB <i>i</i>	Frame width, internal
RH <i>i</i>	Frame height, internal
Schließstück	Striker
Sicherheits-Schließstück	Security striker
rechts	Right
Wichtig: Für die endgültige Definition der Verschlussstellen, der Treibstangenmaße sowie des Griffes / Getriebes ist eine Profilüberprüfung zwingend erforderlich.	Important: a profile assessment is mandatory for a definitive definition of the locking points, connecting rod dimensions and handle / espagnolette.
Wichtig: Mit den Einlass Spreizgetrieben dürfen max 4 Verschlussstellen verwendet werden.	Important: a maximum of four locking points may be used with flush-encased reverse-action espagnolettes.

7.4.2 T connector



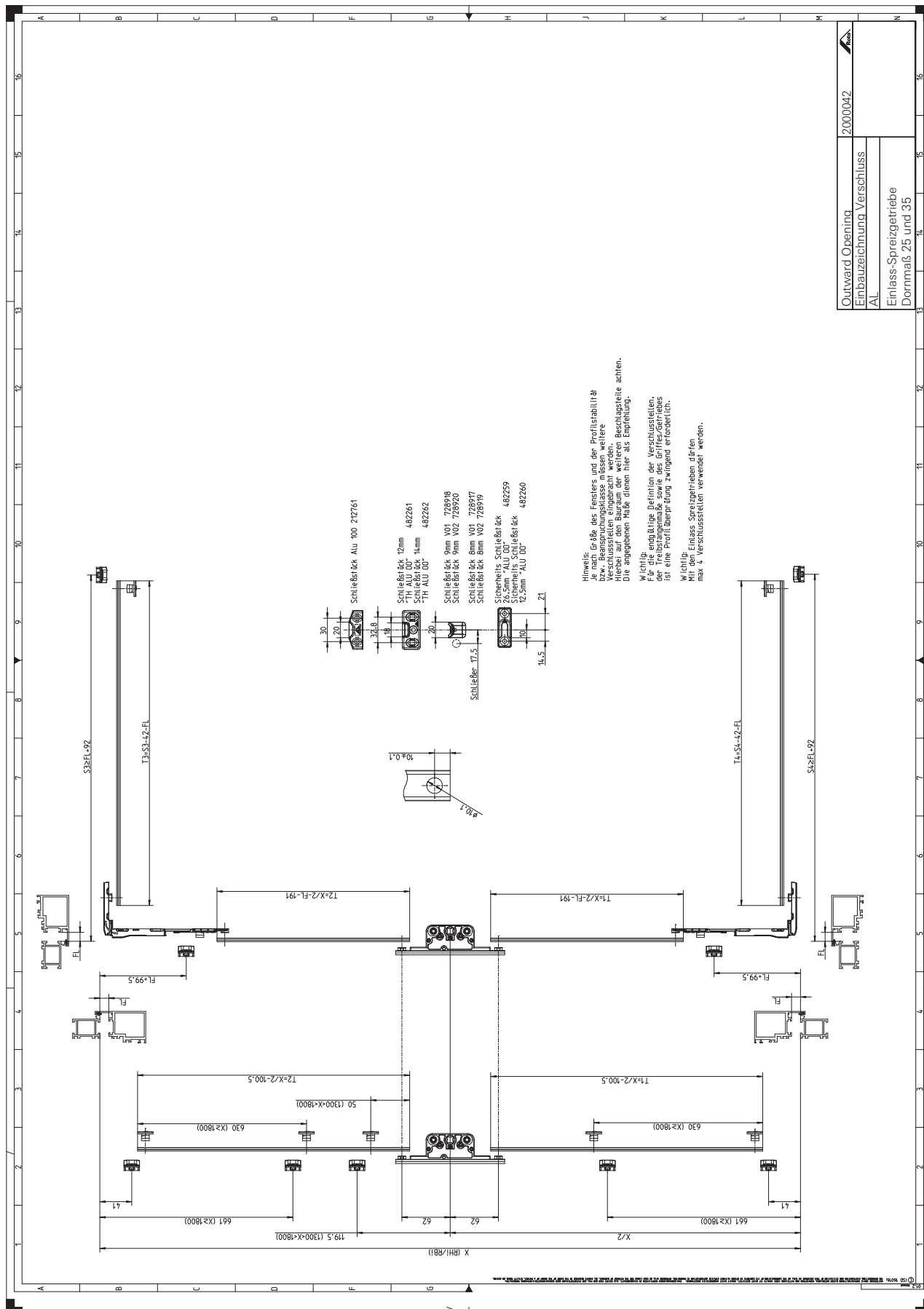
[illegible]

