GEZE - RWA

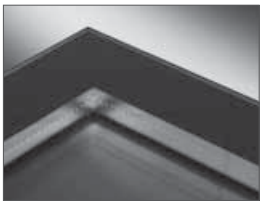
Smoke and heat extraction

GB

System documentation

Contents

DOOR TECHNOLOGY



GLASS SYSTEMS

AUTOMATIC DOOR SYSTEMS

RWA AND WINDOW TECHNOLOGY

SAFETY TECHNOLOGY

1 Foreward

For fire protection, a distinction is drawn between the concepts of "fire-fighting" and "preventive" fire protection:

- **Fire-fighting**: The term "fire-fighting" covers all steps taken in the event of a fire to combat the dangers posed to life, health and property.

- **Preventive** fire protection: This term covers all steps taken to prevent a fire from breaking out or spreading and to keep escape routes open. The aim is to obstruct the spread of a fire long enough for people to be able to escape to safety by their own efforts and to give the fire brigade time to allow people to escape safely from the building.

The smoke and heat extraction system (RWA) is classed under "preventive fire protection" and will save life in the event of a fire. The legal foundations are the building codes, special building codes and technical regulations of Germany on the federal and state levels (see Section 3.1ff).

During a fire, significant amounts of combustion products such as smoke and fire gases as well as heat energies are produced. The most important function of the smoke and heat extraction system is thus to extract the resulting combustion products from the building effectively and quickly. Rooms and buildings without smoke and heat extraction will be filled with toxic smoke gases within a very short amount of time.

The danger to those escaping and emergency personnel increases significantly in buildings without smoke and heat extraction, as uncontrolled blazing fires result from a lack of smoke and heat extraction and the invisible smoke layer makes active and passive rescue impossible.
Fire victims as a result of direct fire contact are only rare; nearly 90% of all fatal fire accidents are caused by asphyxiation due to smoke gases. "Fire victims are smoke victims" – there are two reasons for this:

- Fatal components in smoke gas
- Corrosive components which burn the lungs and respiratory passages during inhalation

Due to thermal lift, large amounts of smoke gases rise and fill the room or building with smoke. In the worst case scenario, the high ambient temperature can lead to the building's collapse.
Therefore, the sustainment of the building structure is also a significant function of the smoke and heat extraction system. Thus people escaping can save themselves from the building on their own and the emergency personnel can carry out active rescue – evacuation of the building longer.

Mode of operation of natural smoke extraction:

Fig. 1 -1 · **Spreading of smoke without RWA** *)

Fig. 1 -2 · **Spreading of smoke with RWA** *)

Triggered by automatic smoke detectors or even manually, the smoke and heat extraction system vents are opened with the aid of the electrically operated drives in the upper part of the building. Through these vents the thermally ascending smoke gases can escape even during the initial phase. The requisite incoming-air vents in the lower part of the buildings assist this process by balancing out the necessary mass flow.

In summary the following objectives are achieved by the use of smoke and heat extraction systems in buildings:

Protection of individuals: keeping rescue routes smoke free

Active rescue. Passive rescue. Localization of the fire.

Environmental protection: reducing damage to the environment

Minimization of damage caused by fire extinguishing activities. Minimum use of extinguishing agents.

Protection of property: conservation of the building structure

Support for fire-fighting. Ventilation of the fire. Minimization of the thermal load.

2 Terms and definitions

In this section, the most important concepts about smoke and heat extraction will be defined briefly.

Natural smoke extraction / mechanical smoke extraction
A natural smoke extraction system relies on the "naturally" occurring principle of thermal lift. In contrast, there are also mechanical smoke extraction systems.

RWA
RWA stands for the term "smoke and heat extraction". This consists of components selected in such a way that their interaction causes smoke and heat to dissipate in order to create a stable layer of warm gases above cool and clean air.

NRWG
NRWG is a natural smoke and heat extraction system. It serves to dissipate smoke and hot gases from a structure in the event of fire. In accordance with EN 12101 Part 2, this building product consists of the following components:
- Drive with brackets
- Respective fitting system if applicable
- Window profile
- Window glazing
- Window fittings

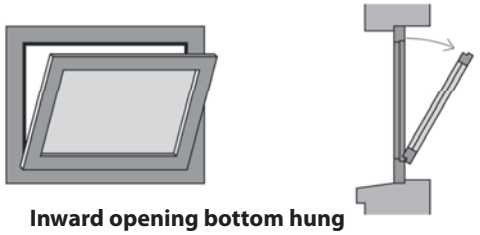
Smoke extraction / smoke dissipation
Smoke extraction is to be understood as smoke extraction in the event of fire (heat smoke extraction). A stabile layer of little smoke develops near the ground, facilitating safe use of escape and rescue routes. In accordance with EN 12101 - Part 2, the use of an NRWG is obligatory where the building code requires a natural "smoke extractor".

Smoke dissipation is conducive for cold smoke extraction and is used following a fire to remove the smoke remaining in the building. Here it is not a matter of a security-relevant component which is listed in building code list C.

CE - Identification
By labeling the product with a CE Identification, the manufacturer confirms that this product is in accordance with all valid European guidelines applicable to this product.

Overview of window types

In exterior walls, various window shapes and casement types are used:



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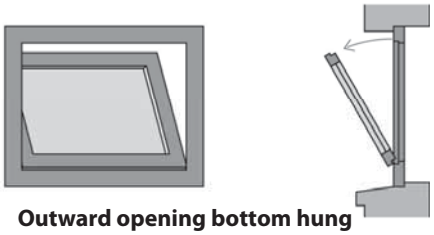

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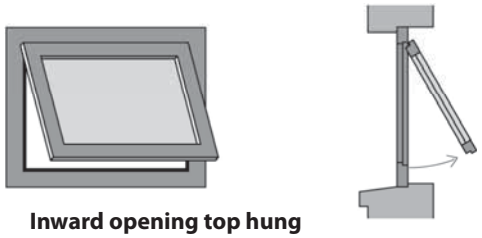

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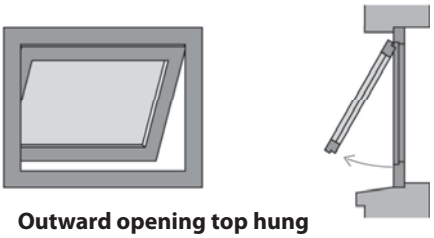

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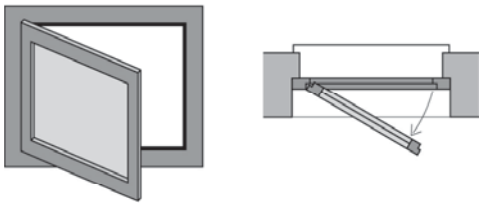
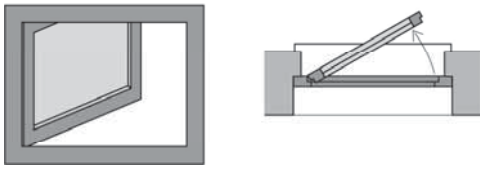
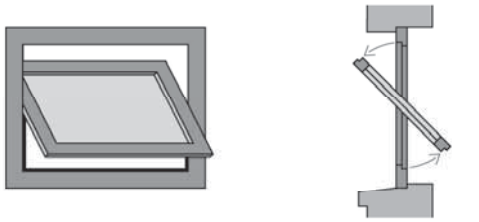


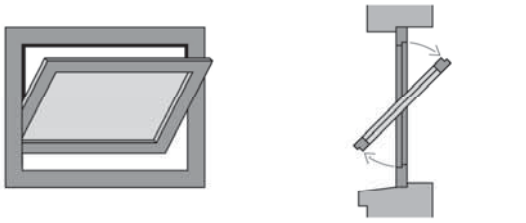
Inward opening side hung casement



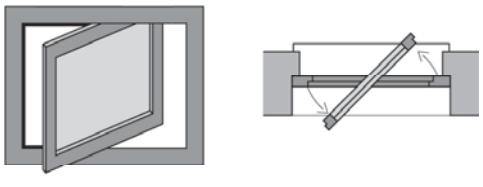
Outward opening side hung casement



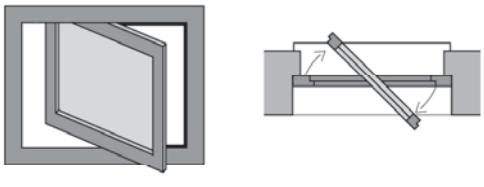
Bottom inward opening pivoted sash window



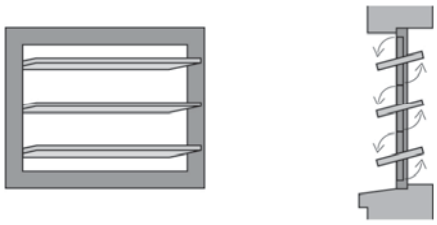
Bottom outward opening pivoted sash window



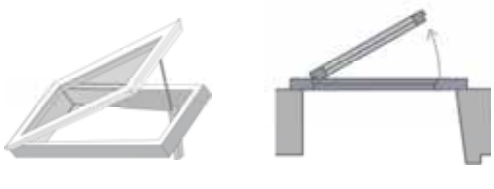
Left inward opening vertically pivoted window



Right inward opening vertically pivoted window



Louvre windows



Outward opening skylight

Fig. 7 -1 · Window and casement types

3 Statutory guidelines: Smoke and Heat Extraction

Building law
In building law, the following objectives are pursued:

- Prevent fire occurrence
- Contain spreading of the fire
- Secure rescue routes
- Facilitate fire-fighting
- Limit environmental pollution in the form of the emission of harmful substances, water pollution, etc.

German building law is divided into the areas of building code and building product law. These will be explained in the following section:

3.1 Building code law

In building code law, building fire prevention is regulated centrally. As building code law is a part of federal state regulation, there is a separate state building code for each individual federal state.
This also applies to special building codes. This is where all requirements directed at the building or special construction are governed. In the relative codes, information is given for dimensioning smoke dissipation and smoke extraction. An overview of the contents of these codes follows:

Model Building Code (MBO):
The model building code (MBO) was collectively created by the federal states as the basis for state building codes. In it, fire prevention objectives are specified, as buildings must generally be in accordance with the basic statutory requirements.

MBO Art. 3, Para. 1 (Version November 2002)
"Systems are to be designed, constructed, modified and maintained in such a way that public safety and order, especially life, health and nature, are not endangered".

MBO Art. 14 (Version November 2002)
"Construction systems are to be designed, constructed, modified and maintained in such a way that the occurrence of fire and the spreading of fire and smoke (spreading of a fire) is avoided and the rescue of people and animals as well as effective fire-fighting is possible in case of fire".

The general guidelines of the Model Building Code (MBO) are to be adopted by the federal state building codes and substantiated with additional guidelines in the wording of the respective building code and its supplementary directives for special constructions. The special building codes of the federal states are also based on the respective model building code. In addition, public and private guidelines apply.

For this reason, the following tables only provide an overview and it is necessary to additionally observe the respective federal state's code for where the building structure should be constructed.

MBO Art. 35, Para. 8 (Version November 2002)
"It must be possible to ventilate the emergency stairwells. On each above-ground floor, they must have windows which can be opened directly to the outside with a free cross-section of at least 0.50 m^2
For interior emergency stairwells and emergency fire escapes in buildings of a height (in accordance with Art. 2 Para. 3 Sentence 3) of more than 13 m, an opening to the smoke dissipation with a free cross-section of at least 1 m^2 is required at the highest point; it must be able to be opened from the ground floor as well as from the highest landing".

MBO Art. 37, Para. 4 (Version November 2002)
"Each cellar without windows must have at least an opening to the outside to make smoke dissipation possible. Common basement light wells for basement floors on top of one another are prohibited".

MBO Art. 39, Para. 3 (Version November 2002)
"Elevator shafts must be able to be ventilated and have an opening for smoke dissipation with a free cross-section of at least 2.5 percent of the elevator shaft footprint, but at least 0.10 m^2. The location of the smoke extraction openings must be selection in such a way that smoke extraction is not compromised by wind influence".

MBO Art. 51 (Version November 2002)
On special buildings and in isolated cases, in order to implement general requirements in accordance with Art. 3 Para. 1, special "equirements can be proposed for

11. ventilation and smoke dissipation (...)"

3.1.1 Requirements of master building codes and federal state codes regarding smoke dissipation & ventilation

The following table provides an overview of the requirements in individual federal state building codes for smoke dissipation in stairwells. GEZE GmbH would be pleased to assist you with information regarding smoke dissipation and ventilation in basement floors and elevator shafts.
Note: In the following, you will find currently valid extracts. Regular updating is to be considered.

Federal state	Code	Status	Smoke dissipation when?	Smoke dissipation where?	Smoke dissipation how big?	Control-sections where?	Ventilation
	Model Building Code (MBO)	Version November 2000	For interior emergency stairwells and fire escapes in buildings of more than 13 m	At the highest point	With a free cross-section of at least 1 m^2	Ground floor and highest landing	Fire escapes: Windows which can be opened directly to the outside with a free cross-section of at least 0.5 m^2 on each above-ground floor
Baden-Württemberg	Federal state code (LBO)	Version November 2000	No regulation regarding smoke dissipation/smoke extraction -> only for special construction				Ventilation to a sufficient degree in lavatories + bathrooms
Bavaria 2008	Federal state code (LBO)	14/July 2007	For interior emergency stairwells and fire escapes in buildings of more than 13 m	At the highest point	With a free cross-section of at least 1 m^2	Ground floor and highest landing	Fire escapes: Windows which can be opened directly to the outside with a free cross-section of at least 0.5 m^2 on each above-ground floor
Berlin	Federal state code (LBO)	11/June 2006	For interior emergency stairwells and fire escapes in buildings of more than 13 m	At the highest point	With a free cross-section of at least 1 m^2	Ground floor and highest landing	Fire escapes: Windows of at least 0.6 m x 0.9 m (width x height) which can be opened directly to the outside on each above-ground floor and have a railing of not more than 1.20 m
Brandenburg	Federal state code (LBO)	16/July 2003	For interior emergency stairwells and fire escapes in buildings of more than 13 m. Not for residential buildings of fewer than two flats	At the highest point	With a free cross-section of at least 1 m^2	Ground floor and highest landing	Fire escapes: Windows which can be opened directly to the outside with a free cross-section of at least 0.5 m^2 on each above-ground floor
Bremen	Federal state code (LBO)	27/March 1995	Buildings of more than 5 floors above the building surface as well as interior stairwells	At the highest point of the stairwell	With a free cross-section of at least 5 percent of the footprint, but at least 1 m^2	Ground floor and highest landing. Additional control-sections can be approved.	Fire escapes located on the exterior wall: Windows of at least 0.6 m x 0.9 m (width x height) which can be opened directly to the outside on each above-ground floor and have a railing of not more than 1.20 m
Hamburg	Federal state code (LBO)	14/December 2005	For interior emergency stairwells and fire escapes in buildings of more than 13 m	At the highest point	With a free cross-section of at least 1 m^2	Ground floor and highest landing	Fire escapes: Windows which can be opened directly to the outside with a free cross-section of at least 0.5 m^2 on each above-ground floor

Continuation:

Federal state	Code	Status	Smoke dissipation when?	Smoke dissipation where?	Smoke dissipation how big?	Control-sections where?	Ventilation
Hesse	Federal state code (LBO)	18/June 2002	For interior emergency stairwells in Class 5 buildings	At the highest point	With a free cross-section of at least 1 m^2	Ground floor and highest landing	Fire escapes: Windows which can be opened directly to the outside with a free cross-section of at least 0.5 m^2 on each above-ground floor
Mecklenburg-Western Pmerania	Federal state code (LBO)	18/April 2006	For interior emergency stairwells and fire escapes in buildings of more than 13 m	At the highest point	With a free cross-section of at least 1 m^2	Ground floor and highest landing	Fire escapes: Windows which can be opened directly to the outside with a free cross-section of at least 0.5 m^2 on each above-ground floor
Lower Saxony	Federal state code (LBO)	Version November 2000	No statement regarding smoke dissipation/smoke extraction				Stairwells must be able to be ventilated
North Rhine-Westphalia	Federal state code (LBO)	1/March 2000	Buildings of more than 5 floors above the building surface as well as interior necessary stairwells	At the highest point of the stairwell	With a free cross-section of at least 5 percent of the footprint, but at least 1 m^2	Ground floor and highest landing. Additional control-sections can be approved.	Fire escapes: Windows which can be opened directly to the outside with a free cross-section of at least 0.5 m^2 on each above-ground floor
Rhineland-Palatinate	Federal state code (LBO)	24/November 1998	Buildings of more than 5 floors above the building surface as well as for fire escapes which are not located on the exterior wall	At the highest point of the stairwell	With a free cross-section of at least 5 percent of the footprint, but at least 1 m^2	Ground floor and highest landing. Additional control-sections can be approved.	Stairwells must be able to be ventilated. For building classes 4 + 5, requisite fire escapes located on the exterior wall must have windows of at least 0.6 m x 0.9 m (width x height) which can be opened directly to the outside on each above-ground floor and have a railing of not more than 1.2 m
Saarland	Federal state code (LBO)	18/ February 2004	For interior emergency stairwells and fire escapes in buildings with a height of more than 13 m	At the highest point of the stairwell	With a free cross-section of at least 1 m^2	Ground floor and highest landing	Fire escapes: Windows which can be opened directly to the outside with a free cross-section of at least 0.5 m^2 on each above-ground floor
Saxony	Federal state code (LBO)	28/May 2004	For interior emergency stairwells and fire escapes in buildings with a height of more than 13 m	At the highest point	With a free cross-section of at least 1 m^2	Ground floor and highest landing	Fire escapes: Windows which can be opened directly to the outside with a free cross-section of at least 0.5 m^2 on each above-ground floor
Saxony-Anhalt	Federal state code (LBO)	20/December 2005	For interior emergency stairwells and fire escapes in buildings with a height of more than 13 m	At the highest point of the stairwell	With a free cross-section of at least 1 m^2	Ground floor and highest landing	Fire escapes: Windows which can be opened directly to the outside with a free cross-section of at least 0.5 m^2 on each above-ground floor
Schleswig-Holstein	Federal state code (LBO)	10/January 2000	Buildings of more than 5 floors above the building surface as well as interior necessary stairwells	At the highest point of the stairwell	With a free cross-section of at least 5 % of the footprint, but at least 1 m^2	Ground floor and highest landing. Additional control-sections can be approved.	Fire escapes located on the exterior wall: Windows of at least 0.6 m x 0.9 m (width x height) which can be opened directly to the outside on each above-ground floor and have a railing of not more than 1.2 m
Thuringia	Federal state code (LBO)	16/March 2004	For interior emergency stairwells and fire escapes in buildings with a height of more than 13 m	At the highest point of the stairwell	With a free cross-section of at least 1 m^2	Ground floor and highest landing	Fire escapes: Windows which can be opened directly to the outside with a free cross-section of at least 0.5 m^2 on each above-ground floor

3.1.2 Requirements of the Master Special Building Codes

For the following special constructions, there are special building codes:

- Multi-storey buildings
- Accomodation locations
- Retail locations
- Public assembly locations
- Schools
- Hospitals
- Industrial constructions

Note: In the following, you will find currently valid extracts. Regular updating is to be considered.

Special building code	Status	System
Master school building code	Version July 1998	Smoke extraction
Master retail location code	Version September 1995	Smoke extraction and ventilation
Master public assembly location code	Version June 2006	Smoke dissipation/smoke extraction and ventilation
Master hospital building code	Version December 1976	Smoke extraction and ventilation
Master industrial building code	Version March 2000	Smoke dissipation/smoke extraction and ventilation
Master multi-storey building code	Version May 1981	Smoke dissipation/smoke extraction and ventilation

3.2 Building product law

In building product law, the regulations for building products are governed.

EN 12101 Part 2
Statutory guidelines
The harmonized EN 12101 Part 2 defines the requirements for the building product NRWG and governs its testing, classification and CE identification. The objective of CE identification is the facilitation of importing and exporting goods within the EU.

The norm sets the following guidelines for testing and classifying NRWGs:
- Determining of the aerodynamic opening surface area
- Reliability testing
- Performance testing under load
- Performance testing at a low ambient temperature
- Stability testing with wind strain
- Heat exposure testing

Certification in accordance with EN 12101 Part 2
The conformity process of EN 12101-2 is described in appendix ZA.

Product	Application	System of the certificate of conformity
Natural smoke and heat extraction units	Fire protection	1

The appendix ZA of this norm requires the following imperatively:
- Initial type testing (ITT)
- In-house production control
- Initial visit and continuous external quality control by a notified body

GEZE drives which can be installed in GEZE NRWGs certified and tested in accordance with EN 12101 Part 2 are identified separately in Section 6ff. The GEZE NRWG planning document is available for a more precise system description and additional more detailed information regarding NRWGs.

Additional important guidelines include the **MLAR** (master line system guidelines) and **DIN VDE 0833: Requirement for master line system lines (Version March 2000)**
In accordance with the master line system guidelines (MLAR), maintenance of performance of the E30 classification is sufficient for natural smoke extraction systems. These lines must be tested and approved in accordance with DIN 4102 Part 12. Line laying must be carried out according to the line manufacturer's specifications with respective fastening materials.

Exceptions according to the MLAR (Version March 2000)
Maintenance of performance for the smoke and heat extraction lines can be foregone if a fire early detection trigger element with the SMOKE parameter (smoke detector) monitors the entire line and triggering the automatic detector causes the smoke and heat extraction system to be opened. In practice, this means: Rooms through which a smoke and heat extraction system line leads and in which smoke and heat extractor system components are fitted must be monitored by smoke detectors if the line should not be designed in E30.

In-wall line laying
It is to be observed that in-wall laying does not represent an approved laying method for achieving maintenance of performance following DIN 4102 Part 12. If one wishes to comply with the requirements with lines laid in-wall, they must either also have the E30 classification or the room must be secured with smoke detectors.

Service life
Referring to **DIN VDE 0833-2 (6.1.6 / 2004)** the smoke and heat extraction system must be able to "be sustained for a service life of 72 hours", even during a power outage.

3.3 Care and maintenance

According to the Model Building Code (MBO) building owners or principals are basically obliged to undertake proper maintenance since building installations "are to be laid out, built, altered and maintained in such a way that public safety and order and in particular, life, health and the natural basis of life are not endangered". Building products must not be used without proper maintenance and upkeep. **(cf. Art. 3, Para. 1 and 2 MBO).**
The building owner or contractor must at his responsibility look after care, maintenance and inspection. All components must be checked regularly for damage or deformation.
The operator of an RWA installation is obliged to take all necessary precautions to prevent endangerment of persons and property inside the building.
By carrying out regular maintenance of the smoke and heat extraction systems in the interests of their functionality he will very decisively reduce the actual risk of damage and consequently his risk of liability in the event of a claim. He can in this way document at all times that he has fulfilled his obligation to keep the RWA installation in a state fit for service and operation.

A selection of regulations and public statutes

Basic Constitutional Law, Art. 2:
"Everyone has the right to physical integrity".

MBO Art. 3, Para. 1 (Version November 2002)
"Installations are to be laid out, built, altered and maintained in such a way that public safety and order and in particular, life, health and the natural basis of life are not endangered".

MBO Art. 14 (Version November 2002)
"Building installations are to be laid out, built, altered and maintained in such a way that the occurrence of fire and the spreading of fire and smoke is prevented and in the event of a fire, it will be possible to save people and animals and fight the fire effectively".

DIN VDE 0833-1 (5.3.4 / 2003)
"Maintenance should be carried out at least once per year on the basis of the manufacturer's information and taking into account special service conditions".

DIN 18232 Part 2 (Version November 2007)
At regular intervals as specified by the manufacturer but as a rule once per year smoke extraction systems and their operating and control elements, opening units, incoming power lines and accessories must be inspected for functional capability and service readiness, maintained and if necessary repaired. Inspections and maintenance work must be logged in an inspection book. Inspections shall only be carried out by specialized companies qualified for natural smoke extraction systems.

Directive on the monitoring of building installations
In addition to the regular annual inspection, smoke and heat extraction systems in buildings of a special nature and utilization – such as office buildings, places of assembly, large multistorey car parks – must be inspected at three-year intervals by an expert officially recognized or recognized under building legislation.
Regular maintenance is an essential precondition of these statutory inspections. As a rule the maintenance company will take over the obligation of the operator to provide suitable specialists for the inspection of the installations conducted by the expert.
Requirements relating to care and maintenance are laid down separately in the technical installations inspection directives of the individual German states.

For this reason the following points should be observed without fail as regards the care and maintenance of smoke and heat extraction systems:

- Smoke and heat extraction systems are to be serviced and repaired if necessary at least once a year.
- Only qualified personnel are permitted to carry out maintenance work Proof must be submitted of such qualifications. Authorization by GEZE is required.
- Inspections must be logged in an inspections book.

Support during installation and commissioning

GEZE provides support in system consultation, either through authorised partners or the head office. Installation and performance testing of a smoke and heat extraction system must always be carried out by the manufacturer or a specialized company authorised by the manufacturer, as it is only then ensured that the system-relevant functions are executed correctly. The acceptance of the smoke and heat extraction system must be carried out by an expert.