7.4.4 Flush-encased reverse-action espagnolette, backset 22 and 30

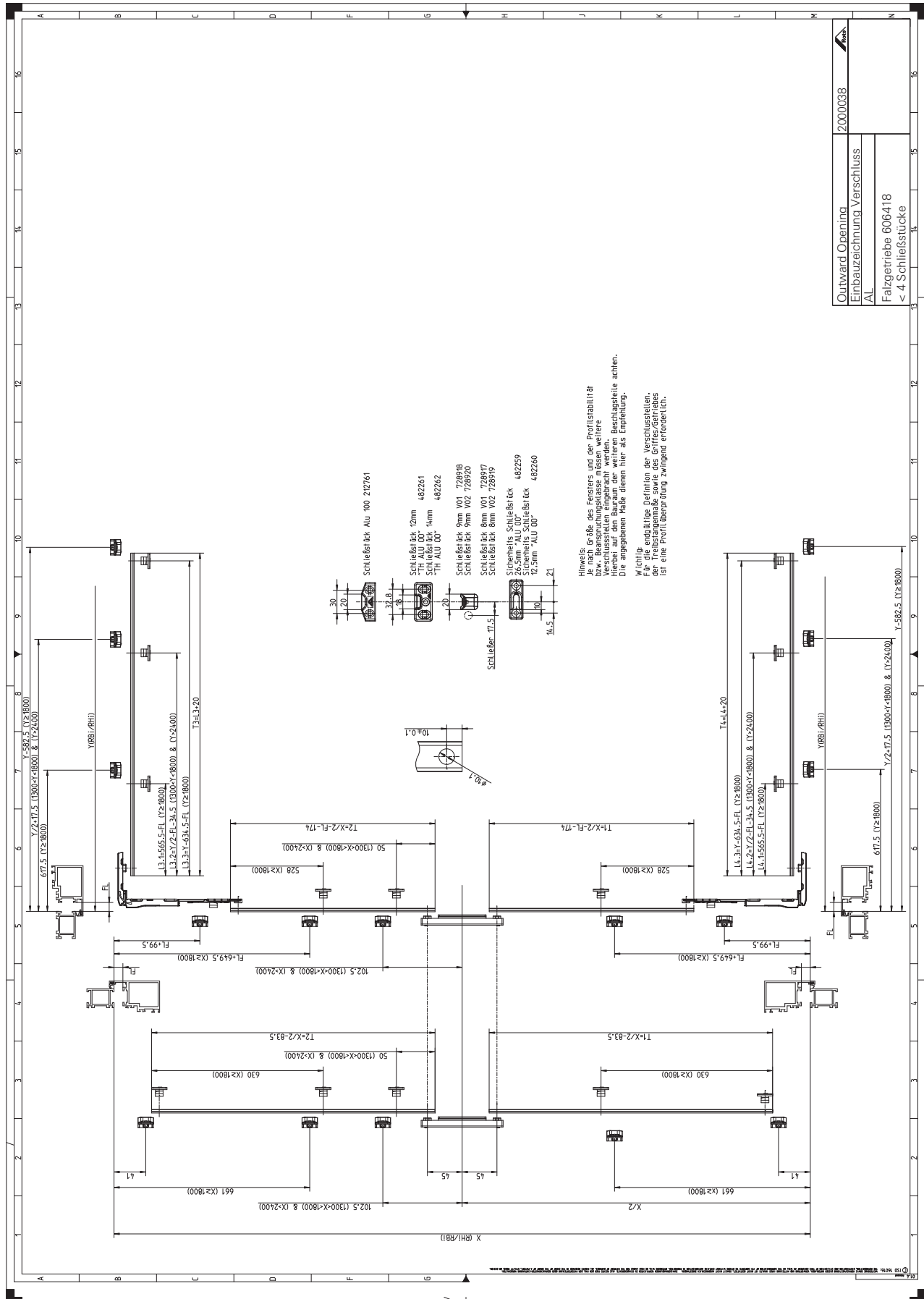




7.4.5 Flush-encased reverse-action espagnolette, backset 25 and 35

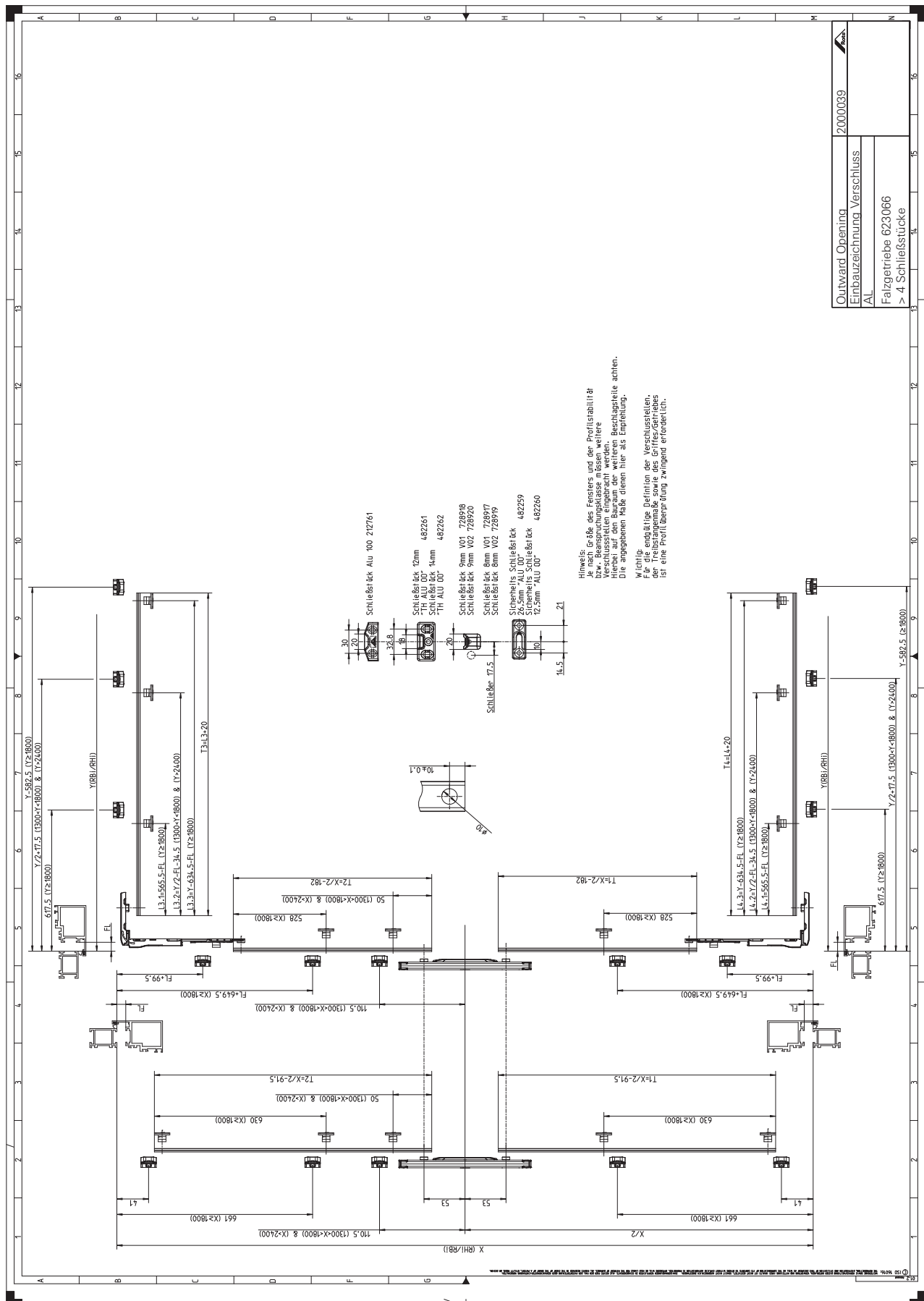