3.4 Summary of laws and guidelines:

In general, these regulations result in the essential requirements for a smoke and heat extraction system:

- In accordance with the MBC, smoke dissipation with a free cross-section of at least 1 m^2 is required for interior emergency stairwells and fire escapes in buildings with a height of more than 13 m. The smoke dissipation vent is to be installed at the highest point and the control-section at the highest point and on the ground floor
    - Please always observe the valid federal state codes and state-specific special building codes
- In case of power outage, the smoke and heat extraction system must also remain operational for 72 hours (DIN VDE 0833 Part 2)
- For natural smoke extraction systems, lines of the classification E30 are normally sufficient (DIN 4102-12 and MLAR).
- The smoke and heat extraction system shall be serviced at least once annually in accordance with DIN 18323 Part 2
    - Please always observe the valid technical testing regulations of the respective federal state

4 GEZE smoke and heat extraction systems

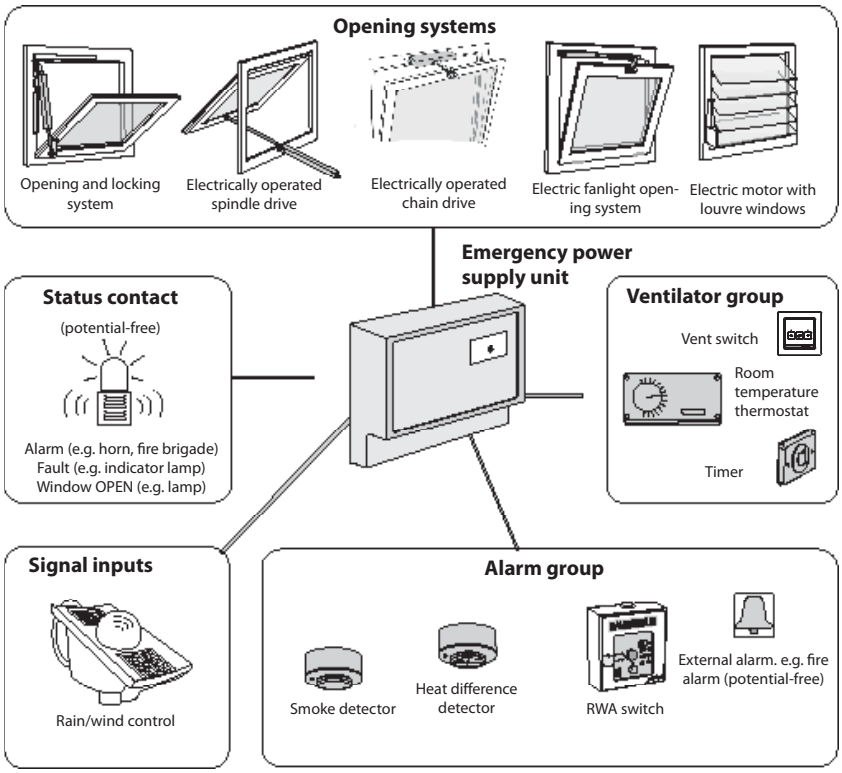


Fig. 4 -1 · Overview of RWA systems

System structure and functional description

The control system of an electrically operated smoke and heat extraction system basically consists of the components shown in the system illustration. The system covers two major task groups: **emergencies** and **and routine ventilation.**
A GEZE smoke and heat extraction system is used for the routine ventilation of rooms and also, in the event of fire, for smoke extraction. Here the emergency power supply unit controls smoke and heat extraction. The windows, smoke flaps and light domes are opened and closed by means of electric drives. For ventilation purposes control is via vent switch, rain/wind control or timer and in the event of an alarm, manually via RWA switch or automatically via smoke or heat difference detectors. In addition, optional alarm signals can be connected up as well.

RWA systems, consisting of at least:

- The opening system
- The emergency power supply unit
- The RWA switch
- An automatic triggering such as a smoke detector

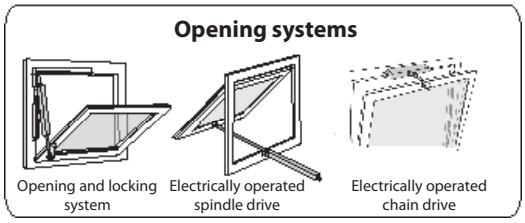
Other components are optional.

If the system is also to be used for ventilation, further components will be required, such as vent switches In the event of an alarm the windows will open up to their full opening angle. In this case the vent switches will not be functional. The windows are closed via the RWA switches or by resetting the alarm in the central control unit. The RWA central control unit E 260 N looks after control of these different functions. It supplies the system components with power and bridges power outages. Die wichtigsten Bestandteile und Funktionen der RWA-Zentrale werden nachfolgend näher beschrieben.

NRWG

The NRWG consists of the following components and where the building code requires a "smoke extractor" is a mandatory component of the RWA system:

- Drive with brackets
- Window profile
- Window panel
- Window fittings
- Seals



Our GEZE NRWGs can of course also be used for daily ventilation.
For detailed information about GEZE NRWGs, please refer to GEZE NRWG planning document.

Calculation fundamentals and designs of the leaves

Smoke and heat extraction opening

The elements through which smoke gases can escape in the event of fire are referred to as smoke and heat extraction system vents. Due to physical laws and guidelines resulting from them, the vents must always be placed in the upper part of the building section from which smoke is to be extracted. The size, type and design of this opening element are of significant importance for the optimum effectiveness of natural smoke extraction. As a rule, the opening element should be designed in such a way that smoke gases can escape to the outside of the building as unhindered as possible. The installation position must be selected so that neither the window casement itself, nor constructional circumstances such as e.g. wall projections, stairs, ventilation channels, etc. hinder air in escaping. Smoke and heat extraction system vents and operating elements shall not compromise escape and rescue routes.

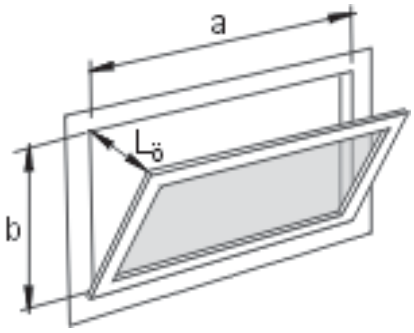
- **Geometric opening area e.g. for smoke dissipation**

  There is no uniform regulation for the calculation of the free geometric opening area A_v of smoke disspiation openings in the vertical wall, in accordance with the requirements in the federal state building codes. The calculation details listed below are recommendations for the various window types and opening forms often used in practice. The underlying calculations for each respective object must be adapted to the responsible fire prevention authorities.

Geometric opening area (A_v):

$$A_v = L_{ö} \cdot a$$

Constraints due to recessed installation layouts or wall projections are to be factored in but have decreased significance with larger opening widths.
The free minimum ventilation area is determined by building codes and the constructional circumstances: e.g. a free cross-section of 5 % of the footprint for stairwells, but at least 1 m².
Using these values, the number and size of the ventilation leaves can be calculated.



$L_{ö}$: clear opening width [m]
a: clear opening breadth [m]
b: clear opening height [m]

Fig. 16 -1 · Opening areas

- **Aerodynamic opening area (following EN 12101 Part 2)**

  The aerodynamic opening surface is the product of:

  clear frame dimensions and **flow coefficient c_{V0}**

  Aerodynamic opening area (A_A):

$$A_a = a_{clear} \cdot b_{clear} \cdot c_{V0}$$

The c_{V0} value can be found in the den GEZE product passes for the individual GEZE NRWGs.

Exemplary calculation

The following data is available:

1. Smoke dissipation area $A_{a(required)}$ = 8m² in a side wall
2. Casement format LAB x LAH in mm: 1200 x 900 , clear frame dimensions FCB x FCH in mm: 1136 x 836
3. Schüco System AWS65 / casement profile 373090
4. Opening type: Outward opening top hung casement

Determining the geometric reference area A_v:

The geometric reference surface is determined with the clear frame demensions FCB and FCH.

A_v = FCB x FCH [in m²] = 1.136 m x 0.836 m = 0.95 m²

Determining the ratio B/H:

The ratio B/H is determined with the clear frame dimensions FCB and FCH.

B/H = 1136 / 836 = 1.36

Determining the opening angle:

The following NRWG systems are applicable for the case of application "outward opening top hung casement":

- RWA 110E (solo)
- Direct opener E250 VDS (solo)

Determining the aerodynamic opening area:

Opening angle [DEG]										
	Side ratio	c_{v0} values								
		0.25	**0.3**	**0.35**	**0.4**	**0.45**	**0.5**	**0.55**	**0.58**	**0.6**
Outward opening bottom hung, top hung	B/H < 0.45	-	-	-	22	29	36	50	-	-
	B/H < 1	-	22	27	34	42	52	78	-	-
	B/H < 2.25	25	29	34	41	49	62	-	-	-
	B/H <= 5	27	32	27	44	53	66	-	-	-

There is an opening angle of 55° for the smoke and heat extraction system 100E with opening angle. This lies between the opening angles given in the table of 49° and 62° For interim values, the C_{v0} value must be determined.
Here there is an average between C_{v0} 0.45 and 0.5 ➢ **0.475**.
Determining the flow coefficient for the NRWG of the direct opener EE250 VDS shall be executed along these lines.

Summarised, the results for the various NRWG systems are:

System	Opening angle for LH 900 mm	Flow coefficient c_{v0}
Smoke & heat extraction 110E Stroke 300 mm	55°	0.475
Direct opener E250 VDS Stroke 500 mm	33°	0.325

Determining the number of NRWG elements:

The number n of requisite NRWG elements is determined with the following equation

$n = A_{a(required)} / (A_v \cdot c_{v0})$ [in m²]

For the various NRWG elements, the following results:

System	Flow coefficient c_{v0}	geometr. Reference area A_v	Number n
Smoke & heat extraction 110E Stroke 300mm	0.475	0.95 m²	18
Direct opener E250 VDS Stroke 500 mm	0.325	0.95 m²	26

5 Opening systems

As part of their double function, GEZE smoke and heat extraction opening systems can be used for routine ventilation as well as for safe and fast smoke and heat extraction or for smoke dissipation.
In contrast to standard ventilation drives, the opening systems for smoke and heat extraction have motors with a voltage of 24 Volt DC to ensure the smoke and heat extraction opens also in case of a power outage. In order to ensure a smoke and heat extraction system functioning at all times, an emergency power supply designed for 24 Volt DC is therefore necessary.

As a rule, the following opening systems can be used:

- **As direct openers**

  RWA - Electrically operated spindle drives
  E250, E1500, E1500 VdS and E3000
  (see Section 5.1)

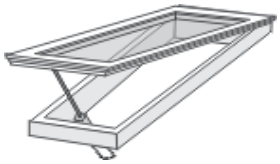


Fig. 18 -1 · RWA spindle drive

  RWA - Electrically operated chain drives
  E600, E620, E640, E660 and E680
  (see Section 5.2)

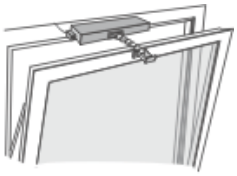


Fig. 18 -2 RWA chain drive

- **As opening and locking systems**

  Smoke and heat extraction systems 100E, 105E or 110E
  (see Section 5.3)

Fig. 18 -3 · RWA opening and locking system

- **As a fanlight opening system**

  Fanlight opening system with electric linear drive
  E212 or E205 (see Section 5.4)

Fig. 18 -4 · Skylight opener with electric linear drive

Please observe the guidelines for power-operated windows, doors and gates BGR 232 for all opening systems.

6 RWA - Electrically operated spindle drives as direct openers

6.1 RWA - Electrically operated spindle drive E250 as a direct opener

The Electrically operated spindle drive E 250 serves for direct opening of bottom, top hung windows and skylights as well as light domes with standard brackets made of light alloy that can be slid lengthwise.
The E250 AB with ventilation element is suitable for use in locations with large temperature fluctuations and in protected exterior areas.
In the case of very large and heavy leaves, 2 drives (left and right) with a tandem function can be fitted. Connection is via special tandem switch E102 / 24 V.
Important: This tandem function is recommended with a main closing edge of 1.2 m or longer.

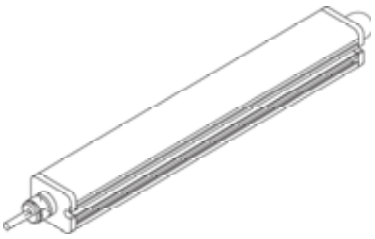


Fig. 19 -1 · Electrically operated spindle drive E250

- **Product features**
  - Electrically operated spindle drive for daily ventilation as well as safe and fast smoke and heat extraction and smoke dissipation
  - An elegant and technically advanced solution for the direct opening of bottom hung, top hung and side hung leaves, skylights and light domes
  - Due to its compact design it is suitable for use with small windows
  - Technically advanced detail solutions such as internally located cable guide and mechanical load disconnection
  - Pushing/pulling force: 750 N
  - Stroke: 100-1000 mm (longer strokes on request)
  - n the case of very large and heavy leaves, 2 drives with a tandem function can be fitted; connection via special tandem switch E102
  - The E250 AB with ventilation element is suitable for use in locations with large temperature fluctuations and in protected exterior areas
  - In combination with our opening and locking systems RWA 100 E / RWA 105 E / RWA 110 E, the motor fitting closely to the frame reaches large opening widths quickly (< 60 seconds) at a low spindle stroke

  - **The E250 VdS electrically operated spindle drive is suitable for installation in inspected and certified GEZE NRWGs in accordance with EN 12101-2**

Technical product data	
Stroke length	100, 150, 200, 230, 300, 500, 700, 750 or 1000 mm (Stroke limitation possible)
Protection type	IP 65
Cables	Cables 3 x 0.75 mm^2, 2 metres; special version 10 m
Operating voltage	Operating voltage 24 V DC (-25%, +45%)
Current consumption	Current consumption 0.8 A (for E250 VdS, Stroke 500; 1.7 A)
Load factor	Load factor 100 % (E250 Vds 30%)
Temperature range	Temperature range -20 °C to +70 °C (E250 Vds -5 °C to +75 °C)
Lift force at spindle for all strokes	Lift force at the spindle for all strokes 750 N (E250 Vds lift force 500N)

▸ **Range of applications:**

Bottom hung, top hung and side hung windows

▸ **inward opening**

- Permissible casement weight **without** factoring in additional loads:
  Solo: max. 100 kg
  Tandem: max. 200 kg
- Max. permissible motor stroke: 500 mm

Fig. 20 -1 · Inward opening window

Minimum casement heights	
Stroke	**Casement height**
100 mm	---
150 mm	---
200 mm	200 mm
230 mm	230 mm
300 mm	300 mm
500 mm	600 mm

▸ **Outward opening**

- Permissible casement weight**without**factoring in additional loads:
  Solo: max. 100 kg
  Tandem: max. 200 kg
- Max. permissible motor stroke: 500 mm

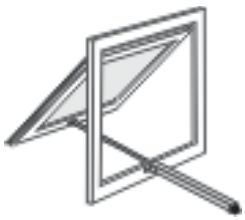


Fig. 20 -2 · Outward opening window

Minimum casement heights	
Stroke	**Casement height**
100-300 mm	400 mm
500 mm	600 mm

Skylights and light domes

- Permissible casement weight**without**factoring in additional loads:
  Solo: max. 100 kg
  Tandem: max. 200 kg
- Max. permissible motor stroke: 1000 mm

Minimum casement heights	
Stroke	**Casement height**
100 mm	220 mm
150 mm	270 mm
200 mm	320 mm
230 mm	350 mm
300 mm	440 mm
500 mm	670 mm
700 mm	910 mm
750 mm	980 mm
1000 mm	1270 mm

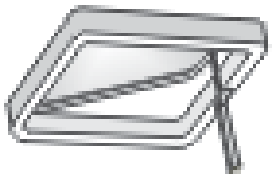


Fig. 20 -3 · Skylight

Swivelling bracket for E250

With the swivelling bracket the direct opener can be fitted in a tandem version directly to the side closing edge and thus results in greater opening widths in comparison to fitting with comparable stroke at the main closing edge of the skylight.

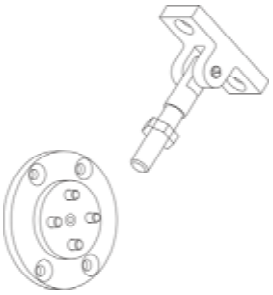


Fig. 21 -1 · Swivelling bracket

Permissible total casement weight F_{gmax} with swivelling brackets:

$$F_{gmax} = \frac{200 * X}{H}$$

X= mounting dimension,
H= casement height

Drives at the side closing edges

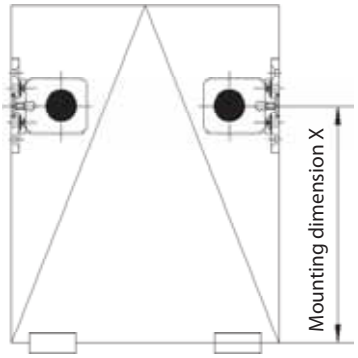


Fig. 21 -2 · Stop on the side closing edge

Opening angle

Diagram for determining the opening angle J depending on the stroke and mounting dimension X.

(for casement heights H larger than 1000 mm: dimension X should be min. 1/2 H).

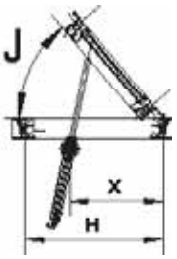
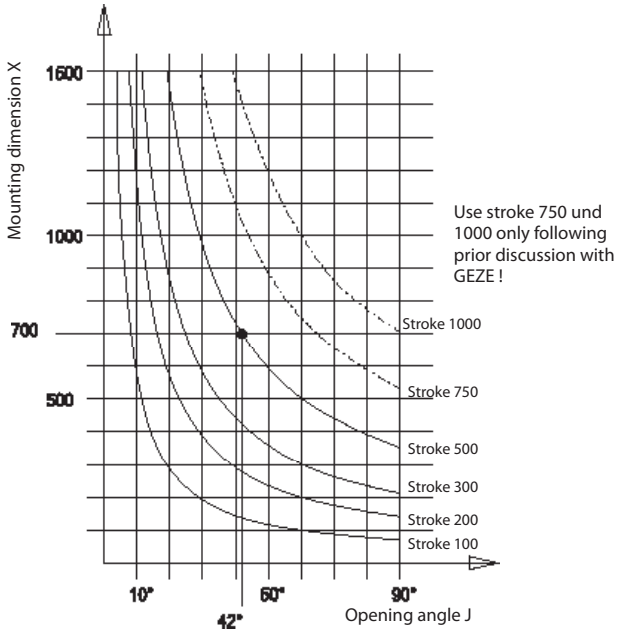


Fig. 21 -3 · Opening angle



Example: Stroke 500, mounting dimension X=700 mm
-> Opening angle = approx. 42°

Fig. 21 -4 · Diagram

Notes:

Snow and wind loads should also be taken into consideration.

Stroke 750 and 1000 only upon request

Note for all installation examples:

The stipulated minimum casement heights are only reference values as they depend on installation situation, mounting dimension and stroke.

The drive may not hit another component or other hindrances in the swivel range.

6.2 RWA - Electrically operated spindle drive E1500 as a direct opener

For motorised opening and closing of bottom, side and top hung windows and also skylights. Can be used variable for natural smoke and heat extraction and smoke dissipation as well as for ventilation, or as both a solo drive and a synchronous solution for especially heavy and wide casements. The synchronous control unit E1500 is required for the synchronous operation.
Important: This synchronous solution is recommended with a main closing edge of 1.2 m or longer.

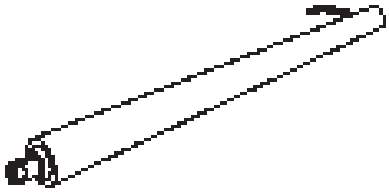


Fig. 22 -1 · Electrically operated spindle drive E1500

- **Product features:**
  - Electrically operated spindle drive for daily ventilation as well as safe and fast smoke and heat extraction and smoke dissipation
  - For motorised opening and closing of bottom, side and top hung windows and also skylights
  - Pushing or pulling force of 1500 N
  - Stroke length up to 1000 mm
  - Can be used not only as a solo drive but also as a genuine synchronous solution
  - High protection type of IP65

Technical product data	
Dimensions	Length approx. 302 mm + stroke, diameter 36 mm
Pushing/pulling force	max. 1500 N
Stroke length	300, 500, 750 or 1000 mm
Protection type	IP 65
Rated current	approx. 0.7 A*
Turn-off current	1.2 A*
Start-up speed	2.4 mm/s*
Load factor	30%
Ambient temperature	-5 °C to +75 °C

* Calculated force = 2/3 of the maximum force

▸ **Range of application:**

Inward and outward opening bottom and top hung windows

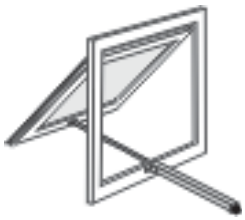


Fig. 23 -1 · Top hung window

- Max. permissible motor stroke: 500 mm

▸ **Casement dimensions:**

Window type	Minimum casement height		Maximum casement width	
	Stroke 300 mm	Stroke 500 mm	Solo	Tandem
Bottom hung windows	650 mm	1200 mm	max. 1200 mm	max. 2400 mm
Top hung windows	400 mm	400 mm		

▸ **Casement weights:**

Top hung window	Stroke			
	300 mm		500 mm	
Casement height	Solo	Tandem	Solo	Tandem
400 mm - 650 mm	max. 180 kg	max. 360 kg	max. 150 kg	max. 300 kg
650 mm - 1200 mm	max. 200 kg	max. 400 kg	max. 170 kg	max. 340 kg
1200 mm - 1700 mm	max. 250 kg	max. 500 kg	max. 200 kg	max. 400 kg

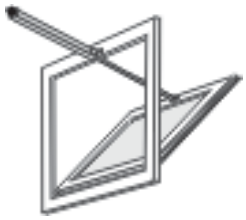


Fig. 23 -2 · Bottom hung window

Bottom hung window	Stroke			
	300 mm		500 mm	
Casement height	Solo	Tandem	Solo	Tandem
650 mm - 1200 mm	max. 200 kg	max. 400 kg	max. 170 kg	max. 340 kg
1200 mm - 1700 mm	max. 250 kg	max. 500 kg	max. 200 kg	max. 400 kg

Skylight:

Max. permissible motor stroke: 1000 mm

Skylight	Solo	Tandem
Casement weights for all strokes	max. 180 kg	max. 360 kg
Maximum casement width	max. 1200 mm	max. 2400 mm

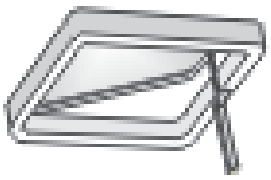


Fig. 23 -3 · Skylight

- **Calculating the swivel range:**

  The space required under the window for drive swivelling depends on the casement height (the higher the casement height, the smaller the swivelling)

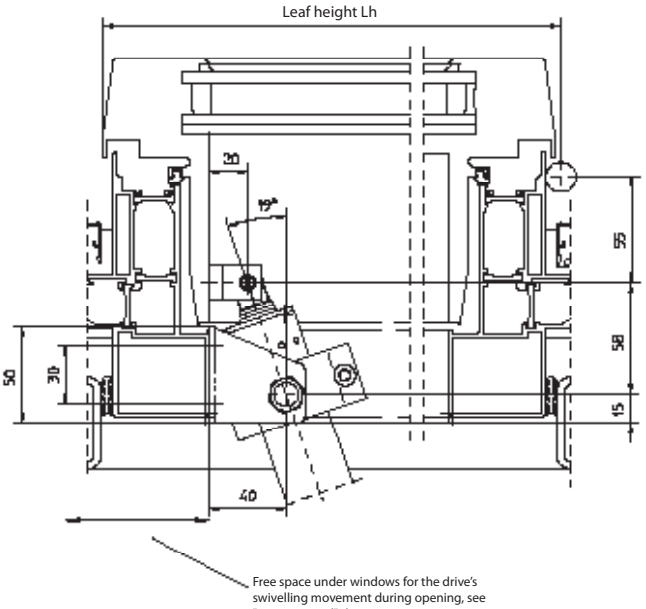
  Note: Depending on the installation situation and the profile, the values can change slighty.
  Depending on the profile, two different skylight consoles can be selected.

- **Skylight console H40**

Installation of spindle drive E1500 at skylights with casement bracket E1500 and skylight console E1500 H40

Benchmarks based on installation example

Attention: The diagram and tables only contain benchmarks and refer to applications as shown below. The values should be calculated by the customer for other installation circumstances.

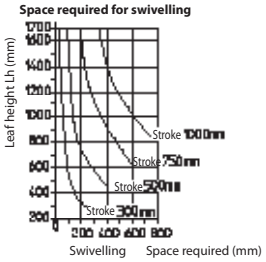


Minimum casement height for E1500 on skylights, benchmarks*

E1500 Stroke (mm)	Leaf height (Lh) (mm)	Opening angle (°)	Space required for drive swivelling under windows (mm)
1000	850	approx. 85°	min. 340
750	640	approx. 85°	min. 590
500	480	approx. 85°	min. 490
300	300	approx. 85°	min. 240

* An installation study is recommended due to the large supply of window profiles and installation possibilities with underlays on the customer's site, especially for limit values.

Space required for swivelling

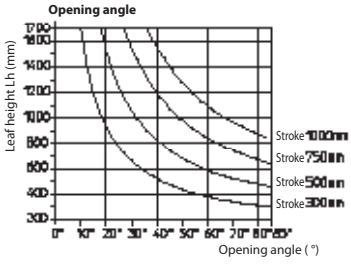


Example: Space required for drive swivelling under skylights with an opening width of approx. 60°

E1500 Stroke (mm)	Leaf height (Lh) (mm)	Opening angle (°)	Space required for drive swivelling under windows ** (mm)
1000	1100	approx. 60°	min. 540
750	850	approx. 60°	min. 410
500	600	approx. 60°	min. 270
300	380	approx. 60°	min. 160

** The space required under the window for drive swivelling depends on the casement height (the higher the casement height, the smaller the swivelling).