7.4.6 Rebate espagnolette < four strikers

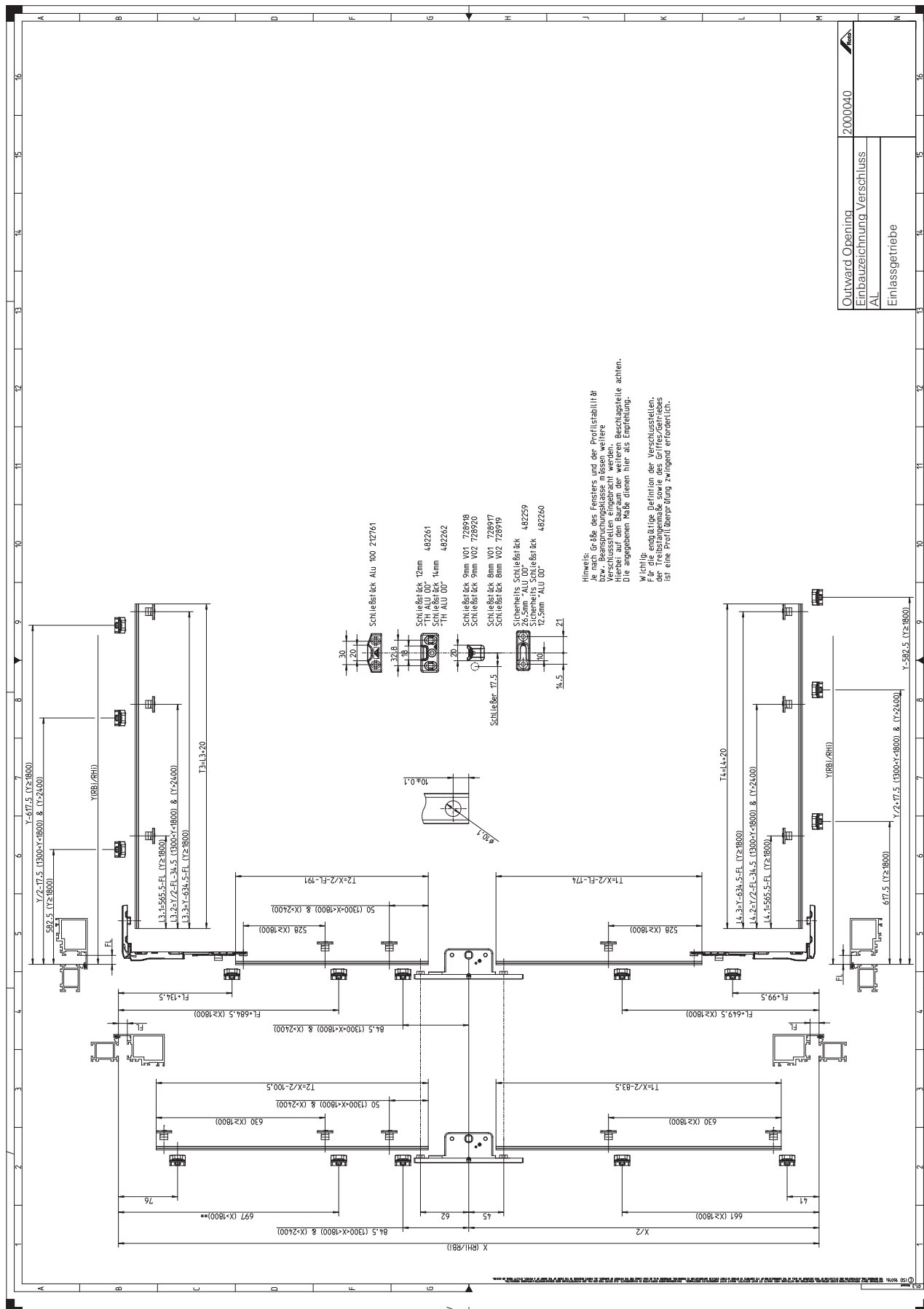




7.4.7 Rebate espagnolette > four strikers

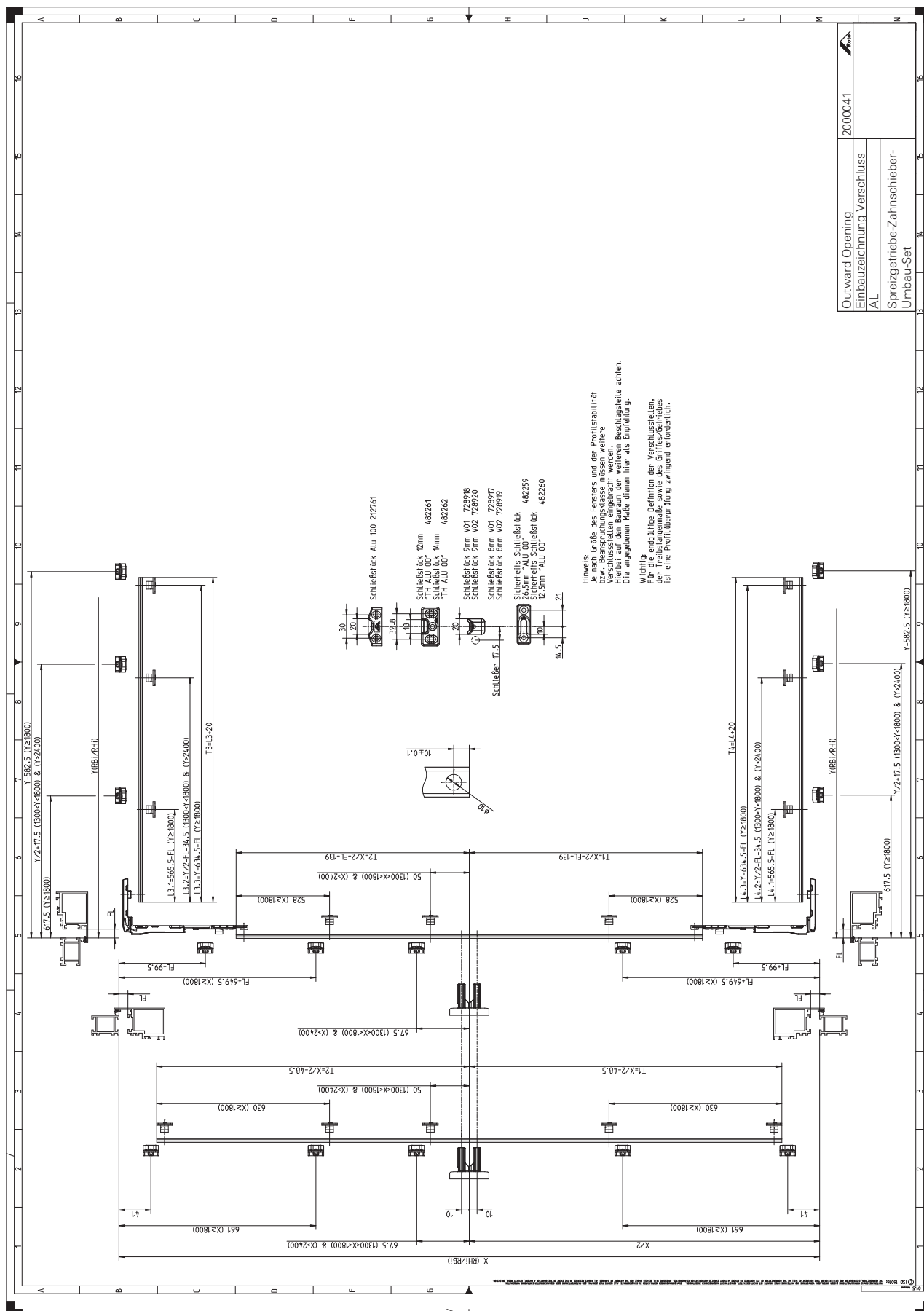


7.4.8 Flush-encased gearbox, backset 25 and 30





7.4.9 Reverse-action espagnolette fork conversion set



8 Operation

8.1 Operation information



WARNING

Opening and closing sashes in an uncontrolled manner may pose a risk of death!