Opening angle

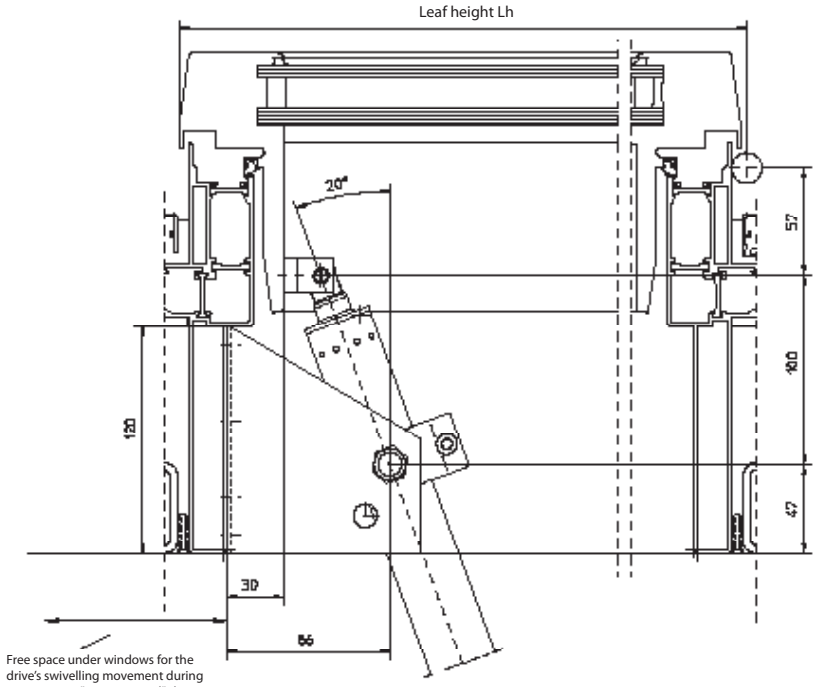


Skylight console H86

Installation of spindle drive E1500 at skylights with casement bracket E1500 and skylight console E1500 H86

Benchmarks based on installation example

Attention: The diagram and tables only contain benchmarks and refer to applications as shown below. The values should be calculated by the customer for other installation circumstances.



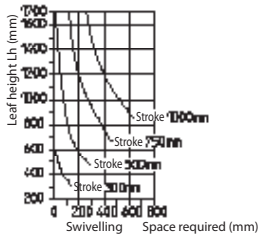
Free space under windows for the drive's swivelling movement during opening, see "pace required" diagram

Minimum casement height for E1500 on skylights, benchmarks*

E1500 Stroke (mm)	Leaf height (Lh) (mm)	Opening angle (°)	Space required for drive swivelling under windows (mm)
1000	850	approx. 85°	min. 640
750	670	approx. 85°	min. 460
500	470	approx. 85°	min. 290
300	310	approx. 85°	min. 140

* An installation study is recommended due to the large supply of window profiles and installation possibilities with underlays on the customer's site, especially for limit values.

Space required for swivelling

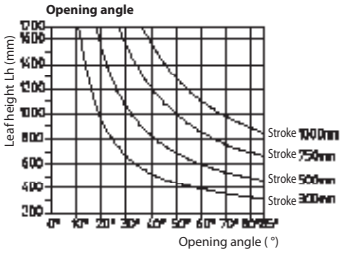


Example: Space required for drive swivelling under skylights with an opening width of approx. 60°

E1500 Stroke (mm)	Leaf height (Lh) (mm)	Opening angle (°)	Space required for drive swivelling under windows ** (mm)
1000	1100	approx. 60°	min. 460
750	850	approx. 60°	min. 300
500	600	approx. 60°	min. 180
300	400	approx. 60°	min. 70

** The space required under the window for drive swivelling depends on the casement height (the higher the casement height, the smaller the swivelling).

Opening angle



Notes:

Snow and wind loads should also be taken into consideration!

An opening width of 600 mm is achieved in ventilation operation for a stroke of 750 mm and 1000 mm. In the case of smoke and heat extraction systems, the respective stroke is extrended completely; in order to be able to then close the window, the reset button must be pressed twice on the RWA switch (e.g. FT4).

6.3 RWA - Electrically operated spindle drive E1500 VdS as a direct opener

The E1500 VdS tested in accordance with VdS 2580 is suitable for electrically operated opening and closing of bottom, top and side hung windows as well as skylights. It can be used variably for natural smoke and heat extraction and smoke dissipation as well as for ventilation. Can be used as both a solo drive and a synchronous solution for especially heavy and wide leaves. In addition, the drive is suitable for installation in tested and certified GEZE NRWGs in accordance with EN 12101-2.
The synchronous control unit E1500 VdS is required for the synchronous operation.
Important: This synchronous solution is recommended with a main closing edge of 1.2 m or longer.

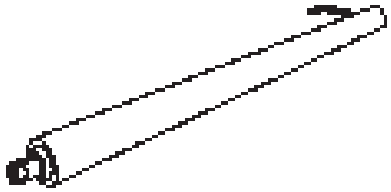


Fig. 26 -1 · Electrically operated spindle drive E1500 VdS

- **Product features:**
  - Electrically operated spindle drive for daily ventilation as well as safe and fast smoke and heat extraction and smoke dissipation
  - For motorised opening and closing of bottom, top and side hung windows as well as skylights
  - Additional variations of the E1500 tested in accordance with VdS 2580 and opens the hub of 400 mm completely within 60 sec.
  - Pushing or pulling force of 1300 N/1500 N (ventilation/NRA)
  - Stroke length 400 mm
  - Can be used not only as a solo drive but also as a genuine synchronous solution
  - High protection type of IP65

  - **The drive is suitable for installation in tested and certified GEZE NRWGs in accordance with EN 12101-2**

Technical product data	
Dimensions	Length approx. 302 mm + stroke, diameter 36 mm
Pushing/pulling force	max. 1300 N/1500 N (ventilation/NRA)
Stroke length	400 mm
Protection type	IP 65
Rated current	approx. 1.7 A*
Turn-off current	2.5A*
Start-up speed	7.1 mm/s*
Load factor	30%
Ambient temperature	-5 °C to +75 °C

* Calculated force = 2/3 of the maximum force

- **Range of application:**
  - Stroke 400 mm

Inward and outward opening bottom and top hung windows

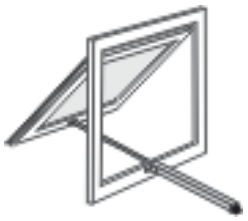


Fig. 27 -1 · Top hung window

- **Casement dimensions:**

Window type	Minimum casement height	Maximum casement width	
	Stroke 400 mm	Solo	Tandem
Top hung windows	400 mm	max. 1200 mm	max. 2400 mm
Bottom hung windows	950 mm		

- **Casement weights:**

Bottom hung windows	Stroke 400 mm	
Casement height	Solo	Tandem
950 mm - 1700 mm	max. 250 kg	max. 500 kg

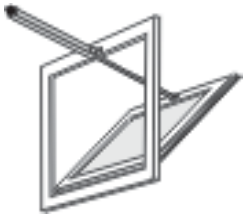


Fig. 27 -2 · Bottom hung window

Top hung windows	Stroke 400 mm	
Casement height	Solo	Tandem
400 mm - 950 mm	max. 170 kg	max. 340kg
950 mm - 1700 mm	max. 250 kg	max. 500kg

Skylight:

Skylight	Solo	Tandem
Casement weights for all strokes	max. 180 kg	max. 360 kg
Maximum casement width	max. 1200 mm	max. 2400 mm

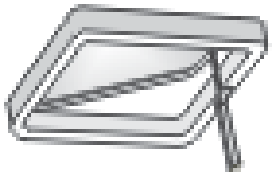


Fig. 27 -3 · Skylight

- **Calculating the swivel range:**
  The space required under the window for drive swivelling depends on the casement height (the higher the casement height, the smaller the swivelling)

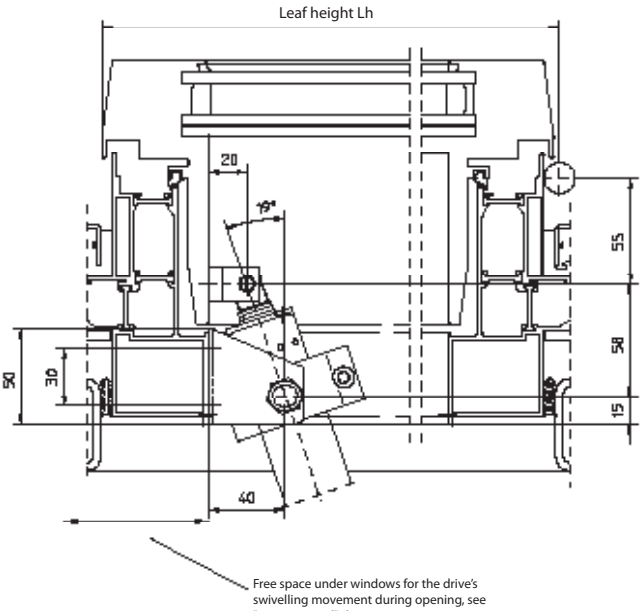
  Note: Depending on the installation situation and the profile, the values can change slighty. Depending on the profile, two different skylight consoles can be selected.

- **Skylight console H40**

Installation of spindle drive E1500 Vds at skylights with casement bracket E1500 and skylight console E1500 H40

Benchmarks based on installation example

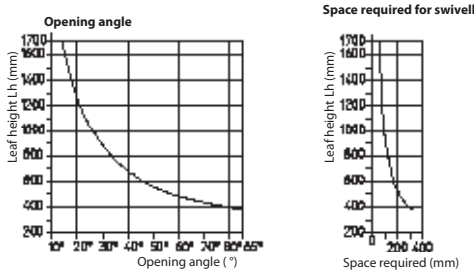
Attention: The diagram and tables only contain benchmarks and refer to applications as shown below. The values should be calculated by the customer for other installation circumstances.



Minimum casement height for E1500 on skylights, benchmarks*

E1500 VdS Stroke (mm)	Leaf height (Lh) (mm)	Opening angle (°) approx.	Space required for drive swivelling under windows ** (mm)
600	360	65°	min. 330

- Installation study is recommended due to the large supply of window profiles and installation possibilities with underlays on the customer's site, especially for limit values.
- ** The space required under the window for drive swivelling depends on the casement height (the higher the casement height, the smaller the swivelling).

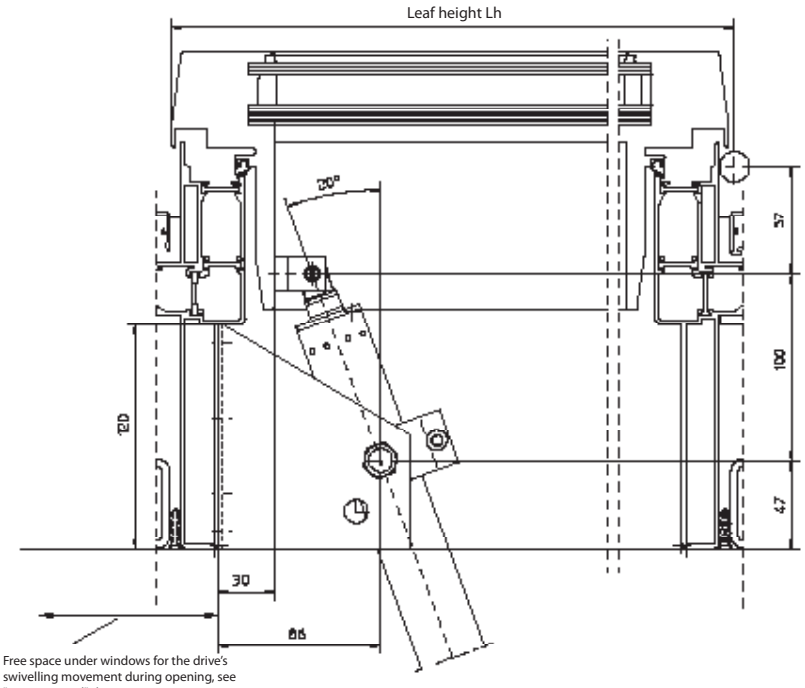


Skylight console H86

Installation of spindle drive E1500 Vds at skylights with casement bracket E1500 and skylight console E1500 H86

Benchmarks based on installation example

Attention: The diagram and tables only contain benchmarks and refer to applications as shown below. The values should be calculated by the customer for other installation circumstances.



Free space under windows for the drive's swivelling movement during opening, see "pace required" diagram

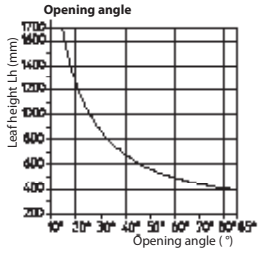
Minimum casement height for E1500 on skylights, benchmarks*

E1500 VdS Stroke (mm)	Leaf height (Lh) (mm)	Opening angle (°) approx.	Space required for drive swivelling under windows ** (mm)
400	390	85°	min. 230

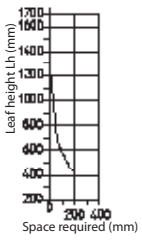
* Installation study is recommended due to the large supply of window profiles and installation possibilities with underlays on the customer's site, especially for limit values.

** The space required under the window for drive swivelling depends on the casement height (the higher the casement height, the smaller the swivelling).

Opening angle



Space required for swivelling



Note:

Snow and wind loads should also be taken into consideration! Depending on the installation situation and the profile, the values can change slighty.

6.4 RWA - Electrically operated spindle drive E3000 as a direct opener

For electrically operated opening and closing of skylights. The E3000 can be used variably for natural smoke and heat extraction and smoke dissipation as well as for ventilation. Can be used as both a solo drive and a synchronous solution for especially heavy and wide leaves.
Important: This synchronous solution is recommended with a main closing edge of 1.2 m or longer.

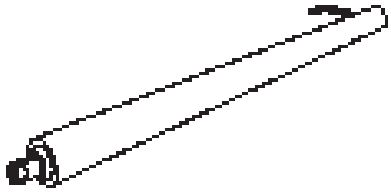


Fig. 30 -1 · Electrically operated spindle drive E3000

- **Product features:**
  - Electrically operated spindle drive for daily ventilation as well as safe and fast smoke and heat extraction and smoke dissipation
  - For electrically operated opening and closing of skylights
  - Pushing or pulling force of 3000 N
  - Stroke length 1000 mm
  - Can be used not only as a solo drive but also as a genuine synchronous solution
  - High protection type of IP54

Technical product data	
Dimensions	Length approx. 465mm + stroke, diameter 50 mm
Pushing/pulling force	max. 3000N
Stroke length	300, 500, 750 or 1000 mm
Protection type	IP 54
Rated current	approx. 3.1 A*
Turn-off current	5.5 A*
Start-up speed	7.8 mm/s*
Load factor	30%
Ambient temperature	-5 °C to +75 °C

- **Range of application:**
  - **Only for skylights**

Skylight	Solo	Tandem
Casement weights for all strokes	max. 300 kg	max. 600 kg
Maximum casement width	max. 1200 mm	max. 2400 mm

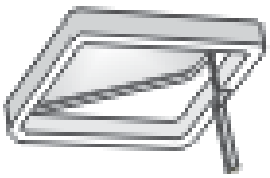


Fig. 30 -2 · Skylights

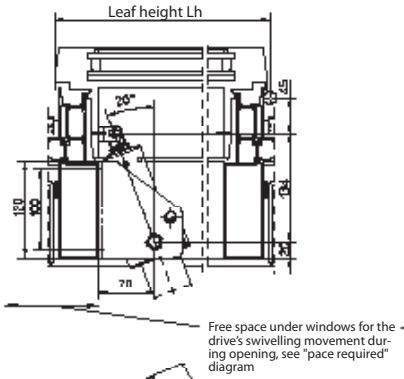
- **Calculating the swivel range:**

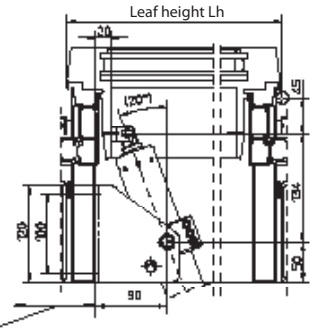
  The space required under the window for drive swivelling depends on the casement height (the higher the casement height, the smaller the swivelling)

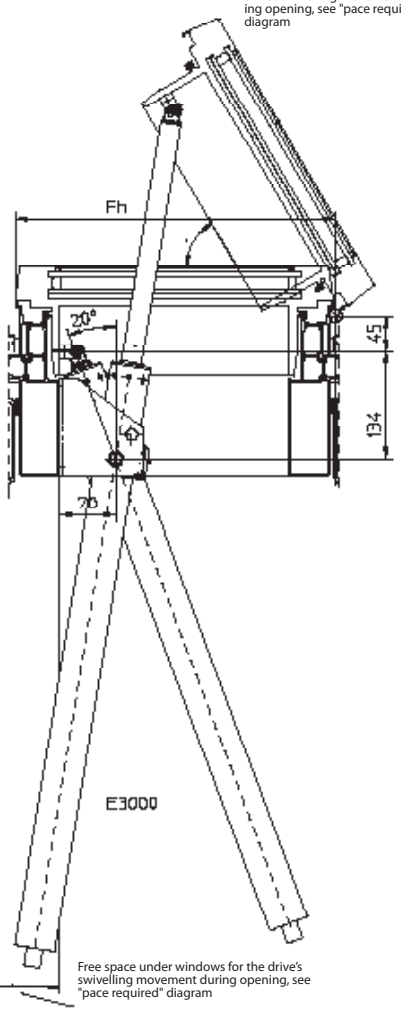
  Note: Depending on the installation situation and the profile, the values can change slighty.

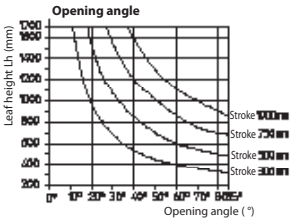
- **Skylight console H86**

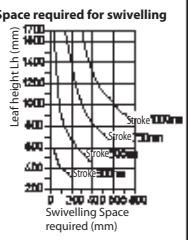
Installation of spindle drive E3000 solo or synchronous at the skylight (main closing edge) with casement bracket E3000 and skylight console E3000 benchmarks based on installation example











Minimum casement height for E3000 on skylights, benchmarks*

E3000 Stroke (mm)	Leaf height (Lh) (mm)	Opening angle (°)	Space required for drive swivelling under windows (mm)
1000	850	approx. 85°	min. 770
750	680	approx. 85°	min. 550
500	480	approx. 85°	min. 370
300	300	approx. 85°	min. 300

* An installation study is recommended due to the large supply of window profiles and installation possibilities with underlays on the customer's site, especially for limit values.

Example: Space required for drive swivelling under skylights with an opening width of approx. 60°

E3000 Stroke (mm)	Leaf height (Lh) (mm)	Opening angle (°)	Space required for drive swivelling under windows ** (mm)
1000	1100	approx. 60°	min. 520
750	850	approx. 60°	min. 380
500	600	approx. 60°	min. 240
300	400	approx. 60°	min. 110

** The space required under the window for drive swivelling depends on the casement height (the higher the casement height, the smaller the swivelling).

Spindle drive E3000 skylights: Range of application

Casement dimensions:
- Leaf height (Lh): Benchmarks see diagram casement widths
  Solo operation max. 1200 mm
  Synchronous operation max. 2400 mm Casement weights:
- for skylights: (Snow and wind loads should also be taken into considertion)
  Solo operation max. 300 kg (for all strokes)
  Synchronous operation max. 600 kg (for all strokes)

Opening width:
Benchmarks see diagrams

Note:

Snow and wind loads should also be taken into consideration!

Overview of electrical spindle drives

Electrically operated spindle drives	E250/ E250 AB	E250 VdS	E1500	E1500VdS	E3000
General range of application					
Window type	Bottom, top hung windows and skylights	Bottom, top hung windows and skylights	Bottom, top hung windows and skylights	Bottom, top hung windows and skylights	Skylight
max. casement weight solo/tandem	100 kg / 200 kg	100 kg / 200 kg	according to stroke	according to casement dimensions	300 kg / 600 kg
Space required	Various, depending on installation type + use of brackets	Various, depending on installation type + use of brackets	Various, depending on installation type + use of brackets	Various, depending on installation type + use of brackets	Various, depending on installation type + use of brackets
Tandem / synchronous operation	Tandem switch E102	Tandem switch E102	Synchronous configuration E1500	Synchronous configuration E1500	Synchronous configuration E3000
Technical data					
Dimensions	Length approx. 240 mm + stroke	Length max. 740 mm + stroke 500 mm	Length approx. 302 mm + stroke, diameter 36 mm	Length approx. 302 mm + stroke, diameter 36 mm	Length approx. 465mm + stroke, diameter 50 mm
Pushing/pulling force	max. 750N	max. 500N	max. 1500N	max. 1300 N/1500 N (ventilation/NRA)	max. 3000N
Stroke length	up to 1000 mm	up to 500 mm	up to 1000 mm	400 mm	up to 1000 mm
Rated current	approx. 0.8 A	Stroke 100-300 mm: 0.8 A Stroke 500 mm: 1.7 A	approx. 0.7 A*	approx. 1.7 A*	approx. 3.1 A*
Turn-off current	0.9 A	Stroke 100-300 mm: 0.9 A Stroke 500 mm: 1.7 A	1.2 A*	2.5 A*	5.5 A*
Pressure speed	5 mm/s	Stroke 100-300 mm: 5 mm/s Stroke 500 mm: 10 mm/s	2.4 mm/s*	7.1 mm/s*	7.8 mm/s*
Load factor	100%	30%	30%	30%	30%
Ambient temperature	-20 °C to +70 °C	-5 °C to +75 °C	-5 °C to +75 °C	-5 °C to +75 °C	-5 °C to +75 °C

* Calculated force = 2/3 of the maximum force

7 RWA - Electrically operated chain drives as direct openers

The GEZE RWA electrically operated chain drives are intended for vertically installed, rectangular bottom, top, side hung, pivoted sash and vertically pivoted windows in dry rooms. The drives E640 and E660 are also suitable for angled windows (e.g. skylights).
For extremely wide or heavy leaves, it is also possible to use two drives in tandem configuration. The tandem switch E102 is required for this.
On the following pages, you will find more detailed information regarding from which height tandem configuration is advisable.

Note: Two safety scissors are required for bottom hung windows.

- **Stop configurations for electrically operated chain motors:**

Inward opening bottom hung window:

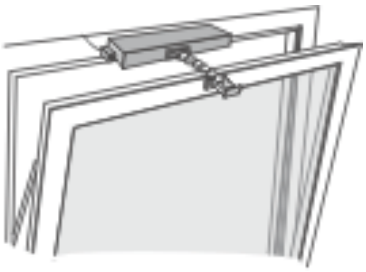


Fig. 33 -1 · Standard installation: Electrically operated drive on frame

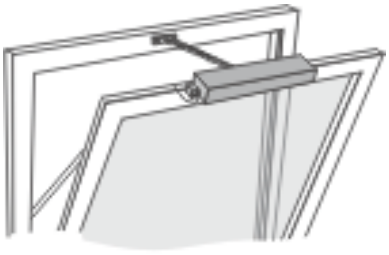


Fig. 33 -2 · Electrically operated drive on leave

Outward opening top hung window:

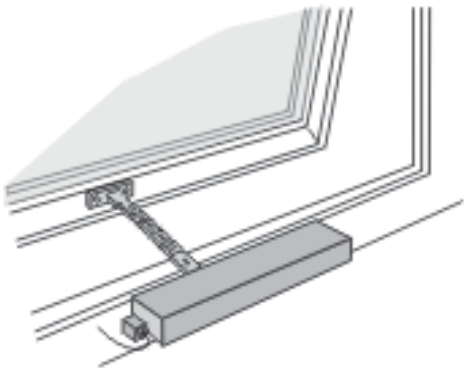


Fig. 33 - 3 · Electrically operated drive on frame

inward opening:

Fig. 33 - 4 · Electrically operated drive on leave

7.1 RWA - Electrically operated chain drive E600, stroke 250 and 370

▸ **Range of application:***

Panel weights for bottom hung and top hung windows, vertical for individual drive stroke 250/370 mm

Casement width a: min. 495 mm;
max. 1500 mm
Casement height b: min. 500 mm (stroke 250) bzw. min. 800 mm (stroke 370);
max. 1500 mm
The respective permissible casement width and height should be calculated based on panel weight.

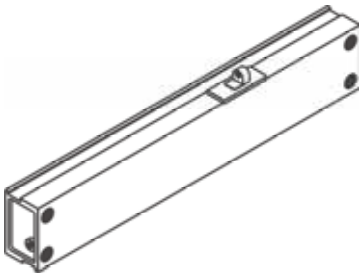


Fig. 34 -1 · Electrically operated chain drive

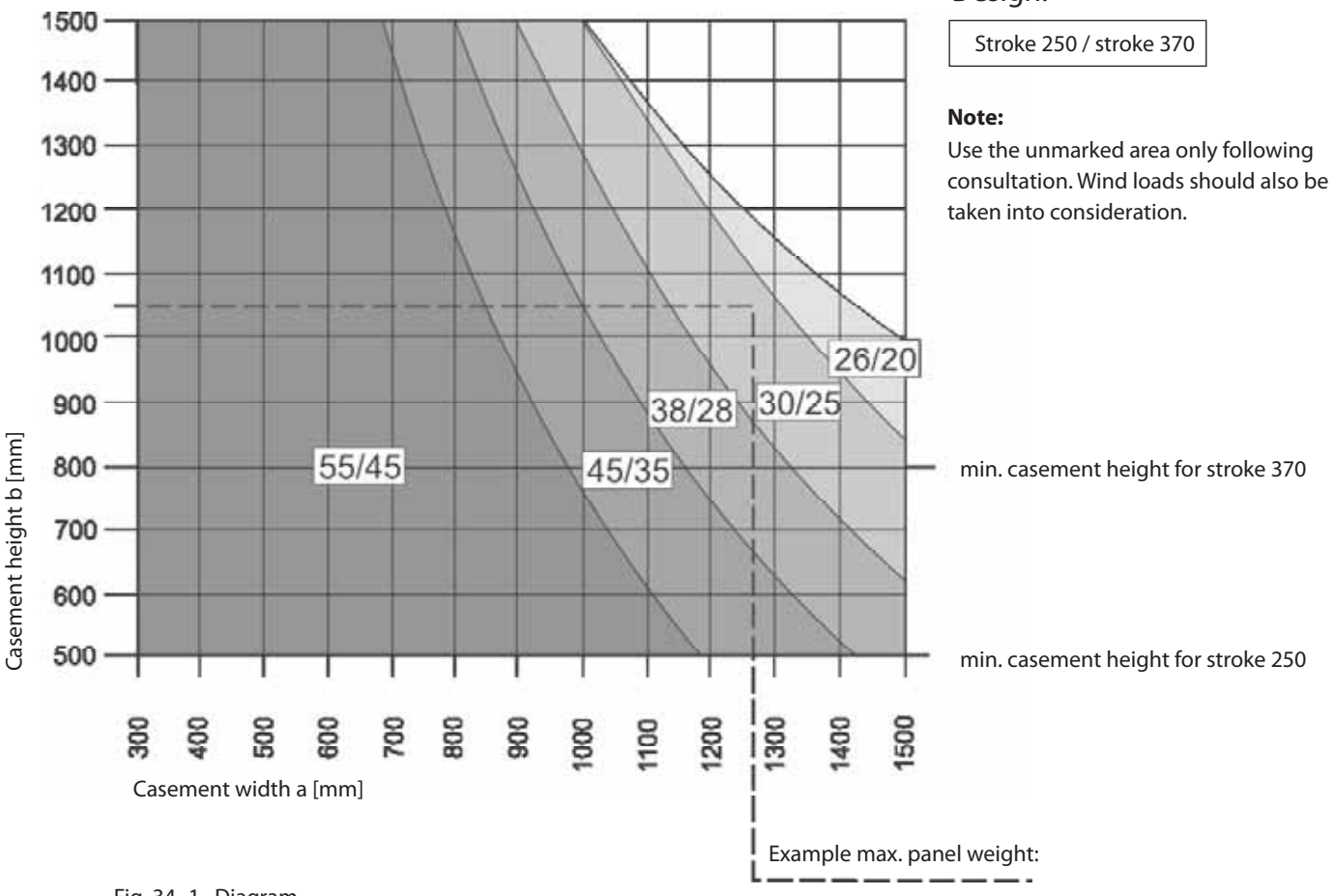


Fig. 34 -1 · Diagram

* Smaller casement dimensions are also possible on request.

▸ **Range of application:**

Panel weights for bottom hung and top hung windows, vertical for tandem drives stroke 250/370 mm

Casement width a: min. 700 mm;
max. 2400 mm
Casement height b: min. 500 mm (stroke 250) bzw. min. 800 mm (stroke 370);
max. 1600 mm
The respective permissible casement width and height should be calculated based on panel weight.

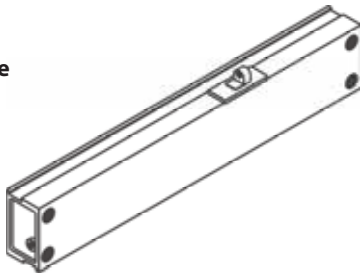


Fig. 35 -1 · Electrically operated chain drive

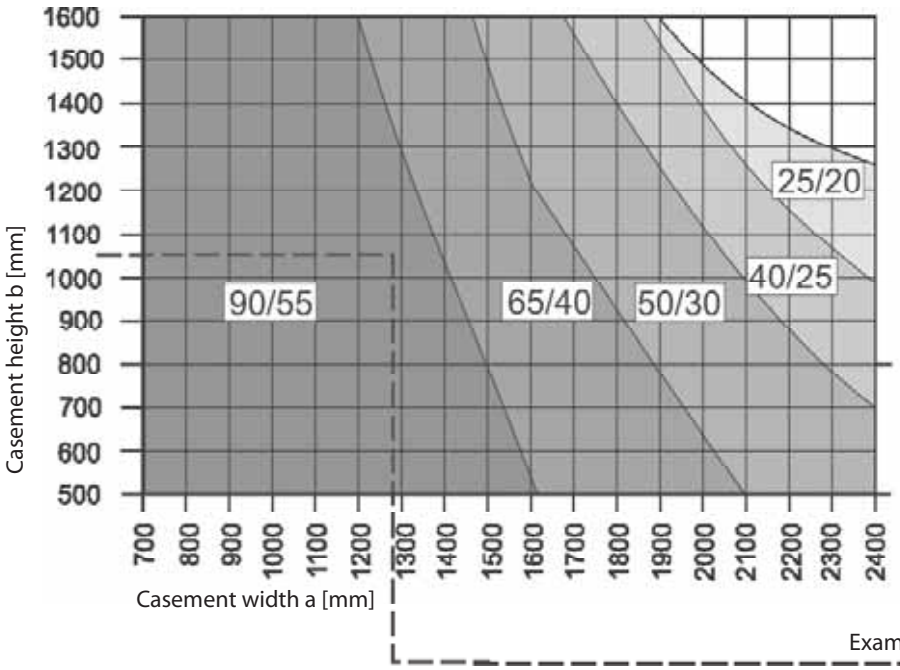


Fig. 35 -1 · Diagram

Design:

Stroke 250 / stroke 370

Note:
Use the unmarked area only following consultation. Wind loads should also be taken into consideration.

min. casement height for stroke 370

min. casement height for stroke 250

Example max. panel weight:

Casement width a = 1270 mm
Casement height b = 1050 mm
Panel weight max. 90 kg/m² for stroke 250
Panel weight max. 55 kg/m² for stroke 370

Exception: Casement heights less than 500 mm (stroke 250) or 800 mm (stroke 370).

For inward opening and outward opening bottom hung and top hung windows from 300 mm to 800 mm.

Bottom hung and top hung windows		min. casement height [mm]	min. casement width [mm]	max. casement weight [kg]	max. panel weight [kg/m²]	Addition
Stroke 250	**Solo**	300 - 500	495	20	30	1*)
	Tandem		700	30	30	
Stroke 370	**Solo**	500 - 800	495	20	30	2*)
	Tandem		700	30	30	

1*) Top hung window: Outward opening fitting plate (slanted plate)
Bottom hung window: Inward opening swivelling bracket
2*) Top hung window: Standard
Bottom hung window: Inward opening swivelling bracket

7.2 RWA - Electrically operated chain drive E620, stroke 200 and 250

▸ **Range of application:***

Panel weights for bottom hung and top hung windows, vertical for individual drive stroke 200/250 mm

Casement width a: min. 400 mm (stroke 200) or 450 mm (stroke 250); max. 1500 mm
Casement height b: min. 600 mm; max. 1500 mm
The respective permissible casement width and height should be calculated based on panel weight.

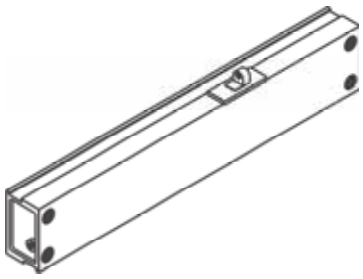


Fig. 36 -1 · Electrically operated chain drive

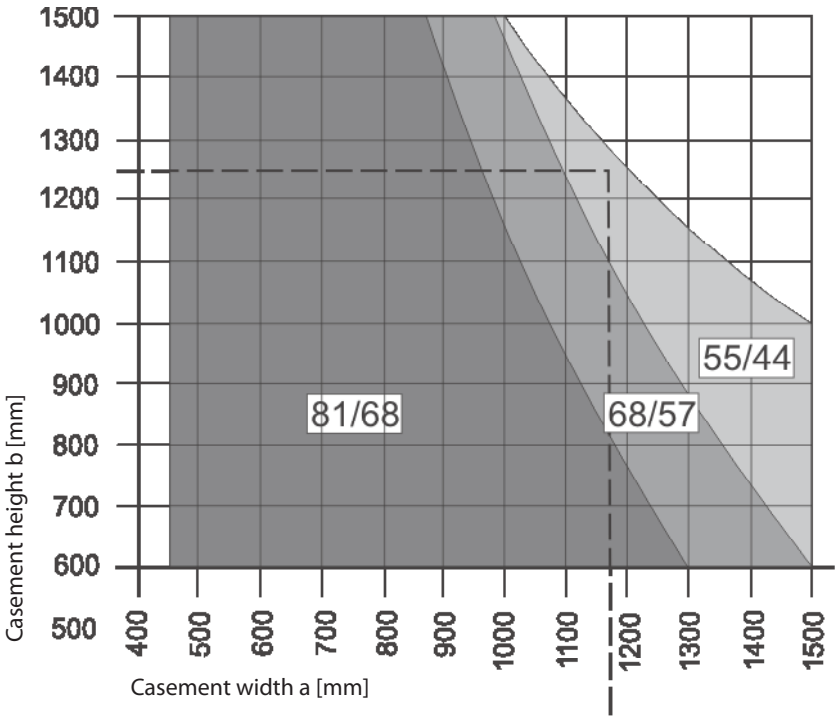


Fig. 36 -1 · Diagram

Design:

Stroke 200 / stroke 250

Note:
Use the unmarked area only following consultation. Wind loads should also be taken into consideration.

Example max. panel weight:
Casement width a = 1170 mm
Casement height b = 1250 mm
Panel weight max. 55 kg/m² for stroke 200
Panel weight max. 44 kg/m² for stroke 250

* Smaller casement dimensions are also possible on request.

▸ **Range of application:**

Panel weights for bottom hung and top hung windows, vertical for tandem drives stroke 200/250 mm

Casement width a: min. 680 mm (stroke 200) or 730 mm (stroke 250); max. 2400 mm
Casement height b: min. 600 mm; max. 1600 mm

The respective permissible casement width and height should be calculated based on panel weight.

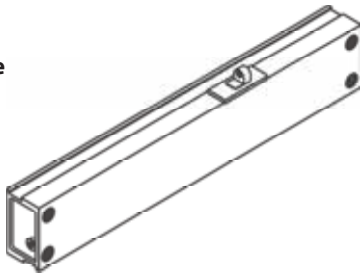


Fig. 37 -1 · Electrically operated chain drive

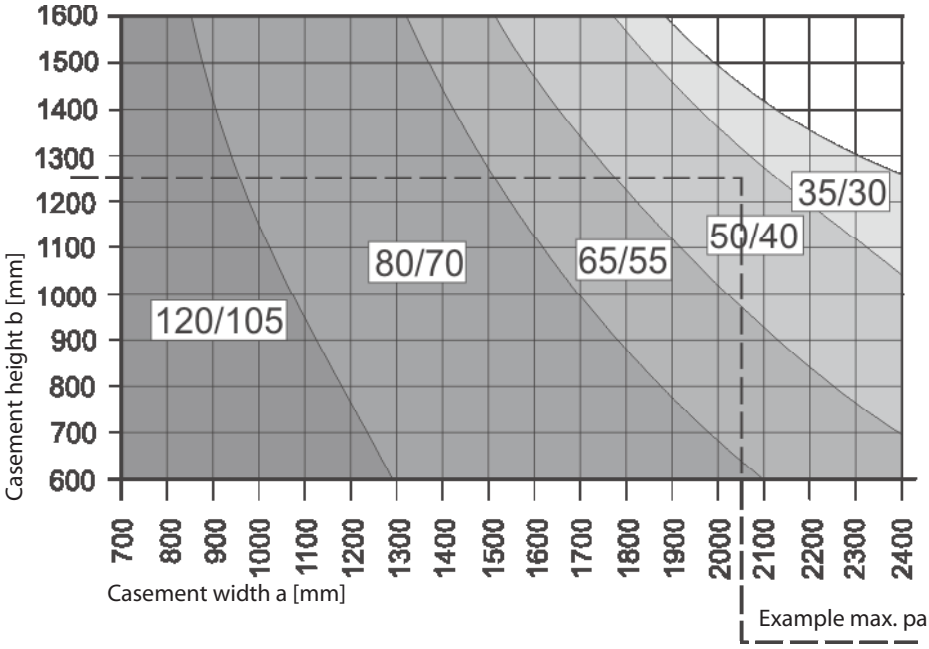


Fig. 37 -1 · Diagram

Design:

Stroke 200 / stroke 250

Note:
Use the unmarked area only following consultation. Wind loads should also be taken into consideration.

Example max. panel weight:
Casement width a = 2050 mm
Casement height b = 1250 mm
Panel weight max. 50 kg/m² for stroke 200
Panel weight max. 40 kg/m² for stroke 250

Exception: Casement heights less than 600 mm For bottom hung windows from 350 mm to 600 mm, with inward opening swivelling bracket

Bottom hung windows		**min. casement height [mm]**	**min. casement width [mm]**	**max. casement weight [kg]**	**max. panel weight [kg/m²]**
Stroke 200	**Solo**	350 -600	430	35	30
	Tandem		675	63	30
Stroke 250	**Solo**		480	30	30
	Tandem		750	54	30

For top hung windows from 250 to 600 mm with outward opening swivelling bracket.

Top hung windows		**min. casement height [mm]**	**min. casement width [mm]**	**max. casement weight [kg]**	**max. panel weight [kg/m²]**
Stroke 200	Solo	250 - 600	265	35	30
	Tandem		680	63	30
Stroke 250	Solo	270 - 600	290	30	30
	Tandem		730	54	30

Outward opening swivelling bracket for monting on a windowsill or ledge.
Note: If there is not a windowsill, a mounting bracket must be supplied by the customer!

7.3 RWA - Electrically operated chain drive E640, stroke 280 and 380

▸ **Range of application:***

Panel weights for bottom hung and top hung windows, vertical for individual drive with stroke 280/380 mm

Casement width a: min. 570 mm (stroke 280) bzw. min. 670 mm (stroke 380); max. 1500 mm
Casement height b: min. 900 mm; max. 1500 mm
The respective permissible casement width and height should be calculated based on panel weight.

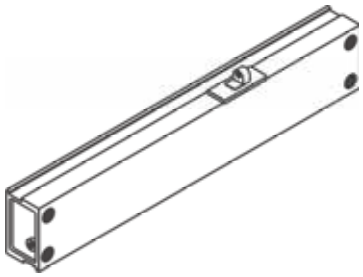


Fig. 38 -1 · Electrically operated chain drive

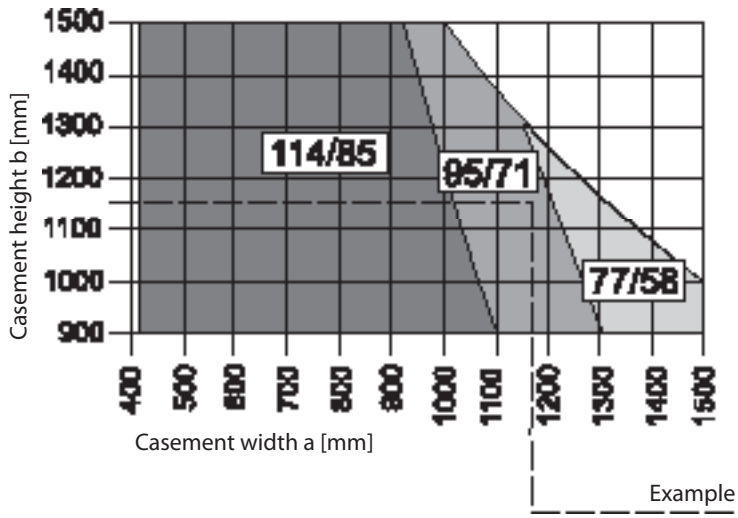


Fig. 38 -1 · Diagram

Design:

Stroke 280 / stroke 380

Note:
Use the unmarked area only following consultation. Wind and snow loads should also be taken into consideration.

Example max. panel weight:
Casement width a = 1170 mm
Casement height b = 1150 mm
Panel weight max. 95 kg/m² for stroke 280
Panel weight max. 71 kg/m² for stroke 380

* Smaller casement dimensions are also possible on request.

Determining the maximum total casement weight for angled outward opening top hung windows (skylights)

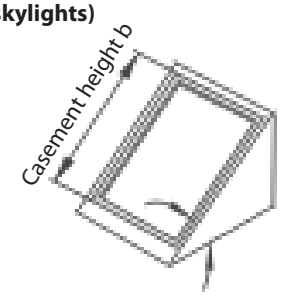


Fig. 39 -1 · Horizontal skylight corresponds to 0° roof inclination

Chain drive	Roof inclination to [°]	Casement height b [mm]	max. casement weight [kg]
E640 **Stroke 280**	40	500-900	34
		900-1200	38
		1200-1500	40
	50	500-900	36
		900-1200	42
		1200-1500	44
	60	500-900	38
		900-1200	47
		1200-1500	52
	70	500-900	43
		900-1200	57
		1200-1500	64
	80	500-900	51
		900-1200	76
		1200-1500	90

Chain drive	Roof inclination to [°]	Casement height b [mm]	max. casement weight [kg]
E640 **Stroke 380**	40	500-900	33
		900-1200	36
		1200-1500	38
	50	500-900	33
		900-1200	39
		1200-1500	41
	60	500-900	34
		900-1200	43
		1200-1500	47
	70	500-900	36
		900-1200	50
		1200-1500	57
	80	500-900	40
		900-1200	62
		1200-1500	75

Wind and snow loads should also be taken into consideration!
Observe max. casement width 1500 mm and max. casement area 1.5 m^2 beachten.

▸ **Range of application:**

Panel weights for bottom hung and top hung windows, vertical for tandem drives stroke 280/380 mm

Casement width a: min. 950 mm (stroke 280) bzw. min. 1050 mm (stroke 380); max. 2400 mm
Casement height b: min. 900 mm; max. 1600 mm
The respective permissible casement width and height should be calculated based on panel weight.

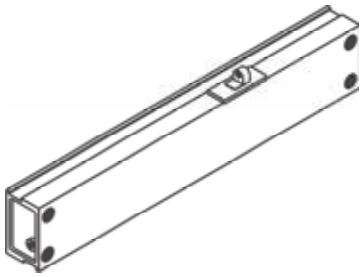


Fig. 40 -1 · Electrically operated chain drive

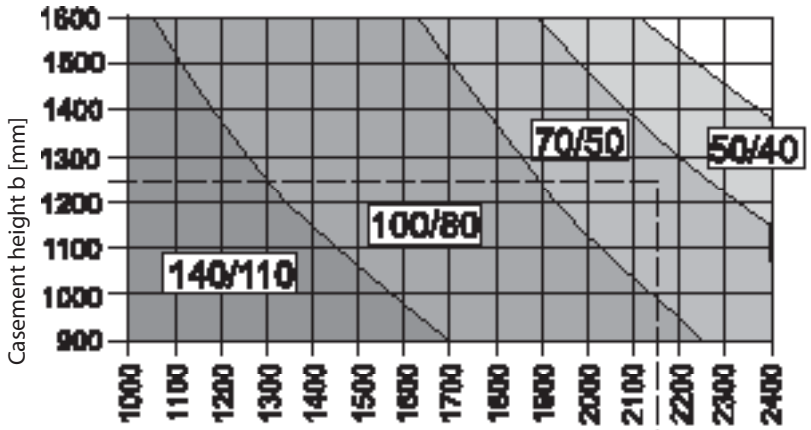


Fig. 40 -1 · Diagram

Design:

Stroke 280 / stroke 380

Note:
Use the unmarked area only following consultation. Wind loads should also be taken into consideration.

Example max. panel weight:

Casement width a = 2150 mm
Casement height b = 1250 mm
Panel weight max. 70 kg/m² for stroke 280
Panel weight max. 50 kg/m² for stroke 380

Exception: Casement heights less than 900 mm. For bottom hung windows from 500 mm to 900 mm, with inward opening swivelling bracket:

Bottom hung windows	min. casement height [mm]	min. casement width [mm] solo / tandem	max. casement weight [kg]	max. panel weight [kg/m²]
Stroke 280	300 - 900	615 / 995	45	58
Stroke 380	500 - 900	665 / 1145	35	45

For top hung windows from 500 to 900 mm:

Top hung windows		min. casement height [mm]	min. casement width [mm]	max. casement weight [kg]	max. panel weight [kg/m²]
Stroke 280	**Solo**	500 -900	575	45	58
	Tandem		995	80	58
Stroke 380	**Solo**	500 - 900	675	35	45
	Tandem		1145	60	45

7.4 RWA - Electrically operated chain drive E660, stroke 420 and 600

▶ **Range of application:***

Panel weights for bottom hung and top hung windows, vertical for individual drive with stroke 420/600 mm

Casement width a: min. 775 mm (stroke 420);
max. 1500 mm
min. 965 mm (stroke 600 mm);
max. 1500 mm
Casement height b: min. 1100 mm;
max. 1500 mm

The respective permissible casement width and height should be calculated based on panel weight.

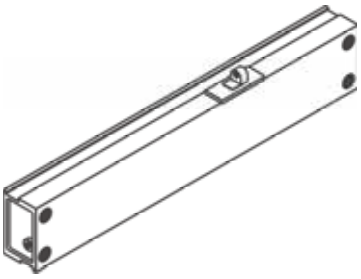


Fig. 41 -1 · Electrically operated chain drive

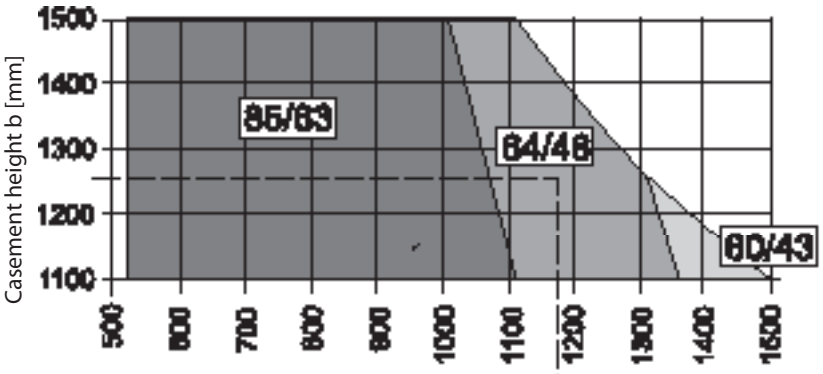


Fig. 41 -1 · Diagram

Design:

Stroke 420 / stroke 600

Note:
Use the unmarked area only following consultation. Wind and snow loads should also be taken into consideration.

Example max. panel weight:

Casement width a = 1170 mm
Casement height b = 1250 mm
Panel weight max. 64 kg/m² for stroke 420
Panel weight max. 48 kg/m² for stroke 600

* Smaller casement dimensions are also possible on request.

▸ **Range of application:**

Panel weights for bottom hung and top hung windows, vertical for tandem drives with stroke 420/600 mm

Casement width a: min. 1150 mm (stroke 420 mm) or min. 1340 mm (stroke 600 mm); max. 2400 mm
Casement height b: min. 1100 mm; max. 1600 mm
The respective permissible casement width and height should be calculated based on panel weight.

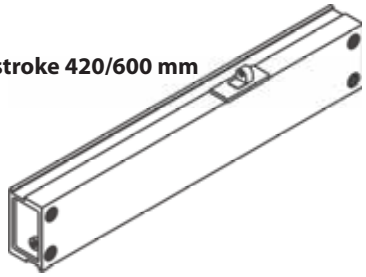


Fig. 42 -1 · Electrically operated chain drive

Panel weight max. 60 kg/m² for stroke 420
Panel weight max. 40 kg/m² for stroke 600

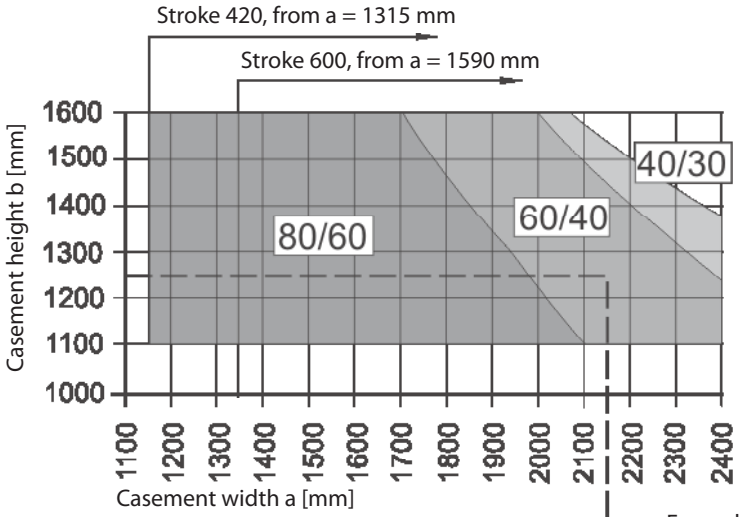


Fig. 42 -1 · Diagram

Design:

Stroke 420 / stroke 600

Note:
Use the unmarked area only following consultation. Wind loads should also be taken into consideration.

Example max. panel weight:
Casement width a = 2150 mm
Casement height b = 1250 mm
Panel weight max. 60 kg/m² for stroke 420
Panel weight max. 40 kg/m² for stroke 600

Exception: Casement heights less than 1100 mm For bottom hung windows from 500 mm to 1100 mm, with inward opening swivelling bracket:

Bottom hung windows	min. casement height [mm]	min. casement width [mm] Solo / Tandem	max. casement weight [kg]	max. panel weight [kg/m²]
Stroke 420	500 - 700	845 / 1315	25	30
	700 - 1100		35	42
Stroke 600	700 - 1100	1030 / 1590	25	30

For top hung windows from 500 to 1100 mm with outward opening swivelling bracket:

Top hung windows solo	min. casement height [mm]	min. casement width [mm]	max. casement width a_{max} [mm]	max. casement weight [kg]
Stroke 420	500 - 700	545	1500	25
	700 - 1100	545		35
Stroke 600	700 - 1100	635		25

Top hung windows tandem	min. casement height b_{min} [mm]	min. casement width a_{min} [mm]	max. casement width a_{max} [mm]	max. casement weight [kg]
Stroke 420	500 - 700	1070	2400	45
	700 - 1100	1070		63
Stroke 600	700 - 1100	1250		45

▸ **Range of application:**

Panel weights for bottom hung and top hung windows for angled windows / skylights – individual drive

Casement height b: min. 1100 mm;
max. 2200 mm
Inclination a: 0° - 90°
The respective permissible casement width and height should be calculated based on panel weight.