Opening and closing the sash in an uncontrolled manner may lead to serious injuries.

- ▶ Use opening restrictors to prevent the sash moving by itself.
- ▶ When operating the sash, do not lean too far outward.
- ▶ Ensure that the sash is slowly guided by hand throughout its entire movement range, until it has been brought into a fully closed or opening position.
- ▶ When pressing the restrictor, hold on to the sash with your other hand to prevent it from falling back. One hand on the sash, one on the handle.



ATTENTION

The impact of wind on open sashes may cause property damage.

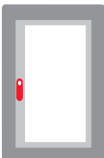
In extremely windy conditions, too much force may impact on the scissor stays.

- ▶ Keep the sash closed in extremely windy conditions.
- ▶ Do not leave open sashes unattended.

The windows are operated using a handle.

The following symbols illustrate the different handle positions and the resultant sash positions of the windows.

8.1.1 Side-Hung

Handle position	Sash position	Meaning
		Sash in closed position.
		Sash in opening position.

8.1.2 Top-Hung

Handle position	Sash position	Meaning
		Sash in closed position.
		Sash in opening position.



8.2 Fault assistance

Fault	Cause	Corrective action	To be carried out by
Window is difficult to open / close.	Friction stay is incorrectly adjusted.	Adjust the friction stay.	■
	Incorrect sash alignment.	Check glazing and correct if necessary.	■
	Incorrect rebate area dimensions.	Remeasure and readjust the rebate area.	■
	Obstacle in the opening between frame and sash.	Remove the obstacle.	□
	Obstacle between the scissor stay arms.	Remove the obstacle.	□
	Deposits or dirt on the hardware components.	Clean and lubricate the hardware components.	□
	Friction stay is faulty.	Replace the friction stay.	■
	Opening restrictor is faulty.	Replace the opening restrictor.	■
Window opens / closes automatically.	Insufficient friction on the friction stay.	Check the friction stay and readjust.	■
		Install an opening restrictor.	■
No grip between open and closed position.	Friction stay is faulty.	Replace the friction stay.	■
	No opening restrictor installed.	Install an opening restrictor.	■
Window is not closed tightly.	Window gasket is faulty.	Replace the window gasket.	■
	Gasket compression setting is incorrect.	Adjust the gasket compression.	■
	Espagnolette is damaged.	Replace the espagnolette.	■
	Friction stay is not secured tightly enough.	Tighten or replace fixing screws.	■
Window cannot be opened.	Friction stay / opening restrictor is faulty.	Do not use force to open the window.	□
		Secure the sash to prevent it falling out.	
		Contact a specialist company.	
	Espagnolette is faulty.	Replace the espagnolette.	■
Handle is difficult to turn.	Frame components have not been greased.	Grease the frame components.	□
	Handle is faulty.	Replace the handle.	■
	Handle screwed into place too tightly.	Undo the screw fixing slightly.	■
	Sash components with slanting screws.	Screw the sash components in straight.	■
	Sash components are faulty.	Replace the sash components.	■
	Incorrect striker positions.	Adapt the striker positions.	■
Handle cannot be turned 90°.	Sash components hinged or installed incorrectly.	Check the setting in the turn position (potentially rehang – start from the T&T espagnolette).	■

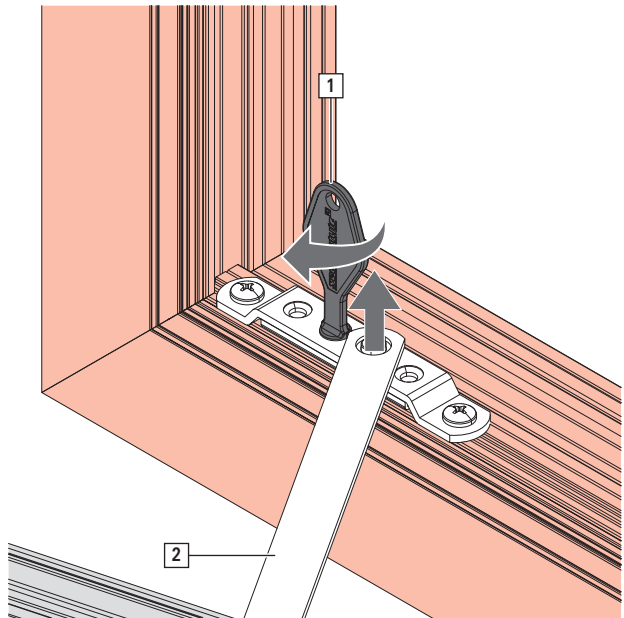
□ = May be carried out by a specialist company or the end user

■ = **Must** be carried out by a specialist company

8.3 RD comfort opening restrictor

Unlocking

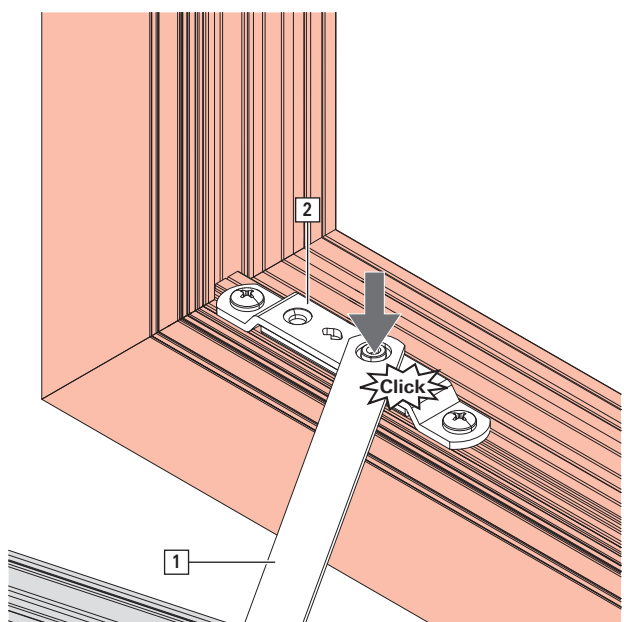
1. Insert the release key [1] and turn it clockwise by 90°.
While doing so, pay attention to the outline of the release key.



2. Pull the arm [2] upwards to remove it.
3. Turn the release key anticlockwise by 90° and remove it.

Locking

1. Push the arm [1] downwards onto the frame component [2] until a click can be heard.





9 Maintenance



CAUTION

Performing maintenance work incorrectly can lead to injuries.

Performing maintenance incorrectly can lead to injuries.

- ▶ Ensure that there is sufficient space for installation before starting work.
- ▶ Ensure that the installation site is clean and tidy.
- ▶ Always have hardware adjustment and replacement work performed by a specialist company.
- ▶ Secure the sash against unintentionally opening or closing.
- ▶ Do not unhinge the sash for maintenance.



ATTENTION

Incorrect or improper testing may cause property damage.

Incorrect or improper testing of the hardware may cause the element to malfunction.

- ▶ Have the hardware checked by a specialist company when installed.
- ▶ If defects need to be remedied, have the element unhinged and remounted by a specialist company.



INFO

Maintenance work may require opening angles that exceed the nominally permitted opening angles of the scissor stays. These opening angles must not be used in regular operation. For this reason, take suitable measures (such as integrated opening restrictor or additional opening restrictor) to limit the sashes to the maximum permitted opening angle.



INFO

The manufacturer must draw the attention of builders and end consumers to these maintenance instructions.

Roto Frank Fenster- und Türtechnologie GmbH recommends the manufacturer conclude a maintenance agreement with their end users.

No legal claims can be derived from the following recommendations; their application is to be based on the specific individual case.

	Responsibility	
Maintenance interval	☐	→ from page 118
Cleaning		→ from page 118
Clean hardware	☐	
Care		→ from page 118
Lubricate movable parts	☐	
Lubricate locking points	☐	
Performance test		→ from page 119
Check that hardware components are fitted securely	☐	
Inspect hardware components for wear	☐	
Check that movable parts work properly	☐	
Check that locking points work properly	☐	
Check ease of movement	■	
Repair		→ from page 120
Retighten screws	■	
Replace damaged components	■	

☐ = May be carried out by a specialist company or the end user

■ = **Must** be carried out by a specialist company

9.1 Maintenance intervals



ATTENTION

Failure to adhere to maintenance intervals may cause property damage.

The maintenance interval for all tasks relating to the hardware components is **annually** at the least. In hospitals, schools and hotels, the maintenance interval is **six-monthly**.

Regular maintenance is necessary in order to maintain the proper and smooth-running operation of the hardware and to prevent premature wear or even defects.

- ▶ Determine and adhere to the appropriate maintenance interval in accordance with the ambient conditions.

9.2 Cleaning



ATTENTION

Using incorrect cleaning agents and sealing compounds may cause property damage.

Cleaning agents and sealing compounds may damage the surfaces of components and gaskets.

- ▶ Do not use aggressive or flammable liquids, acidic cleaners or abrasive cleaners.
- ▶ Only use mild, pH-neutral cleaning agents that have been diluted.
- ▶ Apply a thin protective film to the components, for example using a cloth soaked in oil.
- ▶ Avoid aggressive vapours (e.g. produced by formic acid, acetic acid, ammonia, amine compounds, ammonia compounds, aldehyde, carbolic acid, chlorine, tannic acid) around the element.
- ▶ Do not use any acetic acid-crosslinking or acid-crosslinking sealing compounds or those with the aforementioned constituents as both direct contact with the sealing compound and its fumes can corrode the surface of the components.