Attention: If necessary, snow loads are to be considered for skylights. Mounting plates supplied by the customer.

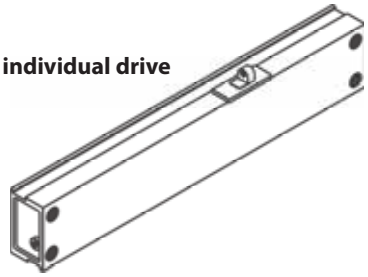


Fig. 43 -1 · Electrically operated chain drive

Note: Use the unmarked area and tandem configuration only following consultation. Wind loads should also be taken into consideration.

Design: Stroke 420 / stroke 600

E660 stroke 420

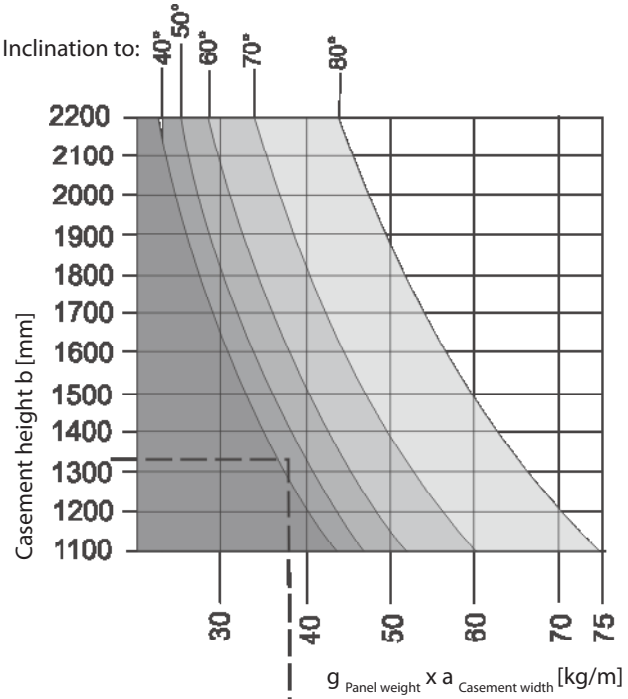


Fig. 43 -1 · Diagram

E660 stroke 600

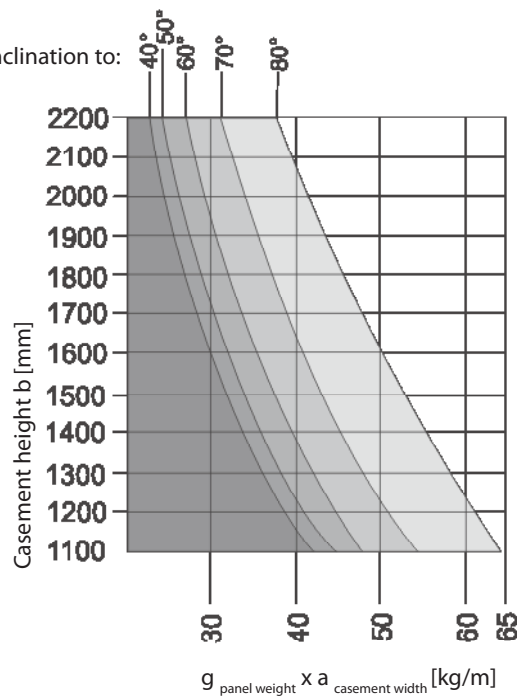


Fig. 43 -2 · Diagram

Example max. casement height:

Casement width	a	= 1100 mm
Panel weight	g	= 35 kg/m²
Inclination	45°	

35 kg/m² x 1.1 m = 38.5 kg/m
max casement height 1315 mm (see diagram)

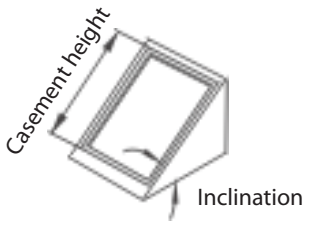


Fig. 43 -3 · Horizontal skylight corresponds to 0° roof inclination

7.5 RWA - Electrically operated chain drive E680, stroke 835

▸ **Range of application:***

Panel weights for bottom hung windows, vertical for individual drive with stroke 835 mm

Casement width a: min. 1195 mm; max. 1500 mm
Casement height b: min. 1100 mm; max. 1500 mm
The respective permissible casement width and height should be calculated based on panel weight.

Panel weight, bottom hung window max. 38 kg/m²

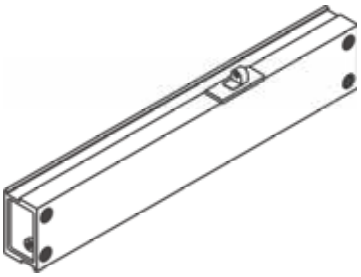


Fig. 44 -1 · Electrically operated chain drive

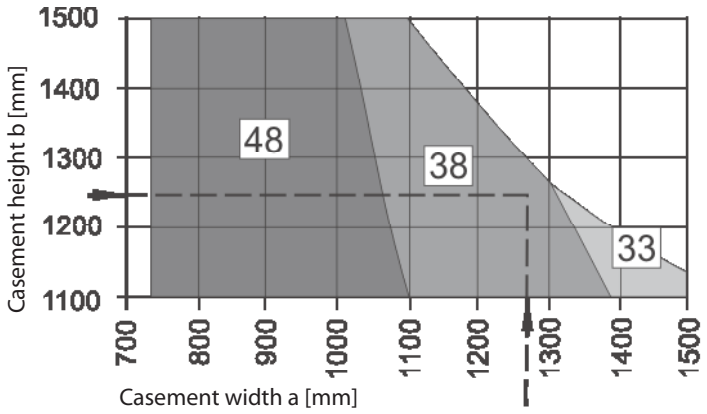


Fig. 44 -1 · Diagram

Example max. panel weight:
Casement width a = 1270 mm
Casement height b = 1250 mm
Panel weight bottom hung window max. 38 kg/m²

Design:

Stroke 835

Note:
Use the unmarked area only following consultation. Wind loads should also be taken into consideration.

* Smaller casement dimensions are also possible on request.

▸ **Range of application:**

Panel weights for bottom hung windows, vertical for tandem drive with stroke 835 mm

Casement width a: min. 1570 mm;
max. 2400 mm
Casement height b: min. 1100 mm;
max. 1500 mm
The respective permissible casement width and height should be calculated based on panel weight.

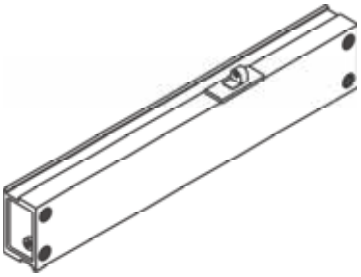


Fig. 45 -1 · Electrically operated chain drive

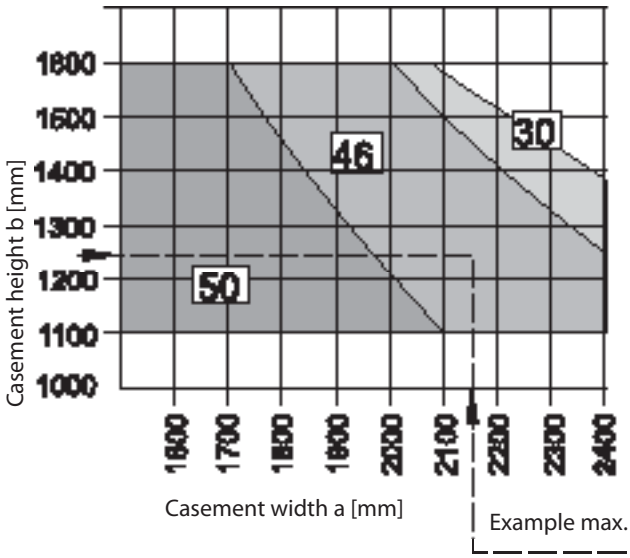


Fig. 45 -1 · Diagram

Design:

Stroke 835

Note:
Use the unmarked area only following consultation. Wind loads should also be taken into consideration.

Example max. panel weight:

Casement width a = 2150 mm
Casement height b = 1250 mm
Panel weight bottom hung window max. 46 kg/m

Exception: Casement heights less than 1100 mm

For bottom hung windows from 800 to 1100 mm with outward opening swivelling bracket:

Bottom hung windows	min. casement height [mm]	min. casement width [mm] solo / tandem	max. casement weight [kg]	max. panel weight [kg/m²]
Stroke 835	800 -1100	1260 / 1860	35	30

7.6 Mechanical locking bracket for GEZE electrically operated chain drives

For windows with large casement areas it is often not sufficient to lock the casement using the drive alone. The solution:
Use of a mechanical locking bracket

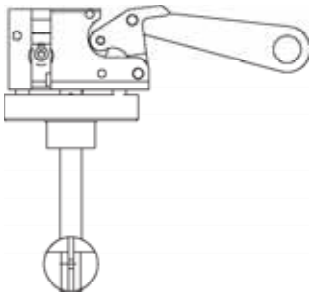


Fig. 46 -1 · Locking bracket

- **Product features:**
  - for all GEZE electrically operated chain drives (E600 - E680)
  - No additional sequence control required
  - No additional cables required due to implementation as locking occurs mechanically
  - for inward opening bottom, top and side hung windows
  - for all usual profile systems
  - simple mounting using templates
  - improved sealing
  - improved protection against intruders

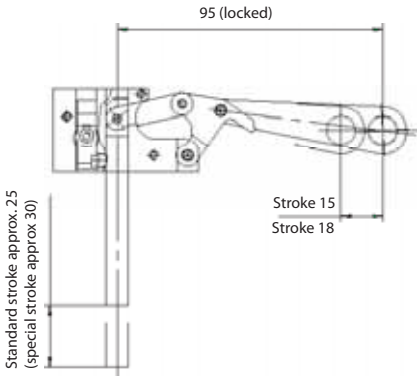
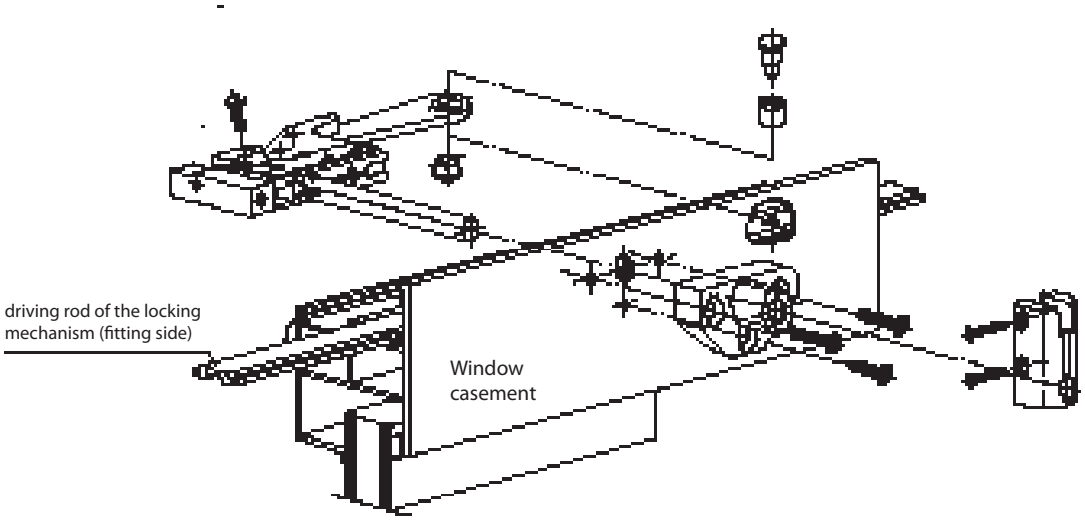


Fig. 46 -2 · Locking bracket stroke

- **Function**
  - When the chain drive extends or retracts the window casement is electromechanically locked or unlocked in a concealed manner via an internal central locking device.
  - The concealed all-round locking in the window casement is effected when the casement bracket engages the driving rod and thus latches the locking components.

- **Installation**



Depending on the permissible casement width and height as well as permissible casement weight and application, the necessary drive is to be selected. The following table provides an overview of the technical data of the respective drives.

Chain drives	E 600	E 620	E 640	E 660	E 680
General range of application:					
max. casement area [m2] Solo/Tandem	1.5 / 3	1.5 / 3	1.5 / 3.3	1.65 / 3.3	1.65 / 3.3
Use on facade inclination of more inclined facades and special window shapes	Yes, possible on request (+/-5°)	Yes, possible on request (+/-5°)	Yes	Yes	Yes, possible on request
Space required on the frame (standard) for inward opening leaves [mm] for outward opening leaves [mm]	52 27	35 25	44 35	54 35	54 35
Overlap Ü [mm] overlap compensation with additional underlay plate (inward) or casement plate (outward) see above mounting instructions	0 - 20	0 - 25	Bottom hung 0 - 20 Top hung 0 - 18	0 - 20	- 20
max. panel weight, for min., max. widths and heights, please see the respective diagrams on the following pages					
Mechanical data:					
Dimensions [mm]	86x50x269	51x29x262/287	62x40x373/423	86x50x478/573	86x50x687
Shear force [N]	150	200	350	400	200
Pushing force [N]	300	200	350	400	400
Stroke length [mm] Variable stroke setting possible with additional group for all drives	250 / 370 selectable with jumper	200 and 250	280 and 380	420 and 600	835
Pressure speed [mm/s]	40	10	15	17	17
Weight [kg]	1.6	0.85	1.6	3.2	4.5
End position cut-off	End switch	Electronic	End switch	End switch	End switch
Overload cut-off	none	Overcurrent	Overcurrent	Overcurrent	Overcurrent
Electrical Data:					
Voltage [V]	24	24	24	24	24
Current consumption [A]	2.1	0.85	1.0	2.0	2.3
Load factor [%]	50	50	50	20	20
Power consumption [W]	50	20	25	50	50
Current cut-off threshold (overload) [A]	-	1.0	2.2	2.8	2.8
Ambient temperature [°C]	-20 to +40	-5 to +50	-5 to +50	-10 to +50	-10 to +50
Protection type/enclosure rating [IP]	III/20	III/20	III/22	III/22	III/22
Insulation class	H	H	H	H	H
Connector cable (supplied by manufacturer)	supplied by the customer	2x1 mm^2, 1m *	2x1 mm^2, 1m **		
Supply line (supplied by customer)	2x1mm^2 / 2x1.5 mm^2 to 10m / 2x2.5 mm^2 to 50 m				

* cable permanently connected to the drive

** loose connector cable with angular connector

8 RWA opening and locking systems

The GEZE smoke and heat extraction opening and locking systems consist of the systems RWA 100E, RWA 105E and RWA 110E and the respective tandem configurations in combination with the **tandem switch E102.**

- **General product features:**
  -The opening and locking systems RWA 100E / RWA 105E / RWA 110E reach large opening widths with low spindle drives rapidly (< 60 seconds)
  - Fits closely to the profile – the motor is mounted directly on the window and does not project into the room
  - Use of additional mechanical locking device for large casement widths
  - In the case of very large and heavy leaves, 2 drives with a tandem function can be fitted; connection via special tandem switch E102
  - Technically advanced detail solutions such as internally located cable guide and mechanical load disconnection
  - Strokes: 100-300 mm
  - Pushing/pulling force: 750 N

  - **The RWA opening and locking systems RWA 100E / RWA 105E / RWA 110E suitable for installation in inspected and certified GEZE NRWGs in accordance with EN 12101-2**

Smoke and heat extraction systems	RWA 100E	RWA 105E	RWA 110E
Main area of application	Inward opening bottom, top and side hung windows	Inward opening post and rail structure and side hung windows, also when space is limited	Outward opening top hung windows

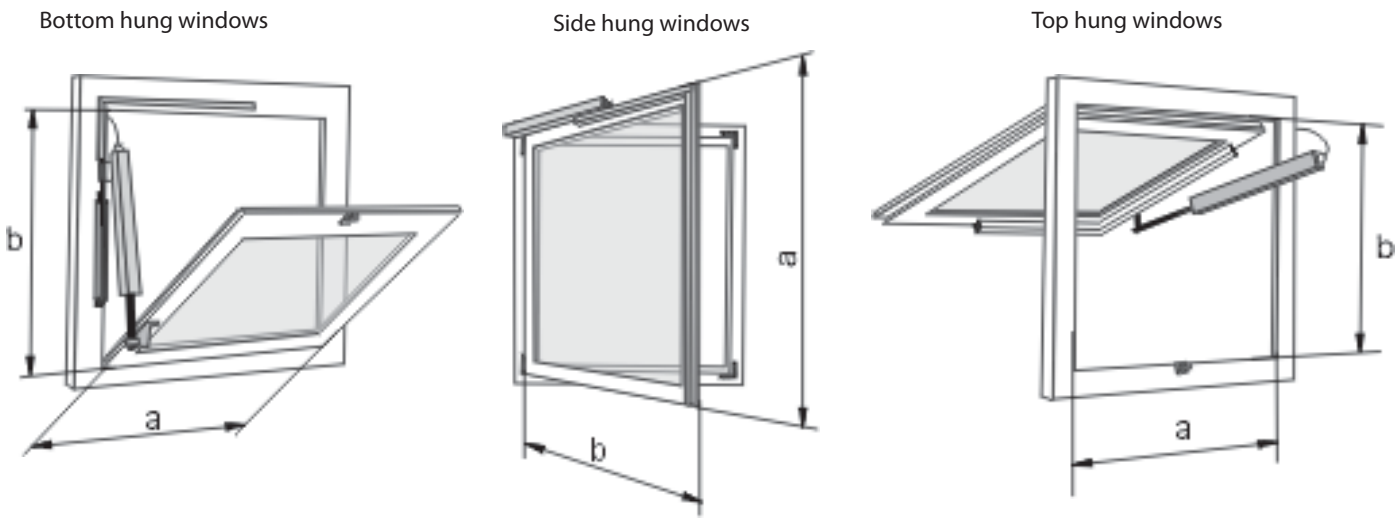


Fig. 48 -1 · Dimensions of the various window types

8.1 System RWA 100E and Tandem RWA 100E

System fitted closely to the profile for vertically installed inward opening bottom, top, bottom angular as well as side hung windows. Inward opening bottom hung windows are the main area of application.

Fig. 49 -1 · Solo

Fig. 49 - 2 · Tandem

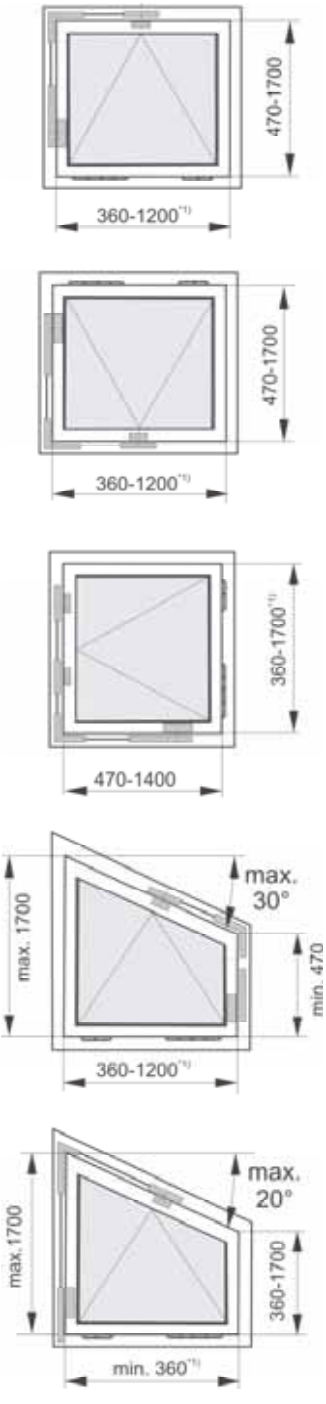
- **Product features:**
  - max. panel weight 30 kg/m²
  - Motor mounting possible on the right and left
  - two locking devices must be mounted for a window area of more than 1.2 m²
  - two belts must be mounted directly next to each other on the motor side

- **Further possible additional locking device on the drive side (side closing edge)**
  For very high bottom, top and side hung leaves, there is the possibility of mounting a further additional locking device on the side closing edge on the motor side

  Important:
  When using an additional locking device, the dimensions such as casement height, weight, opening width and opening angle must be corrected

- **Range of applications:**

RWA 100E



RWA 100E Tandem

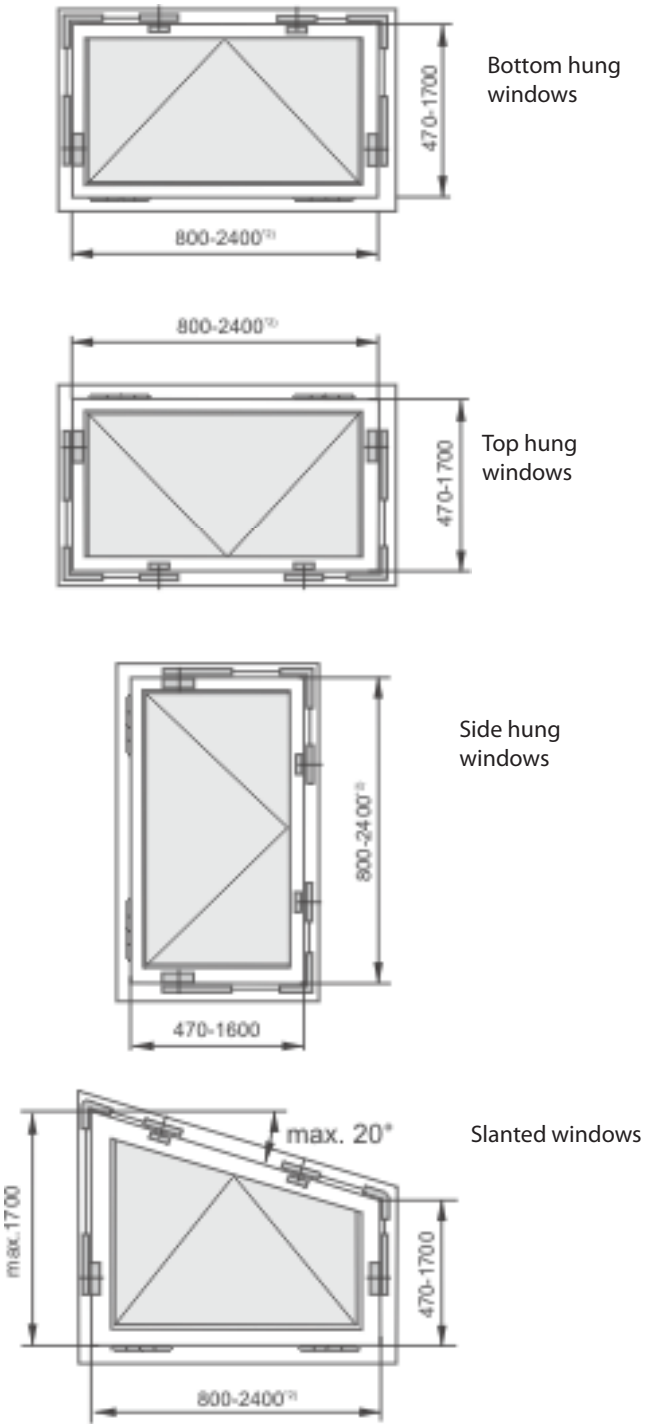
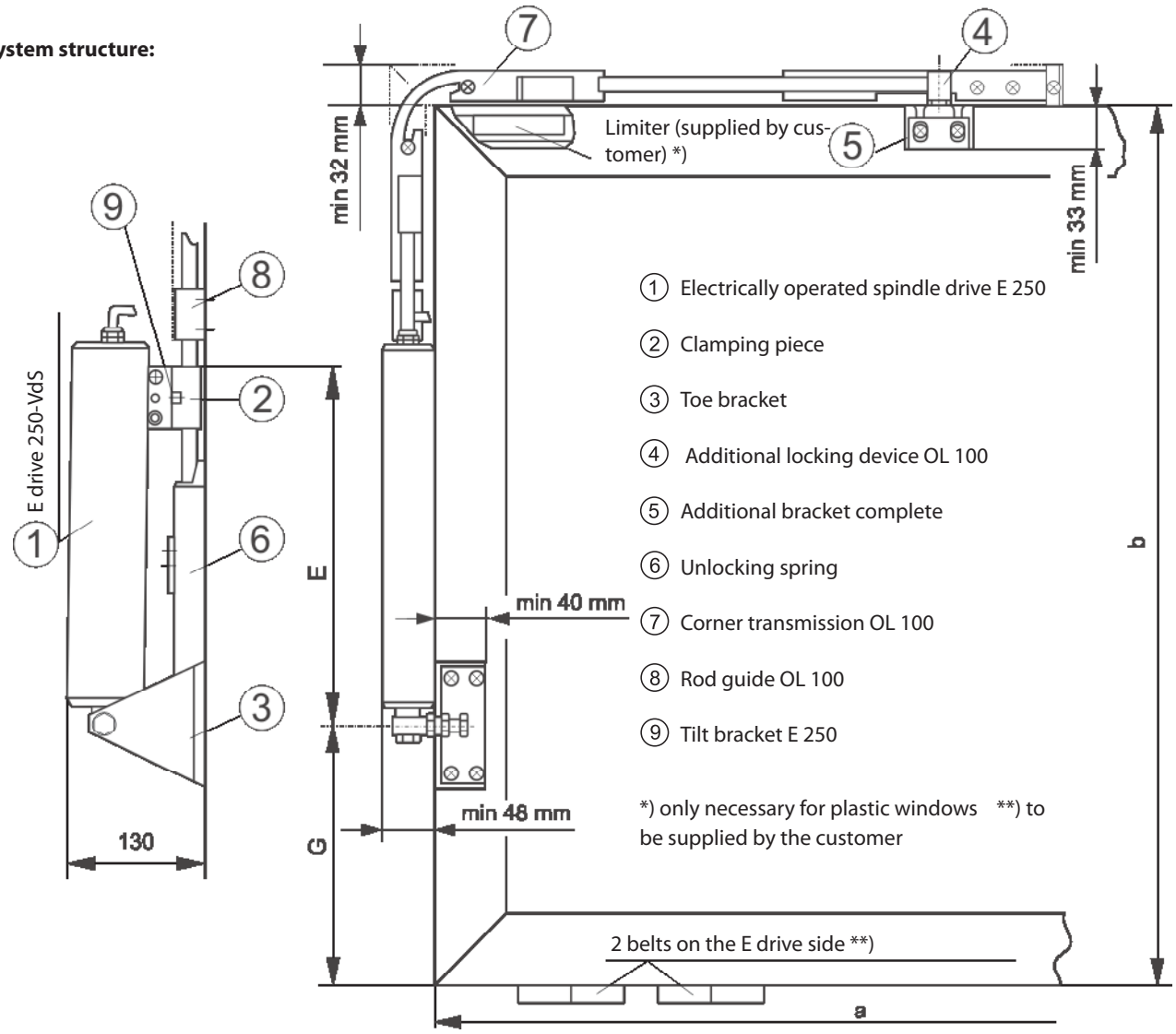


Fig. 50 -1 · Vertically installed window types

Dimensions in [mm] as a standard, please consult with GEZE
Regarding deviations Information for timber/aluminium windows, for plastic windows, the following applies:
*1) max. 800 mm (solo) *2) max. 1600 mm (tandem)

▸ **System structure:**



Mounting dimensions G and E: see mounting instructions in packaging RWA 100 E

Fig. 51 -1 · Vertically installed window types

▸ **Determining the motor stroke:**

RWA 100 E and RWA 100 E Tandem										Dimensions in [mm]	**Stroke**
Casement height (dimension b) Opening angle [°] Opening width [mm]	**950-1000** approx. 52 approx. 860	**1000-1050** approx. 48 approx. 820	**1050-1100** approx. 48 approx. 860	**1100-1150** approx. 44 approx. 840	**1150-1250** approx. 40 approx. 830	**1250-1320** approx. 38 approx. 850	**1320-1400** approx. 35 approx. 820	**1400-1500** approx. 32 approx. 800	**1500-1600** approx. 29 approx. 780	**1600-1700** approx. 27 approx. 750	**300**
Casement height (dimension b) Opening angle [°] Opening width [mm]	**700-800** approx. 50 approx. 640	**800-900** approx. 44 approx. 640	**900-1000** approx. 40 approx. 650	**1000-1100** approx. 33 approx. 600	**1100-1200** approx. 28 approx. 570	**1200-1300** approx. 25 approx. 540					**200**
Casement height (dimension b) Opening angle [°] Opening width [mm]	**560-630** approx. 51 approx. 520	**630-700** approx. 46 approx. 520	**700-800** approx. 37 approx. 490	**800-900** approx. 35 approx. 490	**900-1000** approx. 27 approx. 450						**150**
Casement height (dimension b) Opening angle [°] Opening width [mm]	**470-520** approx. 36 approx. 320	**520-600** approx. 36 approx. 350	**600-700** approx. 34 approx. 380	**700-800** approx. 30 approx. 380	**800-850** approx. 28 approx. 400						**100**

The values of the opening angle and the opening width specified are for orientation purposes and can vary depending on the installation type and mounting dimension G.