Cleaning the hardware

- ▶ Clean deposits and contaminants off the hardware using a soft cloth.
- ▶ Lubricate movable parts and locking points after cleaning. → 9.3 "Care" from page 118
- ▶ Apply a thin protective film to the hardware, for example using a cloth soaked in oil.

9.3 Care



ATTENTION

Using incorrect lubricants may cause property damage.

Substandard lubricants can prevent the hardware from working properly.

- ▶ Use high-quality lubricants.
- ▶ Only use resin-free and acid-free lubricants.
- ▶ Use appropriate lubricant in more challenging climatic conditions. Note the manufacturer specifications.



ATTENTION

Cleaning agents and lubricants may pollute the environment.

Leaking or excess cleaning agents and lubricants may pollute the environment.

- ▶ Remove any leaking or excess cleaning agents and lubricants.
- ▶ Dispose of cleaning agents and lubricants separately and properly.
- ▶ Observe the applicable directives and national laws.

Ease of movement can be improved by lubricating or adjusting the hardware. All functional hardware components must be lubricated on a regular basis.

Recommended lubricants

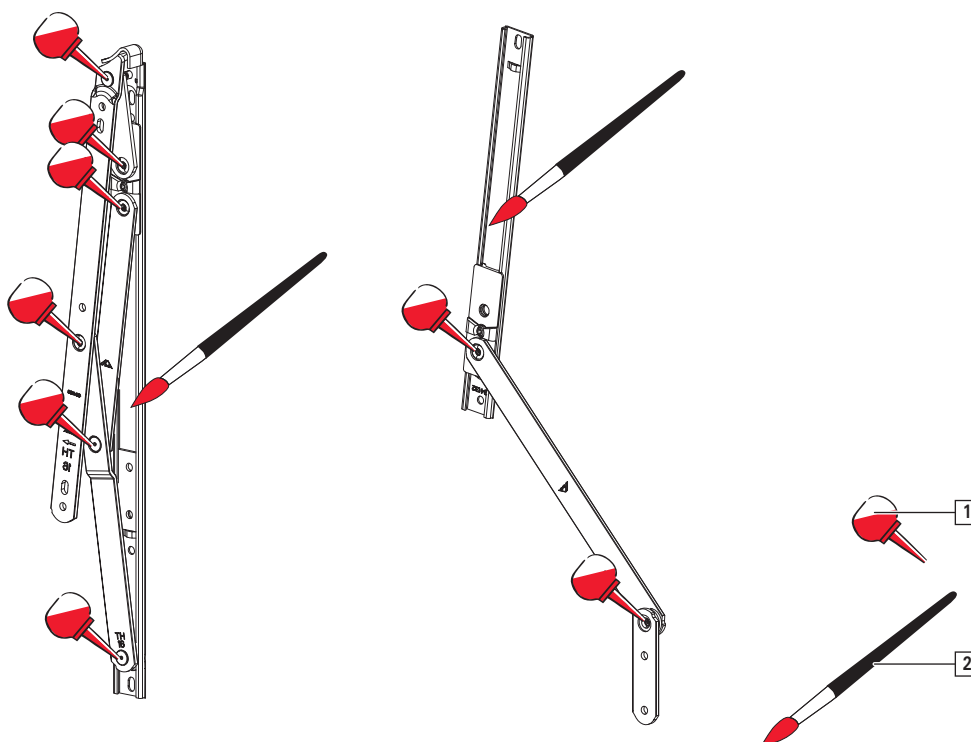
- Roto NX / NT grease



INFO

The figure displays the positioning of potential lubrication points. The figure does not necessarily match the installed hardware. The quantity of lubrication points varies depending on the size and design of the element.

9.3.1 Lubrication points



[1] Oil spray / oil

[2] Grease

9.4 Performance test



WARNING

Improper repair work may pose a risk of death!

Improper maintenance may prevent the element from working properly and make it less safe to use.

- ▶ Always have repairs performed by a specialist company.

Check for proper operation:

- ▶ Inspect hardware components for damage, deformation and a firm fit.
- ▶ Check that windows run smoothly by opening and closing them.
- ▶ Check the window gaskets for elasticity and fit.
- ▶ Check closed windows to ensure that they are leakproof.
- ▶ Locking and unlocking torque max. 10 Nm. The test can be performed on the handle.

Have malfunctions remedied by a specialist company.

9.5 Repair



WARNING

Improper repair work may pose a risk of death!

Improper maintenance may prevent the element from working properly and make it less safe to use.

- ▶ Always have repairs performed by a specialist company.
-



ATTENTION

Improper screw fixings may cause property damage.

Loose or faulty screws can prevent the hardware from working properly.

- ▶ Check that the individual screws are secure and seated correctly.
 - ▶ Tighten or replace loose or faulty screws.
 - ▶ Use only the suggested screws.
-

Repair work includes replacing and repairing components and is only necessary if components have become damaged after wear or as a result of external circumstances. The hardware must be secured reliably in order to ensure that the element works properly and is safe to use.

The following tasks must only be performed by a specialist company:

- All adjustment work on the hardware,
- Replacing hardware or hardware components,
- Installing and removing windows, doors or balcony doors

The specialist company must observe the following:

- Perform the necessary repair work properly, according to generally recognised engineering practice and in accordance with the applicable regulations.
- Do not perform makeshift repairs on worn or damaged components.
- Only use original or approved spare parts for repairs.



10 Dismantling



WARNING

Improper dismantling may pose a risk of death!

The sash may fall during dismantling.

- ▶ Secure the sash to prevent it from falling, e.g. by using two people.
- ▶ Always have dismantling work performed by a specialist company.



CAUTION

Physical strain may cause injury and damage to health.

Carrying and lifting heavy loads for extended periods leads to physical injury in the long term.

- ▶ When carrying or lifting loads, maintain an ergonomically correct posture. The maximum permissible load is 25 kg for men and 10 kg for women.



INFO

Unless otherwise stated, dismantling is performed in reverse order to installation.

10.1 Hardware components

Removing hardware components

1. Undo all screw connections.
2. Remove the hardware components.
3. Dispose of the hardware components properly.

11 Transport

11.1 Transporting elements and hardware



DANGER

Improper transport poses a risk of death!

Improper procedures for transporting, loading or unloading elements may cause serious injuries and glass breakage as a result of the elements swinging open, falling or becoming overloaded.

- ▶ Note the applicable accident prevention regulations.
- ▶ Note force application points and reaction forces.
- ▶ Prevent the sash from opening uncontrollably.
- ▶ Avoid jerky movements.
- ▶ Use suitable transportation means and protective devices.
- ▶ Watch out for protruding components.
- ▶ Transport heavy loads with two people and use suitable transportation means (such as an industrial truck).



CAUTION

Trapped limbs may result in injuries.

The transported goods can skid, open, close or fall during transportation tasks. This can result in limbs being trapped and seriously injured.

- ▶ Never reach near the scissor stays.
- ▶ Close the sash after installation and secure it in place for transport.
- ▶ Wear safety gloves and protective footwear.



CAUTION

Physical strain may cause injury and damage to health.

Carrying and lifting heavy loads for extended periods leads to physical injury in the long term.

- ▶ When carrying or lifting loads, maintain an ergonomically correct posture. The maximum permissible load is 25 kg for men and 10 kg for women.

Hardware is supplied to the specialist company as complete sets. The components are packaged accordingly for each scope of delivery. The instructions for safely transporting the hardware are described below.

Observe the following basic instructions when transporting hardware:

- ▶ Transport larger scopes of delivery using appropriate transportation means (such as industrial trucks).
- ▶ Note the transport weight in order to select appropriate transportation means.
- ▶ Immediately check the delivery for completeness and transport damage on receipt.
- ▶ Only transport fully assembled windows with rebate clearance panelling.



INFO

Submit a complaint about any defects as soon as they are identified. Claims for damages may only be made within the reclamation period.

Use the following transportation means for support when transporting, loading and unloading larger scopes of delivery:



- Industrial trucks, e.g. forklifts, telescopic handlers, pallet trucks
- Lifting equipment, e.g. transport nets, carry straps, round slings
- Protective devices, e.g. edge protection, spacer blocks



INFO

Industrial trucks and lifting devices may only be operated by qualified persons.



INFO

Lifting equipment and protective devices may only be used if they are in full working order.

11.2 Storing the hardware

Store all hardware components as follows until they are installed:

- Dry and protected
- On a level surface
- Protected against sunlight

12 Disposal



ATTENTION

Incorrect disposal may pollute the environment.

Pieces of hardware are raw materials.

- ▶ Dispose of hardware for environmentally friendly material reutilisation as mixed scrap.

12.1 Disposing of packaging

The hardware is supplied as complete sets together with the packaging. Once unpacked, the installation company or builder is responsible for disposing of the packaging properly. The packaging materials are produced in accordance with current environmental protection standards. The materials can be recycled separately.

Follow the basic instructions below for the proper disposal of packaging:

- ▶ Do not dispose of packaging in household waste.
- ▶ Hand over packaging at local waste collection points or recycling centres.
- ▶ Observe the national regulations on the disposal of recyclable materials.
- ▶ Contact the local authorities if necessary.

12.2 Disposing of hardware

Once the hardware is finished with, the end user or builder is responsible for properly disposing of the windows, doors or balcony doors and the hardware, including any accessories. Hardware is produced in accordance with current environmental protection standards. The materials can be recycled separately.

Follow the basic instructions below for the proper disposal of hardware:

- ▶ Observe the information and specifications for disposal contained in the other applicable documents.
- ▶ Separate hardware components from windows, doors or balcony doors.
- ▶ Do not dispose of hardware in household waste.
- ▶ Hand over hardware at local waste collection points or recycling centres.
- ▶ Observe the national regulations on the disposal of recyclable materials.
- ▶ Contact the local authorities if necessary.



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