8.2 System RWA 105E and Tandem RWA 105E

System fitted closely to the profile for vertically installed rectangular inward opening bottom, top, as well as side hung windows. Main areas of application are side hung windows in post and rail façades.

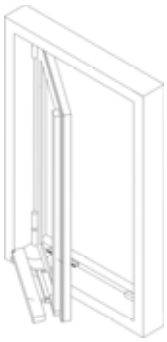


Fig. 52 -1 · Solo

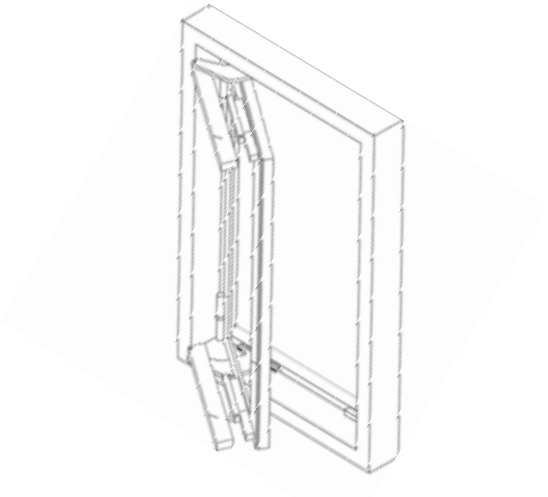
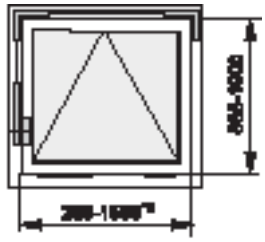


Fig. 52 - 2 · Tandem

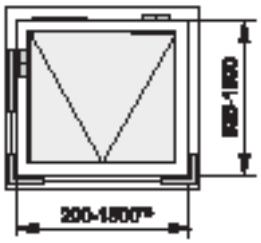
- **Product features:**
  - max. panel weight 30 kg/m²
  - two belts must be mounted directly next to each other on the motor side

▸ **Range of applications:**

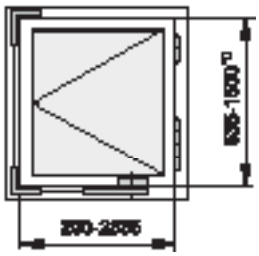
RWA 105E



Bottom hung windows

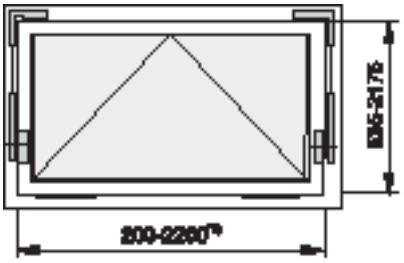


Top hung windows

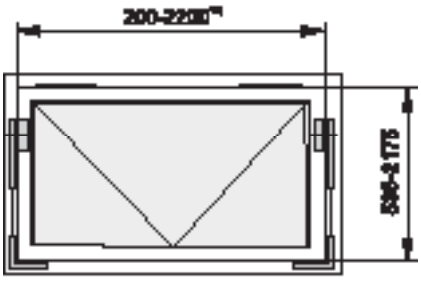


Side hung windows

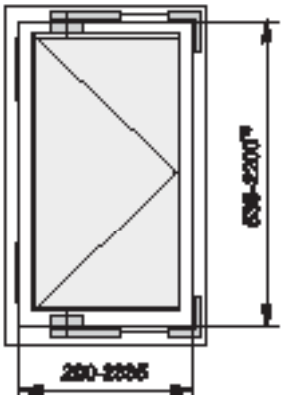
RWA 105E Tandem



Bottom hung windows



Top hung windows

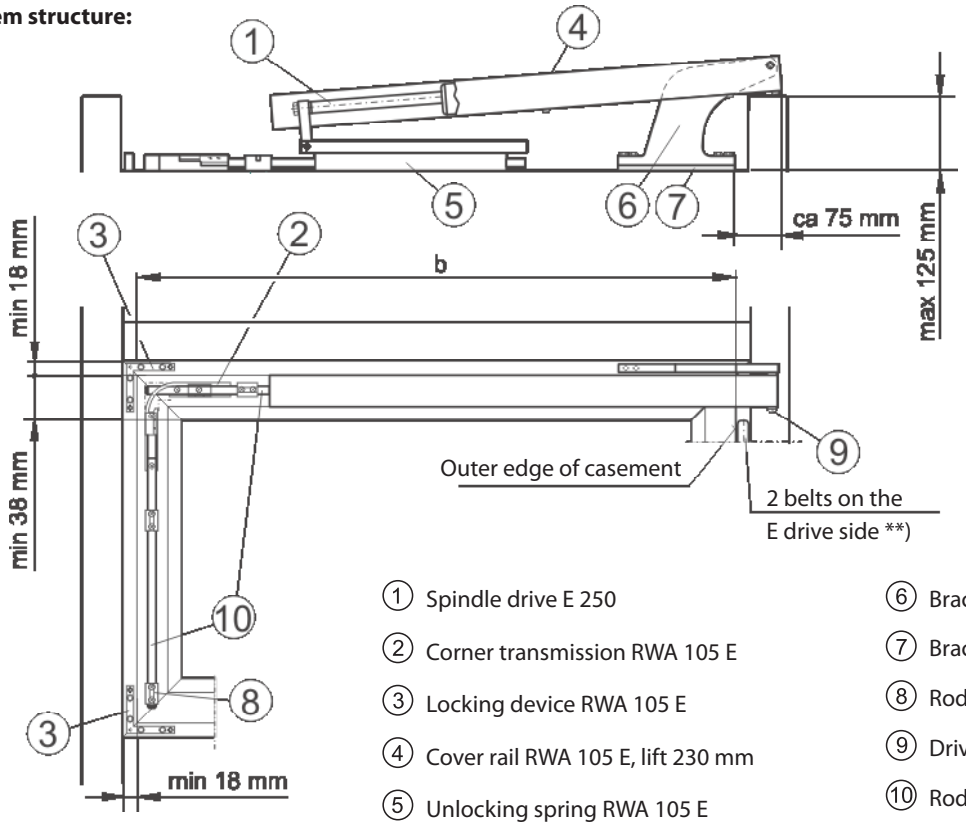


Side hung windows

Fig. 53 -1 · Vertically installed window types

Dimensions in [mm] as a standard, please consult with GEZE
Regarding deviations Information for timber/aluminium windows, for plastic windows, the following applies:
*1) max. 800 mm (solo) *2) max. 1600 mm (tandem)

- **System structure:**



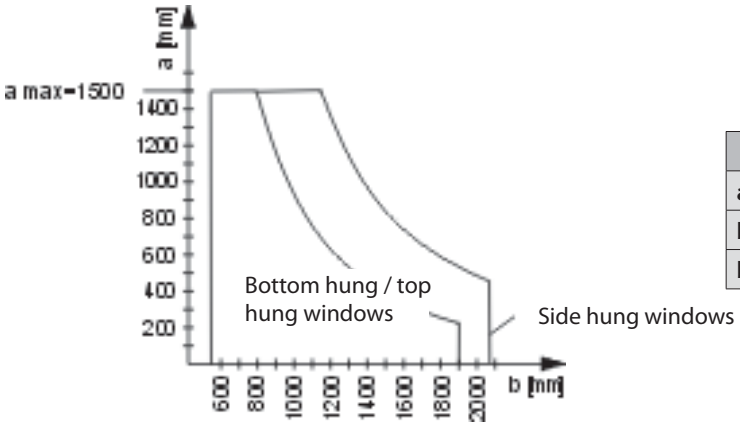
① Spindle drive E 250
② Corner transmission RWA 105 E
③ Locking device RWA 105 E
④ Cover rail RWA 105 E, lift 230 mm
⑤ Unlocking spring RWA 105 E
⑥ Bracket RWA 105 E
⑦ Bracket underlay RWA 105 E
⑧ Rod guide
⑨ Drive support pin
⑩ Rod diameter 12, galvanized

Fig. 54 -1 · Basic construction

**) supplied by the customer

- **RWA 105E (solo) – Determining the motor stroke:**

  - **Stroke 100**



	Stroke 100
a max.	1500
b min.	535
b max.	2075

Fig. 55 - 1 · **Permissible casement formats stroke 100 mm**

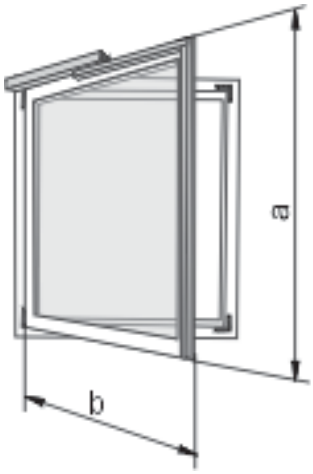
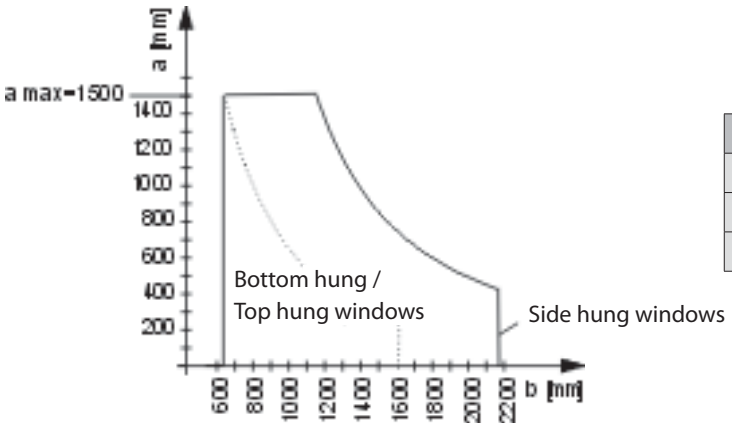


Fig. 55 - 4 · Solo

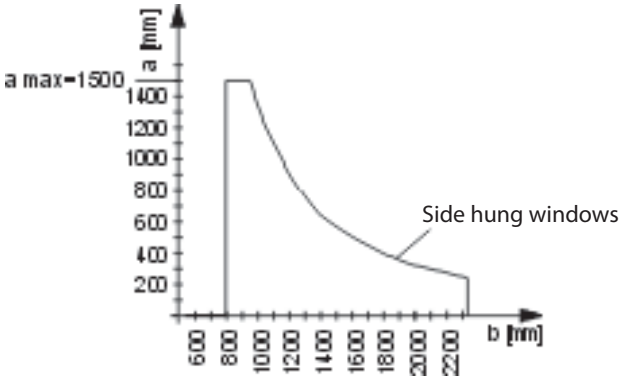
  - **Stroke 150**



	Stroke 150
a max.	1500
b min.	635
b max.	2175

Fig. 55 - 2 · **Permissible casement formats stroke 150 mm**

  - **Stroke 230**

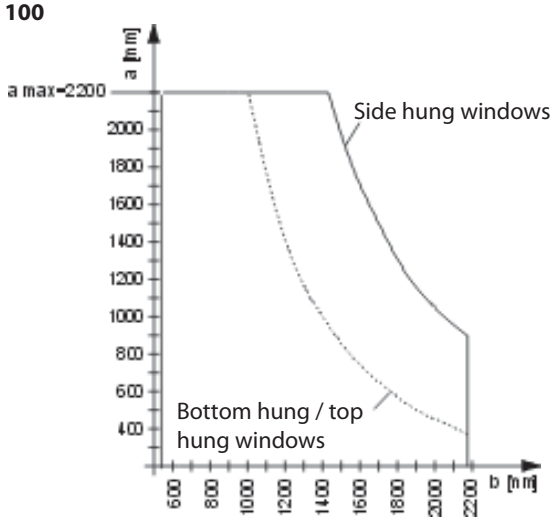


	Stroke 230
a max.	1500
b min.	795
b max.	2335

Fig. 55 - 3 · **Permissible casement formats stroke 230 mm**

- **RWA 105E Tandem - Determining the motor stroke:**

  - **Stroke 100**



	Stroke 100
a max.	2200
b min.	535
b max.	2075

Fig. 56 -1 · **Permissible casement formats stroke 100 mm**

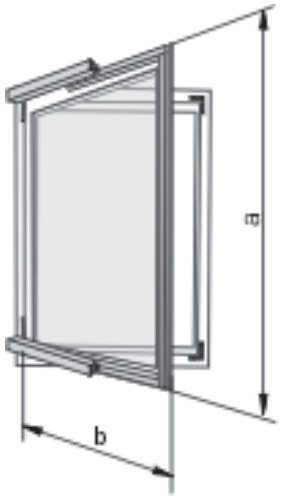
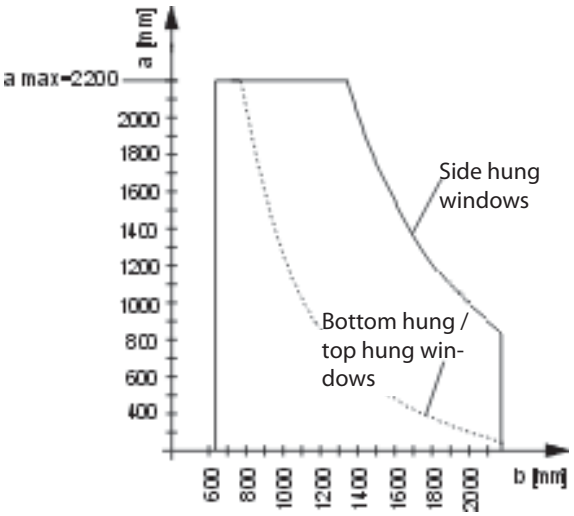


Fig. 56 - 4 · Tandem

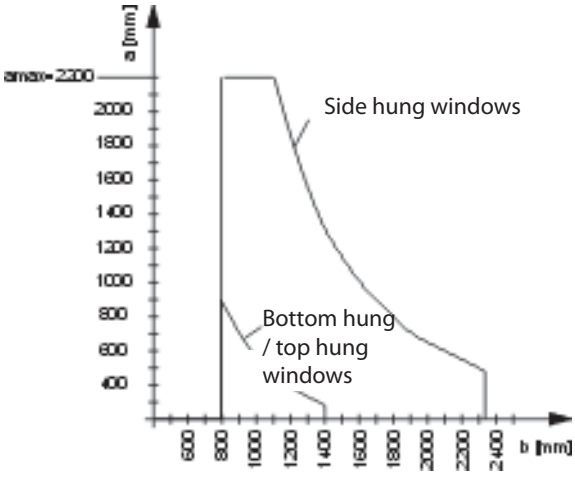
  - **Stroke 150**



	Stroke 150
a max.	2200
b min.	635
b max.	2175

Fig. 56 -2 · **Permissible casement formats stroke 150 mm**

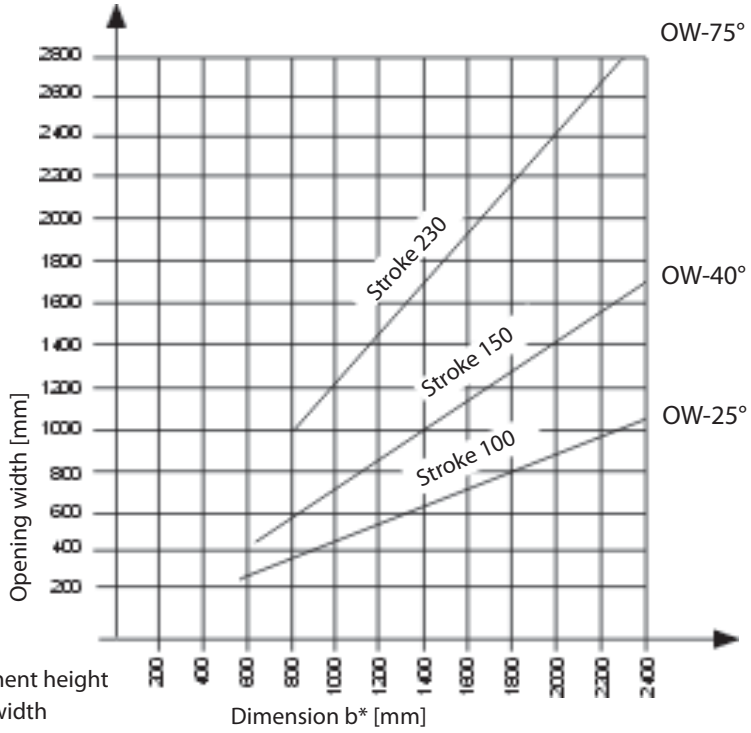
  - **Stroke 230**



	Stroke 230
a max.	2200
b min.	795
b max.	2335

Fig. 56 -3 · **Permissible casement formats stroke 230 mm**

▸ **Determining the opening width:**



* Bottom hung casements: b = casement height
* Side hung windows: b = casement width

8.3 System RWA 110E and Tandem RWA 110E

System fitted closely to the profile for vertically installed outward opening bottom, top, as well as side hung windows.

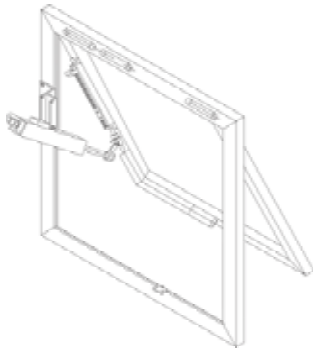


Fig. 58 -1 · Solo

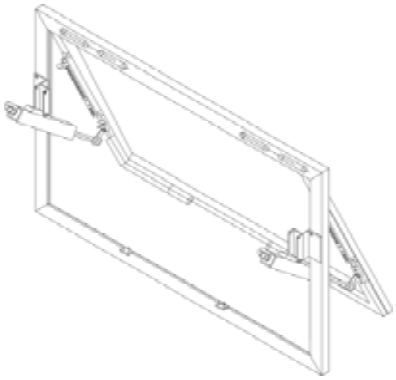
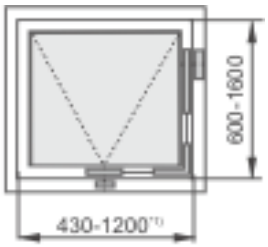


Fig. 58 - 2 · Tandem

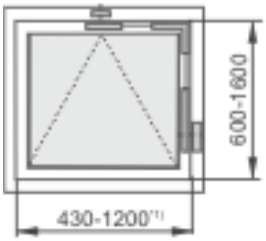
- **Product features:**
  - max. panel weight 30 kg/m², for bottom hung windows 25 kg/m²
  - two belts must be mounted directly next to each other on the motor side
  - Motor mounting possible on the right and left
  - two locking devices must be mounted for a window area of more than 1.2 m²

- **Range of application:**

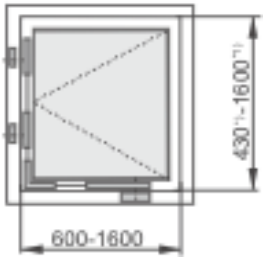
RWA 110E



Top hung windows



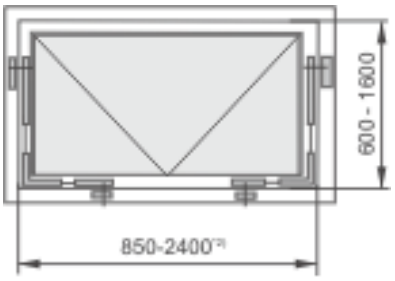
Bottom hung windows



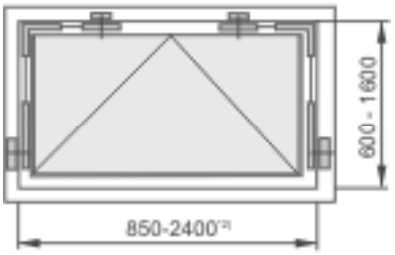
Side hung windows

*) min 800 for
2 locking devices

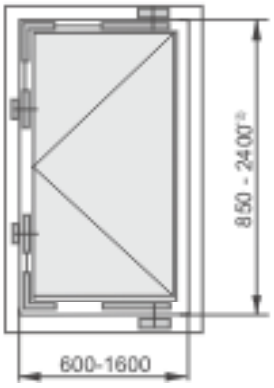
RWA 110E Tandem



Top hung windows



Bottom hung windows



Side hung windows

Fig. 59 -1 · Window designs

Dimensions in [mm] as a standard, please consult with GEZE
Regarding deviations. Information for timber/aluminium windows, for plastic windows, the following applies:
*1) max. 800 mm (solo); *2) max. 1600 mm (tandem)

- **System structure:**

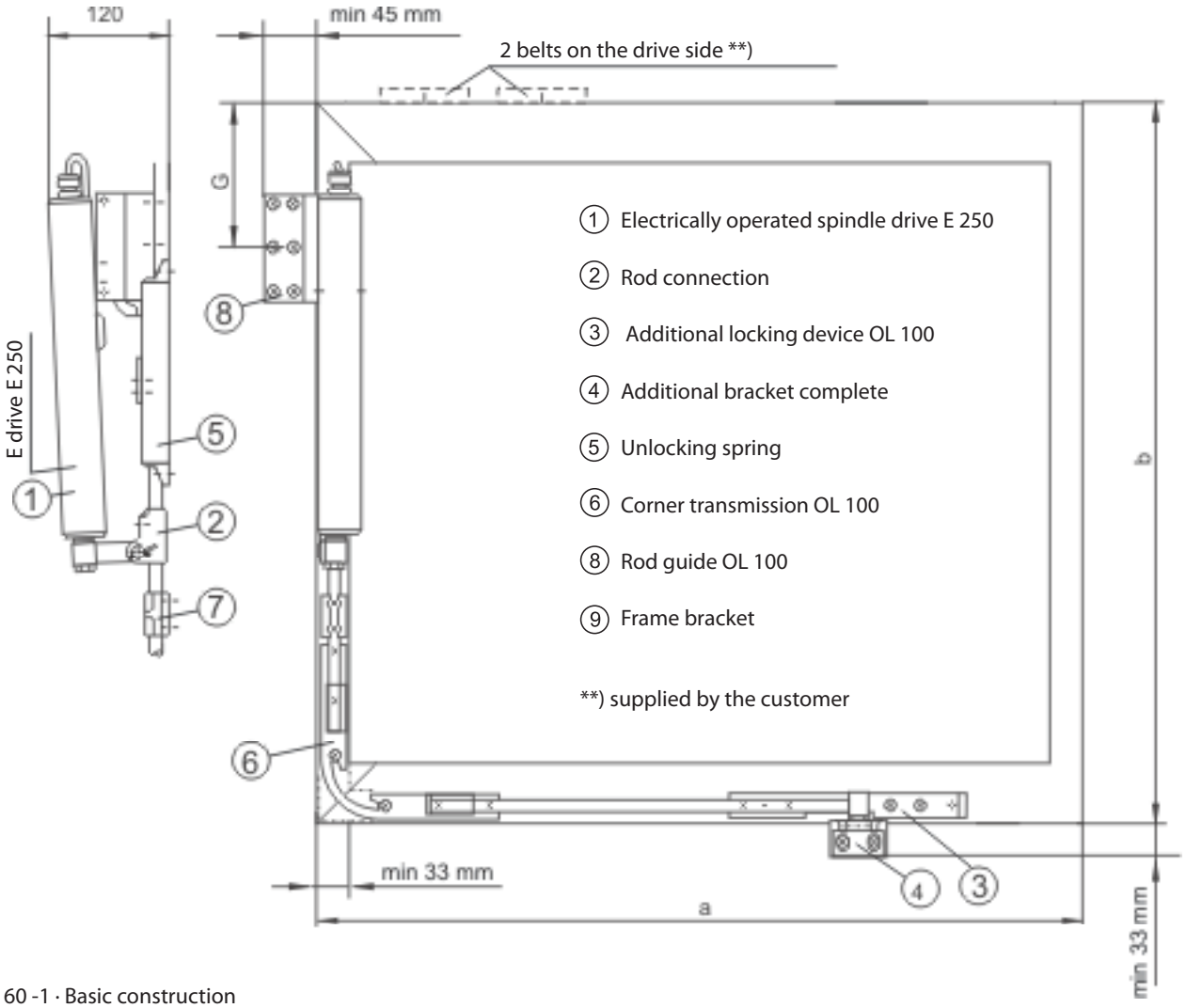


Fig. 60 -1 · Basic construction

- **Determining the motor stroke:**

RWA 110E and RWA 110E Tandem										Dimensions in [mm]	**Stroke**
Casement height (dimension b)	**900-920**	**920-950**	**950-1000**	**1000-1050**	**1050-1100**	**1100-1200**	**1200-1300**	**1300-1400**	**1400-1500**	**1500-1600**	**E250/ E300**
Opening angle [°]	approx. 56	approx. 54	approx. 51	approx. 49	approx. 47	approx. 43	approx. 39	approx. 35	approx. 33	approx. 31	
Opening width [mm]	approx. 880	approx. 870	approx. 870	approx. 880	approx. 880	approx. 860	approx. 860	approx. 830	approx. 840	approx. 840	
Casement height (dimension b)	**650-700**	**700-750**	**750-800**	**800-850**	**850-900**	**900-950**	**950-1000**				**E250/ E200**
Opening angle [°]	approx. 55	approx. 51	approx. 48	approx. 46	approx. 43	approx. 41	approx. 39				
Opening width [mm]	approx. 640	approx. 650	approx. 650	approx. 670	approx. 670	approx. 670	approx. 670				
Casement height (dimension b)	**600-650**	**650-700**	**700-750**	**750-800**	**800-850**						**E250/ E150**
Opening angle [°]	approx. 45	approx. 44	approx. 42	approx. 39	approx. 37						
Opening width [mm]	approx. 510	approx. 530	approx. 540	approx. 540	approx. 540						

The values of the opening angle and the opening width specified are for orientation purposes and can vary depending on the installation type and mounting dimension G.

8.4 Overview of the systems

Inspection:
- Permissible window widths and heights
- Panel weight:
- Space conditions, etc.

Smoke and heat extraction systems	RWA 100E	RWA 105E	RWA 110E
General range of application			
Main area of application	Inward opening bottom, top and side hung windows	Inward opening side hung windows post and rail structure; also when space is limited	Outward opening top hung windows
Vertical, inward opening windows	yes	yes	no
Vertical, outward opening windows	no	no	yes
Permissible window width [mm] for solo for timber and aluminium for plastic	360 – 1200 360 – 800	according to stroke pg. 31	430 – 1200 430 – 800
Casement heights [mm] for solo	470 – 1700	according to stroke pg. 31	600 – 1600
Permissible window widths [mm] for tandem for wood and aluminium for plastic	800 – 2400 900 – 1600	according to stroke pg. 31	850 – 2400 850 – 1600
Casement heights [mm] for solo	470 – 1700	according to stroke pg. 31	600 – 1600
max. panel weight [kg/m²]	30	30	30 (for bottom hung 25)
Space required [mm]	Locking side min: 32 Motor side min: 48	Wall frames: 18 casements: 38 post-rail height max: 125	Casement frames min: 33 wall frames min: 45
Installation possibilities	see RWA 100 E range of application	see RWA 105 E range of application	see RWA 110 E range of application
Tandem operation	yes, with tandem switch E 102		
Locking device and additional bracket	yes, from 1.2 m² window area total 2 locking devices necessary (standard and additional lock)	yes, with 2 locking brackets	yes, from 1.2 m² window area total 2 locking devices necessary (standard and additional lock)
max. l dimension [mm] (see pg.38)	70		
Technical data:			
Dimensions Motor E 250 [mm] wxhxl	40 x 47 x (stroke + 240)		
Operating voltage [V DC]	24 (+30 %; -20 %)		
Current consumption [A]	0.2 – 0.8		
Motor force [N]	750		
Stroke length [mm] variable stroke setting possible	100 / 150 / 200 / 300	100 / 150 / 230	150 / 200 / 300
Load disconnection	electromechanic		
Opening time [mm]	each 100 mm approx. 20 sec.		
Temperature range	-5° to +75°		
Protection type	IP 65		
Connector cable (supplied by manufacturer)	3 x 0.75 mm², approx. 2 m		
Supply line (supplied by customer)	see Emergency power supply units Section 5		
VdS approval	yes	yes	yes

9 Fanlight opening system with electric linear drive E212 or E205

With these fanlight opening system, several scissors are controllable with one drive.

- **Range of application – slimline fanlight opener OL 100**

  - Surface-mounted slimline fanlight opener for vertically installed bottom, top and pivoted sash windows
  - Inward opening leaves, suitable for the left or right
  - Casement weights in accordance with the application diagrams
  - Locking device in the scissors
  - Only one casement bracket for all overlap heights and tools, therefore problem-free installation
  - Completely premounted assembly group and therefore few fittings
  - Minimal space required above or to the side of the leaves
  - All visible components of light alloy

  Opening width approx. 260 mm for stroke 66 mm (standard)
  Opening width approx. 190 mm for stroke 42 mm (on demand)

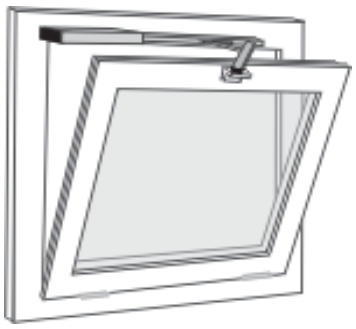


Fig. 62 -1 · Fanlight opener

Technical data	E212	E205
Dimensions	30 x 80 x 210 (HxWxL)	52 x 70 x 360 (HxWxL)
Stroke, adjustable	42-66 mm	42-70 mm
Pushing and pulling force	1400 N	2000 N
Operating time (under load)	approx. 35 s for 52 mm stroke	approx. 45 s for 70 mm stroke
Temperature range	-20° to +70 °C	-20° to +70 °C
Power consumption	29 W	30 W
Current consumption	1.2 A	1.9 A
Protection type	IP 52	IP 54
Operating voltage	24 V DC	24 V DC
Cables	Connector design	3 x 1.5 mm2

Range of application

- Suitable for mounting vertically or horizontally, on the left or the right of the window
- E drive only suitable for dry areas
- Permissible casement overlap height 0-25 mm

Number of scissors needed

	with E212		with E205	
Number of scissors needed	**Casement width a for horizontal installation**	**Casement width a for vertical installation**	**Casement width a for horizontal installation**	**Casement width a for vertical installation**
1 scissor	800-1200	600-1200	850-1350	600-1200
2 scissors	1201-2400	1201-2400	1351-2400	1201-2400
3 scissors	2401-3600	-	2401-3600	2401-3600
4 scissors	-	-	3600- 4800	-
5 scissors	-	-	4801- 5400	-
	Casement height min. b= 400[1)]	Casement height min. b= 500[2]	Casement height min. b= 400[1)]	Casement height min. b= 540[2)]

1) If the opening width is limited to 190 mm using the motor stroke, b is min = 290 mm

2) In case there is no soffit below: b min = 400 mm

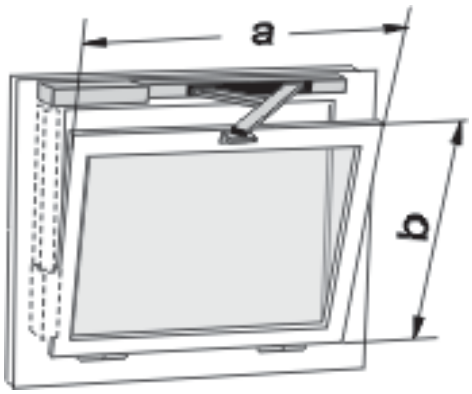


Fig. 63 -1 · Inward bottom hung window

Drives also suitable for use with louvre windows. More detailed information on request.

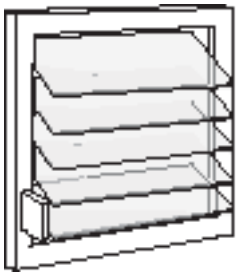
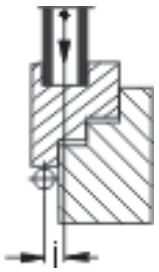


Fig. 63 -2 · Louvre window

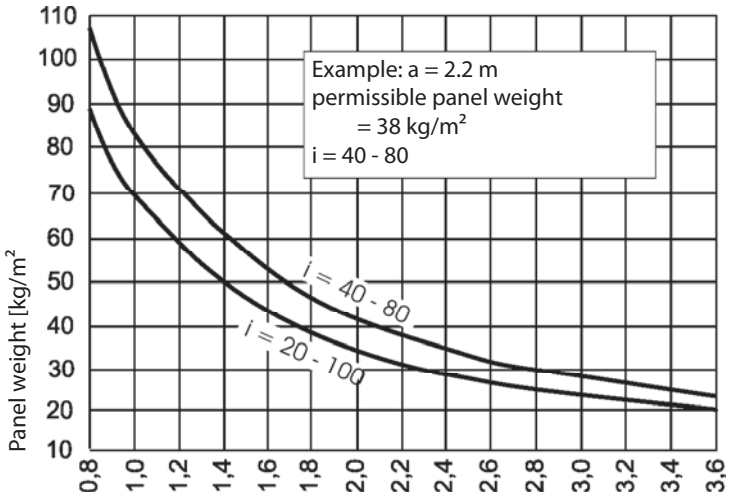
▸ **Permissible casement width and panel weight depending on I dimension**

(for mounting with OL 100)

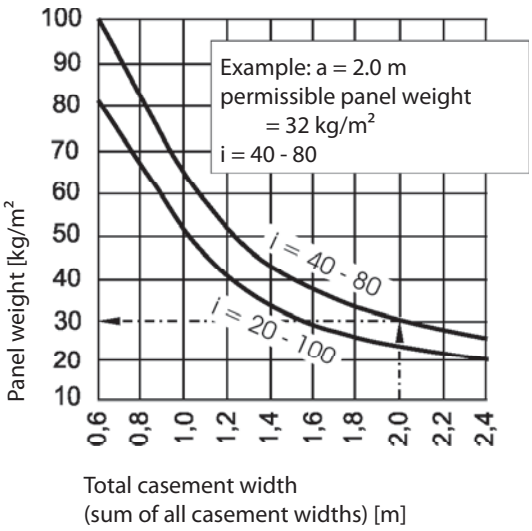
I = distance from casement centre of gravity to belt pivot point [mm]



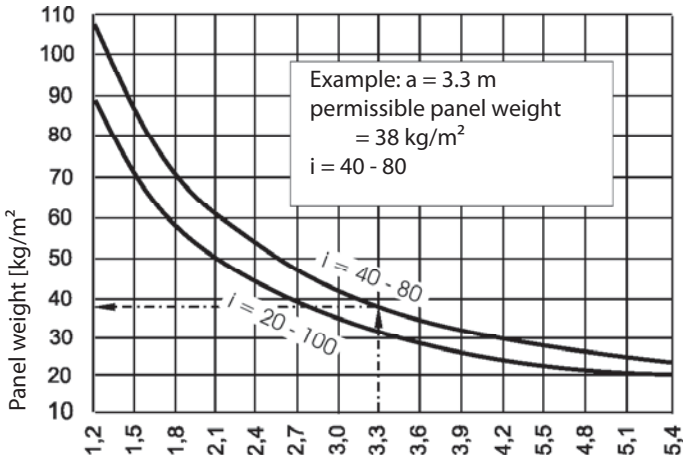
Horizontal mounting - E212



Vertical mounting - E212

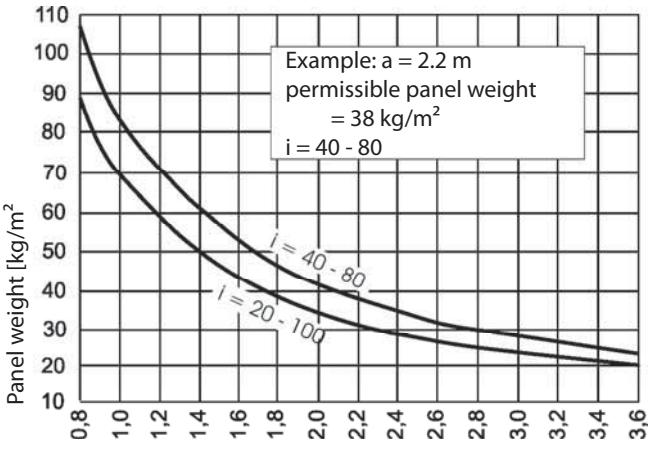


Horizontal mounting - E205



As long as the total casement width is not exceeded, up to five scissors may be mounted.

Vertical mounting - E205



As long as the total casement width is not exceeded, up to four scissors may be mounted.

Fig. 64 -1 · Diagrams

10 RWA emergency power supply unit E260 N

The RWA emergency power supply unit is the central control system on which all components are connected. It controls these components and supplies them with power. Triggering in event of fire occurs with automatic smoke detectors, manual RWA switches or external alarm sensors. Triggering effects the opening and closing of the smoke and heat extraction vents, depending on the configuration of the RWA emergency power supply unit.
Drives on the windows and smoke extraction vents for routine ventilation operation can be controlled using vent switches.
The smoke and heat extraction function is superior to the ventilation function.

Fig. 65 -1 · RWA emergency power supply unit

- **Product features**

  - Mains voltage 230 V AC 50 Hz
  - Output voltage 24V (20-30V) DC, residual ripple < 20%
  - Emergency power supply min. 72 hours via 2 x 12 V lead batteries
  - All functions also with emergency power supply (battery operation) *)
  - Battery monitoring
  - Individual safeguarding of the motor groups
  - Smoke detector resetting with RESET button
  - Driving running direction for alarm variably adjustable (simple jumper adjustment)
  - Line control
  - LCD indicator lamps for operation and fault indication
  - Microcontroller controller
  - Protection type IP 54
  - Ambient temperature -5 °C bis +40 °C
  - **All emergency power supply units E260N are VdS certified**

Connecting possibilities and functions
Overview of technical data for emergency power supply units E260 N

	E260 N2/1 VdS	**E260 N4/1 up to N4/2 VdS**	**E260 N8/1 up to N8/4 VdS**	**E260 N12/2 VdS**	**E260 N32/2 up to N32/8 VdS**
Dimensions in mm (width x height x depth)	256x217x112	295x261x112	362x319x131	362x319x131	600x600x210
max. number of ventilator groups	1	1-2	1-4	1-2	2-8
max. output current	2.0 A	4.0 A	7.5 A	12 A	32 A
Max. RWA switches	4 pieces in a line	10 pieces in a line			15 pieces in a line
Max. smoke detectors/heat difference detectors	10 pieces in a line			20 pieces in a line	
Max. vent switches	3 pieces with LCD pieces per group / as many as desired without LCD				
Max. conductor size of control line Max. motor line	max. 2.5 mm^2 max. 4.0 mm^2				
Available signal inputs	Rain/wind control – external fire brigade control room (potential-free)				
Performance data transformer / battery	80 VA / 1.2 Ah	130 VA / 2.1 Ah	260 VA / 6-7.2 Ah	480 VA / 6-7.2 Ah	1400 VA / 17 Ah
Optional retrofitting	with additional board: - Alarm (horn / signal line)- fault (warning lamp) - Window OPEN switching power 30 W (warning lamp)				- Second alarm group (additional 15 RWA switches/20 smoke or heat difference detectors) - Unit connection (up to 30 units)

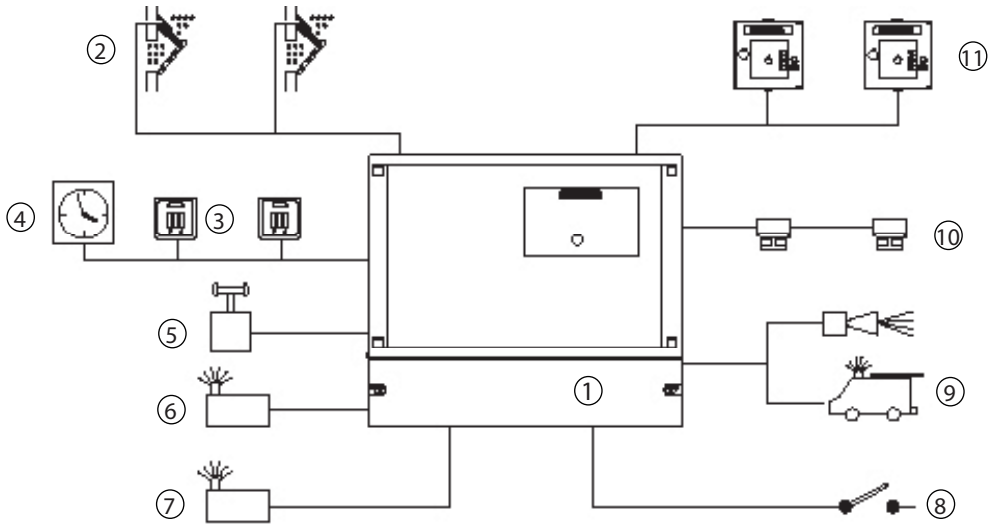
*) Ventilation (window OPEN) is no longer possible in battery operation.

Connecting capabilities and functions

- 24 V DC electric drives
- up to 15 RWA switches FT4 – 24 V DC per Alarm line
- up to 20 smoke detectors total RM1003 or heat difference detectors WM1005 per alarm line
- External alarm triggering, e.g. fire brigade control room (input: external alarm)
- External alarm resetting (input RWA switches)
- Vent switches AS 500 LTA and LTA-LSA
- Vent switches, three with LCD per group / as many as desired without LCD
- Actuation from several emergency power supply units via a central switch
- Key switch AS 500 SCT
- Room temperature thermostat E70
- Rain/wind input for rain/ wind control (potential-free shutter contact)
- up to eight groups depending on emer gency power supply unit type
- Potential-free status contact: 3 contacts (30 W; 24 V DC) for alarm (horn), fault (indicator lamp) and window "OPEN"
- Horns, indicator lamps, etc. (24 V DC; max. 30-50 mA)
- Timer
- BUS/building management system (see Section 5.1)
- Potential-free status contacts (with optional additional boards):
  - → "Alarm" relay: Alarm forwarding to other smoke and heat extraction con trol systems or to the customer's fire alarm system
  - → Relay window "OPEN": Signal window "OPEN"
  - → Fault
- Coupling of several control systems:
  - → E260 N2-N12 VdS – Compact control systems via external alarm and "Alarm" relay
  - → E260 N32 VdS – Large control systems via connection circuit boards.

  Coupling of up to 30 control systems: Coupled units work as a large control system, i.e. their operating signals are exchanged among each other: Faults and operating status displays such as window "OPEN" are displayed as a group signal to a master control system. An alarm to a control system triggers an alarm to all coupled control systems. Resetting the alarm at a control system nullifies the alarm status at all coupled control systems.
- Retroactive expansion of the ventilation groups of up to 8 groups only for emergency power supply units N32 VdS
- Optional second alarm line only fore mergency power control systems N32 VdS

  Use of two separate alarm lines, e.g. an alarm group as an opener and the other as a closer. The alarm of an alarm group effects all corresponding ventilation groups of the control system. With the optional additional circuit board, a second alarm line can be installed with which the ventilation groups can be divided into two separate and inde pendent alarm groups. In addition, an increase the number of alarms is achieved e.g. if more than the pos sible 15 RWA switches or 20 smoke detectors/heat difference detector should be connected.
- Opening width restrictor for ventilation operation only for emergency power control units N32 VdS, e.g. for each ventilation group, the opening width of the window can be limited with time controll during ventilation operation. The opening width restrictor does not apply in the event of an alarm.



1 RWA emergency power supply unit
2 Window and smoke extraction flap drives
3 Vent switch
4 Timer
5 Rain/wind control
6 Window open signal (optional)
7 Fault signal (optional)
8 Alarm from external fire brigade control room
9 Signal Alarm (alarm retransmission) (optional)
10 Smoke detector and heat difference detectors
11 Smoke and heat extraction unit switch

Smoke and heat extraction system in combination with a shading system

Sequence control* is required for this combination. This control is meant to ensure that the windows do not open when the shades are closed and vice versa the shading system should not shade (extend) as long as the windows are open. When opening the windows for ventilation or in event of an alarm the E 260 N first gives the shading system a signal to open the shades. Only when a limit switch supplied by the customer on the shading system (potential-free opener) gives a signal to the control that the shades have reached their open position can e.g. a built-in spindle drive extend (window opens).
When closing, the process is reversed: only when the limit switch on the window drive gives a signal to the control that the windows are closed can the shading system shade.
If the signals on the window drive or on the shading system do not go through, the windows remain open or closed (STOP).

Further control possibilites only on request.

* not a complete unit, consisting of the customer wiring the relays

In combination with mechanical smoke extraction

Mechanical smoke extraction works independent from a natural smoke extraction unit. However there are objects in which RWA exhaust air with fans and the fresh air is realized via a natural smoke and heat extraction unit. For example, fans should only start when the fresh air windows are completely open (due to low pressure). In this case, the fans do not start until they have received a potential-free signal from the smoke and heat extraction control system (external alarm).

Connecting possibilities, as represented in the schematic overview.

Please refer to the installation and operating instructions for more information regarding the emergency power supply units.

10.1 Connection of smoke and heat extraction units to BUS systems

Because so-called output modules (actors) with potential-free switch contacts are available in most systems, GEZE RWA systems can be connected to customers' BUS systems, such as EIB, LON, CAN etc.

The connection can be carried out as follows:

Alarm functions

- In general at least one RWA switch should always be connected
- If required, the smoke detector can be connected independent from the BUS system; otherwise the final resistance must remain installed.
- For "ALARM OPEN" a potential-free make contact must be connected to the fire alarm input (impulse signal is sufficient, motors run to the end position independently)
- For "CLOSE/RESET after alarm" a potential-free make contact is connected parallel to the "CLOSE switch" in the RWA switch (Cl. 1 and Cl. 4) (impulse signal is sufficient, motors run to the end position independently)

Ventilation functions, only OPEN/ CLOSE without STOP

Per ventilation group, one potential-free make contact is connected between Cl. 1 and Cl. 2 (direction OPEN) and Cl. 1 and Cl. 3 (direction CLOSE), here an impulse signal is sufficient, the motors always run to the end position independently.

Ventilation functions, OPEN/CLOSE and STOP

Per ventilation group, one potential-free make contact is connected between Cl. 1 and Cl. 2 (direction OPEN) and Cl. 1 and Cl. 3 (direction CLOSE) and one potential-free opening contact is connected between Cl. 1 and Cl. 4 (STOP function).

Rain/wind control

A potential-free make contact is required for the rain/wind control. As long as this signal is pending, the ventilation functions are inactive.

Feedback

With the additional boards "Status contacts" the following signals are available potential-free:

- Alarm, active following alarm triggering by the RWA switch or smoke detectors or fire alarm
- Fault, as a collective fault message for all faults that can be collected
- Window OPEN

11 Accessories

GEZE tandem switch E102

The GEZE tandem switch is used for common disconnection of two electrically operated spindle or chain drives (24 V DC drives) which are mounted to a window element.
An adjustable follow-up time ensures that running differences between the two drives are balanced out in the end position and that there is an equal contact pressure of the casement.

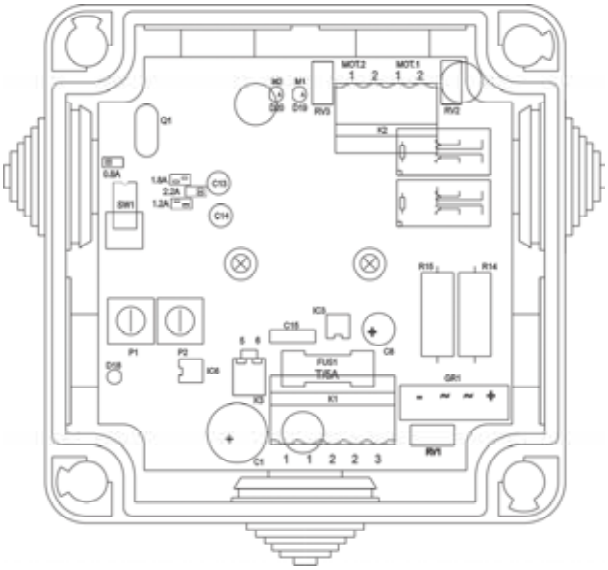


Fig. 69 -1 · E102

Technical data	
Supply voltage	24 V DC, min. 16 V DC, max. 40 V DC residual ripple max. 25 %
Motors suitable for connection	2 pieces 24 V DC drives with integrated load disconnection
Motor current	each motor max. 2.2 A
Follow-up time	0 to 10 s adjustable, default approx. 0 s
Opening time restrictor	5 to 60 s adjustable, default approx. 5 s
Connection cross-section	max. 2.5 mm^2
Protection type	IP 54
Dimensions	113 x 113 x 58 (HxWxD)

Control elements

Manual alarm release

- **RWA switch FT4 – 24 V DC-VdS**

For manual release in the event of a smoke or fire alarm.
Switching power max. 100 mA, 24 V DC, with VdS certification.

Dimensions:	- 125 x 125 x 32.5 mm
Structure:	- Housing for surface mounting made of stabile diecase in the col-
our	orange with replaceable glass pane in accordance with DIN 14655 Additional colours (not VdS) are also available.
	- Reset button for resetting the alarm
	- With LCD operating status displays
Installation:	- Distance of the pushbutton to the floor 1.4 m ±20 cm
	- easily visible in stairwell or hallway
Attention:	- may not be covered by door wings!
	- Observe local fire prevention authority requirements!

Fig. 70 -1 · RWA switch

Automatic alarm release

- **Smoke detector Type 1003 24 V DC**

The automatic smoke detector Type 1003 functions following the optical diffused light
principle. With VdS approval.

Technical data

Air speed:	In accordance with DIN EN 54 Part 7
Operating voltage:	8 V to 30 V
Current consumption	at rest: max. 65 µA
	in case of alarm: max. 20 mA
Dimensions:	Dia. 102 mm x 42 mm
Weight:	120 g
Single display:	LCD red
Operating ambient temp.:	-20 °C to +60 °C
VdS approval	

Fig. 70 -2 · Smoke detector

Important: Smoke detectors should not be used if operating disturbances such as dust, smoke or steam are to be expected.

Heat difference detectors Type 1005 24 V DC
The heat difference detector functions follwing the principle of semiconductor temperature sensors. The activation factors are temperature increase and the temperature threshold of the ambient temperature. With VdS approval.

Technical data

Operating voltage:	8 V to 30 V
Current consumption	at rest: max. 75 µA
	in case of alarm: max. 20 mA
Dimensions:	Dia. 102 mm x 50 mm
Weight:	125 g
Single display:	LCD red
Operating ambient temp.:	-20 °C to +60 °C
VdS approval	

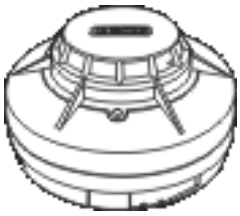


Fig. 70 -3 · Heat difference detector

Important: Heat difference detectors should not be used if rapid operational temperature fluctuations are to be expected.

Ventilation operation

Vent switch AS 500 LTA-24
- 24V - 3-way switch
- with function keys OPEN-STOP-CLOSE*
- with LCDs to display OPEN-CLOSED
- for flush mounting.

Range of application: Electric smoke and heat extraction units with additional ventilation function.

Fig. 71 -1 · Vent switch 24 V

Vent switch AS 500 LTA–230
- 230 V
- 3-way switch
- with function switches OPEN-STOP-CLOSE*
- for flush mounting

Fig. 71 -2 · Vent switch 230 V

Vent switch AS 500 LTA–LSA
- 230V
- 3-way switch
- with function OPEN-CLOSE
- with choice of pressing or resting function
- for flush mounting

Fig. 71 -3 · Vent switch

Range of application: Electric smoke and heat extraction units with additional ventilation function.

Vent switch AS 500 LTA-SCT
- 230 V
- 3-way switch
- with function keyss OPEN-STOP-CLOSE*
- combined with key switch
- in double frame
- for flush mounting.

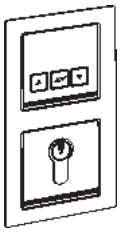


Fig. 71 -4 · Vent switch with key switch

Range of application: Electric smoke and heat extraction units with additional ventilation function.

Key switch SCT
For flush mounting.
Delivery without profile half cylinder

Fig. 71 -5 · Key switch

Room temperature thermostat E 70

The room temperature thermostat E 70 is used to regulate the temperature in rooms. The temperature switchpoint can be adjusted individually between 5 °C and 30 °C.

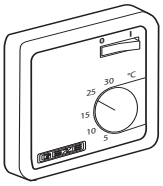


Fig. 71 -6 · Room temperature thermostat

Timer
If a timer is connected, the windows are opened or closed at the preselected times. A timer can optionally be connected to each vent switch line, although they have to be set to impulse signal and not continuous signal. The timer and the vent switch are equa control elements, i.e. that the RWA emergency power supply unit follows the signal sent out last.

* With the "STOP" switch, the motors can be halted at any time.

Rain/wind control

The rain/wind control can be connected to several control systems without additional relays (looping in the signal). A rain/wind control supplied by the customer can also be used, for this the customer must provide a potential-free make contact.
The rain/wind control consists of the following components:

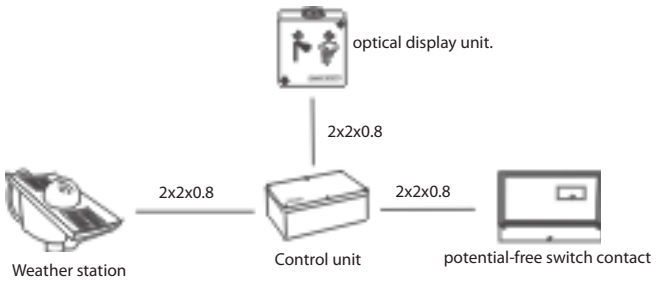


Fig. 72 -1 · Assembly groups of rain/wind control

Control unit with evaluation electronics

The control includes the power supply unit and the potential-free switch contacts with microcontroller control of the rain/wind signals. The evaluation can be carried out individually or jointly. The weather station is supplied with 24 V DC / GND signal input.

Weather station

The weather station unit includes rain, wind and temperature sensors. Wind measurement is executed using heated ceramic wire; thus the usual mechanical measurement with wind vanes is eliminated. Rain measurement is carried out with gilded conductors located on the surface, with which even the finest of rain is measured.
If the rain/wind control is triggered, the connected vent switches are locked and all connected drives are contolled in the direction "CLOSE". However, an alarm has priority over the rain/wind control, i.e. that in the event of an alarm, the windows are opened, even if the rain/wind control is active (windows are not closed). The switch point for the wind speed sensor is adjustable between 1-15 m/s.

Fig. 72 -2 · Weather station

12 RWA special variations

12.1 RWA TÖ "OPEN" for doors

This system offers the possibility to use a door as a RWA fresh air opening and therefore creates a large air supply area relatively quickly.
The GEZE RWA TÖ "OPEN" system is also used in rooms which have no or only small windows or flaps but a door, such as one leading to a roof garden, terrace or balcony. The door can then be used in conjunction with the GEZE RWA TÖ "OPEN" system as a smoke extraction opening.

System design

The following components are necessary for this unit:

In the lock area

① An electricdoor opener, model 14 Fafix KL 24 V AC

② Catch lock (are not a direct part of the smoke and heat extraction unit and should be supplied by the door manufacturer)

On the door lintel

③ One door closer GEZE TS 4000, TS 4000 EFS or GEZE TS 5000 in special mounting

In the area of the door or in an adjoining room

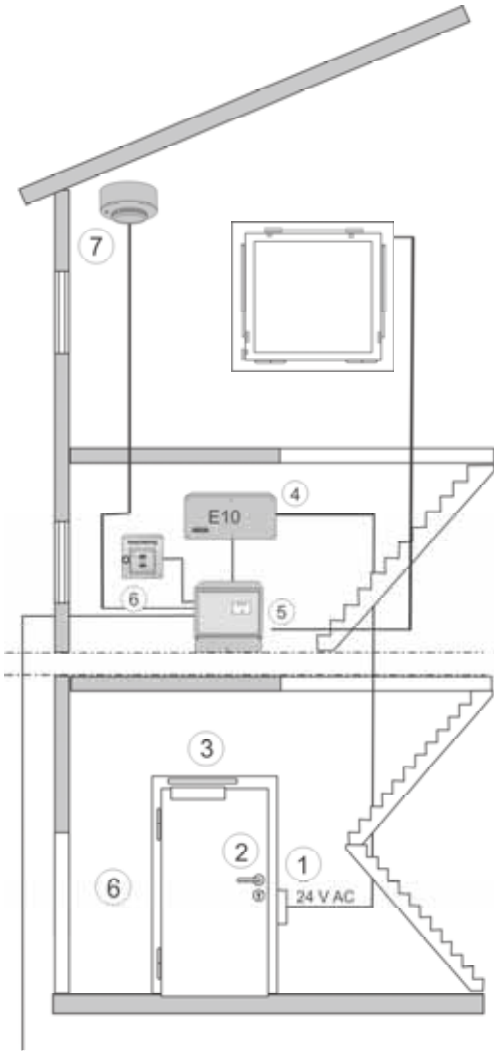
④ One control unit E 10 / 24 V

⑤ One emergency power supply unit E 260 N / 24 V DC

In the stairwell

⑥ RWA switch FT4 for alarm release (number and location in accordance with building authorities)

⑦ One or more (ceiling-mounted) smoke detectors for automatic alarm release



Power supply connection

Fig. 73 -1 · RWA system configuration

Functional description

Opening the door / in the event of an alarm

Manual:

- By pressing a RWA switch FT4 or other pulse generator, the door opener is unlocked. The door closer under spring tension opens the door.
- With the door lever, the door can also be opened without activating the smoke or heat extraction units.

Automatic:

- Through activation of the smoke and heat detector, an impulse goes to the door opener which releases the door.
  Door opening width limited to approx. 90° (otherwise closer damage is possible).

Manual closing of the door / alarm resetting

Resetting the alarm is effected with the reset button of the RWA switch FT4 and the connected unlocking of the switch, resp. by release device via a smoke and heat detector through resetting the detector. Then the door must be closed manually against the pressure of the door closer activated as a door opener.
When the power supply in a building is not secured with an emergency generator, it must be ensured with an emergency power supply.

Technical data

Control unit E10

- Plastic housing
- pre-mounted connection-ready unit
- tailored to the power requirement of the door opener 24 V AC
- Output voltage: max. 1 A
- Input voltage: 24 V DC
- Output voltage: 24 V AC

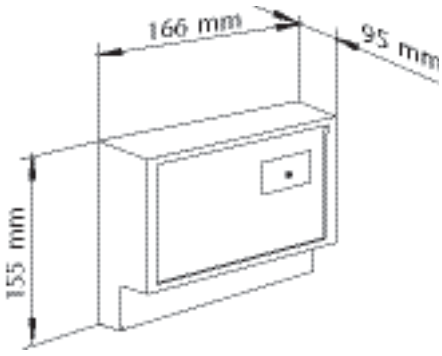


Fig. 74 -1 · Control unit E10

Door opener model 14 Fafix 24 V AC

- Door opener with short flush closing plate
- Latch release, tailored to latches and catches, from door lock and the door construction
- unlocks the door latch safely with operating current
- Adjustable range: max. 4 mm
- Frame dimension: min. 44 mm
- Rated voltage: 24 V AC ±15%
- Current consumption: 400 mA ±15%
- Load factor: max. 1 min.
- can be used on the left and right

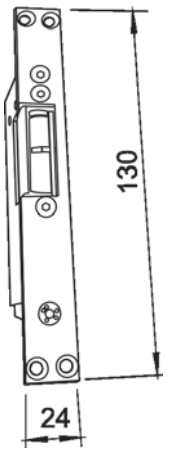


Fig. 74 -2 · Door opener Fafix KL

Door closer TS 4000, TS 4000 EFS or TS 5000 in special installation

- opens the door when the unit is triggered, as soon as the door opener unlocks
- with guide rail and lever
- adjustable opening force
- adjustable opening damping
- Safety valve
- for inward and outward opening doors

Fig. 75-1 · Door closer

Fig. 75-2 · Guide rail

RWA switch FT4 – trigger switch

- Lockable door
- with inspection glass
- Display lamp for "Window open", "Alarm", "Fault" and "Operation OK"
- In the colours orange, red, blue and grey

Fig. 75-3 · Trigger switch

Emergency power supply unit E 260 N 24 V DC

- Automatic switching to battery operation in case of power failure
- Power supply connection voltage: 230 V AC, 50 Hz
- with control diode in the front plate

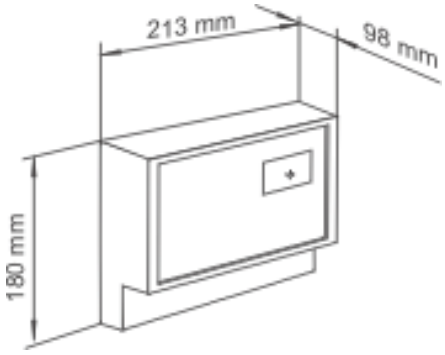


Fig. 75-4 · Emergency power supply unit

Heat difference detector WM1005

-	Operating voltage:	8 V to 30 V
-	Current consumption	at rest: max. 75 µA in case of alarm: max. 20 mA
-	Dimensions:	Dia. 102 mm x 50 mm

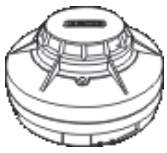


Fig. 75-5 · Heat difference detector

Smoke detector Type 1003 24 V DC

-	Operating voltage:	8 V to 30 V
-	Current consumption	at rest: max. 65 µA in case of alarm: max. 20 mA
-	Dimensions:	Dia. 102 mm x 42 mm

Fig. 75-6 · Smoke detector

Actuation and supply using the emergency power supply unit E260 N2-N32

The mode of operation is the same as for standard smoke and heat extraction with electric drive, i.e. connection via the necessary motor group. The control units E10 are supplied and activated with 24 V DC via the emergency power supply unti E260N (max. five control units E10 per group, under consideration of the total power).
The power output of the control unit E10 is 1 A. Thus a maximum of two door openers Fafix per E10 are possible. In the event of an alarm (window OPEN), the door opener Fafix is active (operating current principle).
The doof opener alarm triggering is activated via the emergency power supply unit E260N

- manually via RWA switch FT4 and/or
- automatically via smoke detector RM1003 or heat difference detector WM1005

Central alarm triggering via the public fire alarm system or a central pushbutton for several control units E10

The alarm is connected via a switch contact potential-free over the emergency power supply to the first control unit E10; i.e. at rest the contact must be open and close in case of alarm. The alarm was looped through all control units E10 switched in a row (up to 10 at the most). Further information to the triggering variations listed below on request:

- Triggering with pushbutton input with potential-free NO contact of the fire alarm system by the customer
- Triggering with smoke switch input with potential-free opening contact of the fire alarm system supplied by the customer
- Triggering by a local pushbutton or smoke switch as well as an additional central switch for all control units E10 switches in a row
- Triggering by a local pushbutton as well as via an additional central key switch and/or fire alarm system remote trigger
- Triggering from a central pushbutton as an interruption

RWA EL TÖ "OPEN" on a 2-leaf door

The functions for the two-leaf variations are the same as in the cases described above. So that two-leaf doors do not have the leaves open at the same time and jam, the fixed leaf must open on a delay. This can be achieved with a time relay or with a GEZE pulling delay LEV before the control unit E10.

Combination with GEZE emergency exit system (RWS)

The mode of operation is similar to the standard design. A door closer in inverse design (with pretensioned spring) and an electric magnetic clamp (MA 500 with reed contact) is mounted on the door. The magnetic clamp is under continuous current and holds the doors closed against the spring tension of the door closer (closed circuit current principle). The actuation and supply of the magnetic clamps has a RWS door control unit. In the event of panic, the door control unit is released directly by triggering the emergency switch. The door control unit is connected to a RWA emergency power supply unit E 260 N (relay alarm) via a potential-free opening contactt. In the event of fire, activating the RWA switch (manual release device) or smoke detectors (automatic release device) triggers the alarm and releases the magnet. Then the door is opened using the spring tension of the door closer.
In addition, in this system the door control unit can be unlocked and passed through using a key switch. After passing through, the door must be closed manually against the spring tension of the door closer.

For a short-term release, automatic locking after closing the door is possible (a so-called interruption), i.e. the door must only be pressed clsed and locks on its own as soon as the door leaf is closed.

For further information regarding RWS functions and the door central control units, please refer to the GEZE SecuLogic documentation.

Combination with TS 4000 EFS

(Inverse design / for comfortably passing through the door in normal operation):

The freeswing door closer TS 4000 EFS **(in special installation for the RWA EL TÖ "OPEN" System)** in inverse design offers the user comfortable passing through the door in routine normal operation.
In the event of fire, the door **opens** on its own (by manual or automatic actuation) to insure smoke extraction.

Manual:

- In the event of an alarm: By pressing a pushbutton or other pulse generator, the door opener is unlocked. The door closer under spring tension opens the door (freeswing function is deactivated).
- Normal operation: With the door lever, the doors can be opened

Automatic:

- Through activation of the smoke and heat detector, an impulse goes to the door opener which releases the door; the door opens (freeswing function is deactivated).

Closing the door

- After an alarm: The activated switch and/or the smoke and heat switch must be reset. Then the door must be closed manually against the pressure of the door closer activated as a "Door opener".

Note:
A combination with GEZE motor lock MLS is possible. Please consult GEZE GmbH in this case.

12.2 Smoke and Heat Extraction – with swing door drive TSA 160 NT Inverse

The system is applied for accessible doors, which can be used as fresh air or exhaust air openings depending on the location in the building in the event of an alarm.

▸ **System design**

Die system described in the following is exemplary: Please enquire with GEZE regarding possibilities of additional variations.

In the lock area

① Escape door opener Type 331

② Catch lock Type 807-10

On the door lintel

③ GEZE swing door drive TSA 160 NT Invers.
The system can also be used with two-leaf doors.

Beside the door

④ Switch pad to open the door in normal operation; other types of actuation e.g. radar are also possible.

⑤ Emergency-off switch (door opens currentless)

In the building

⑥ Emergency power supply unit E 260 N ../..

⑦ Emergency power supply unit USV 700 or 1000 (required if the door should not open in the event of power failure)

⑧ Main switch

In the stairwell

⑨ RWA switch FT4

⑩ One or more (ceiling-mounted) smoke and/or heat detectors for automatic triggering

⑪ Power pack

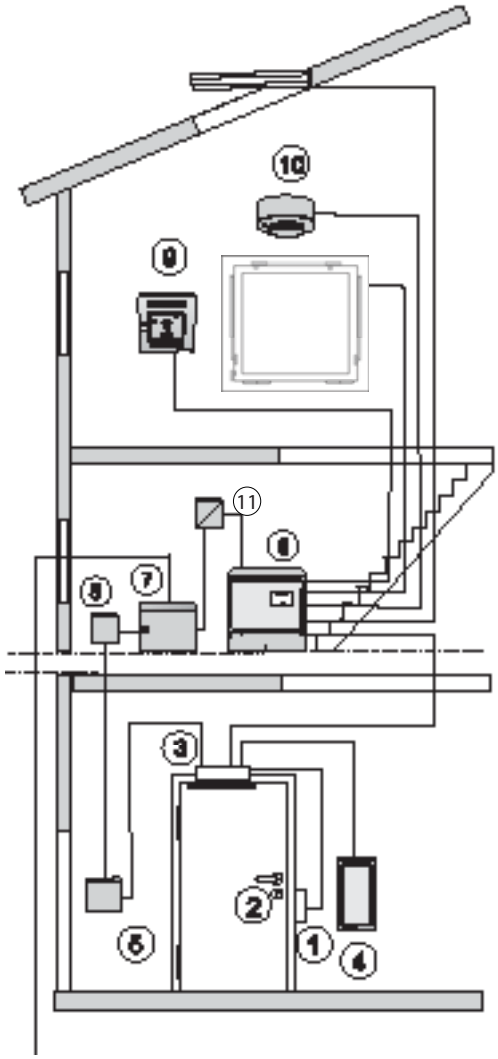


Fig. 78 -1 · System overview of the RWA with TSA160 NT Inverse

Functional description with EDO 331

In comparison to the swing door drive TSA 160 NT which automatically opens the door and closes it using spring tension, the drive TSA 160 NT Inverse reverses this function. Here the closing operation is automated, the open occurs mechanically using spring tension (advantage in case of smoke and heat extraction) I.e. the TSA 160 NT Inverse opens in the event of fire or during a power outage using spring tension – closed current principle. Therefore the use of closed current door openers (or magnetic clamps) is necessary; operating current openers would not be release the door in a power outage.
To prevent unintentional opening of the door in a power outage (e.g. at night) uninterrupted power supply (UPS) is necessary.

Opening the door in the event of an alarm

In the case of alarm of a fire switch or smoke detector, the power supply to the drive and door opener is interrupted. The doors are unlocked immediately and opened mechanically to ensure safe smoke extraction. The doors remain open as long as the alarm has not been reset.

Closing the door after an alarm

After cancellation of an alarm, the activated RWA switch, the smoke and heat difference detectors as well as the TSA 160 NT must be reset.

Opening the door in normal operation

By pressing a switch pad or other pulse generator, the door opener is unlocked. The swing door drive under spring preload opens the door mechanically using spring tension.

Closing the door in normal operation

In normal operation, the door closes using the swing door drive control automatically following the passing of the adjustable hold-open time.

Supply of the disconnection board

The disconnection board of the TSA 160 NT Inverse must be supplied with an additional power pack.

Manual passing

A door equipped with the TSA 160 NT Inverse cannot be passed through manually effortlessly. The door is held closed not only with the escape door opener but also the hydraulic magnet valve. Because no drive signal is generated by manual passing though, the drive tries to reclose after manual opening – this is comparable with the continuously open position on the (standard) TSA 160 NT from which it cannot be closed manually.

Emergency power supply UPS

If the door may not be opened during a power outage, the inverse must be provided with UPS including the additionally necessary power pack.

Note:
Design with automated swing door drive in accordance with DIN 18650.

- **Combination TSA 160 NT Inverse with motor lock MLS**

  The TSA 160 NT Inverse can be combined with the GEZE motor lock. Because the lock works with the operating current principe, it must be ensured in the case of smoke and heat extraction that the lock is supplied with 24 V, e.g. by a GEZE smoke and heat extraction control system E260N The use of GEZE motor lock MLS is only possible on one- leaf doors. For the smoke and heat extraction air exhaust function, the board MST212 is required additionally, which passes the smoke and heat extraction control system onto the lock and switches off the TSA 160 NT Inverse at the same time in case of smoke and heat extraction.

  Opening the door in the event of an alarm:

  The additional board MST212 is controlled e.g. via the E260N. On one hand the MST212 supplies the motor lock with voltage, on the other side it controls the lock, during which the lock is unlocked safely, i.e. also during a power outage. The power supply is interrupted to the drive TSA 160NT Inverse via a contact on the MST212. As soon as the lock has unlocked, the doors open due to the spring tension of the drive.

  Closing the door after an alarm:

  After the cancellation of an alarm, the activated RWA switches and/or the smoke and heat difference detectors must be reset. If the door is closed, it is relocked automatically via the motor lock resp. it adopts the mode of operation set on the lock. Thus the door is relocked. The lock locks following the alarm exactly in the operation setting which was set before the alarm (night/ day/ continuous open).

  The TSA 160 NT must be reset

  Opening the door in normal operation:

  By pressing a switch pad or other pulse generator, the GEZE MLS is unlocked. The swing door drive under spring preload opens the door mechanically using spring tension.

  Closing the door in normal operation:

  In normal operation, the door closes using the swing door drive control automatically following the passing of the adjustable hold-open time.

  Supplying the disconnection board via the power pack of the MST 212.

  Manual passing

  Manual passing through activating the inner door lever or using keys in the cylinder.

12.3 RWA – with swing door drive TSA 160 NT Invers and RWS

See "**RWA with swing door drive TSA 160 NT Invers**" Section 7.2

System design

- Additional components for RWS controller:
  - Door control unit TZ 220,
  - Clamping box KL 220,
  - additional opening contact for emergency switch

Functional description

- The disconnection board of the TSA 160 Invers is supplied with voltage from the door control unit which is switched without voltage in event of an alarm so that the door opens safely. In doing so, the circuit-entering of the fire alarm system or the alarm contact of the emergency power supply unit at the door control unit. A separate power pack for supplying the disconnection board is not necessary.
- In order to avoid unintentional door opening in case of power failure or ensure its safeguarding through the door control unit, the TSA 160 Invers and door control unit must be puffered with an interruption-free power supply.

Opening the door in the event of an alarm

- Upon activation of the emergency switch of the door control unit as well as in case of alarm from the fire switch or smoke detector, the TSH 160 Invers are switched currentless via the door control unit and the escape door opener is unlocked at the same time. The door is immediately opened mechanically and remains open as long as the alarm has not been reset.

Closing the door after an alarm

- After the cancellation of an alarm, the activated RWA switches and/or the smoke and heat difference detectors as well as the door control unit emergency switches must be reset. In addition the alarm at the door control unit must be aknowledged using the key switch.

Passing through the door with emergency exit system (RWS) system – secured operation

- By activating the key switch of the door control unit or other release element (card reader, external key-operated switch), the door opens automatically and closes on its own and locks following the elapse of short-term unlocking (max. five minutes). The release elements of the TSA 160 are not active here. In case the short-term unlocking is exceeded, a prewarning is begun which changes to a door alarm after max. three minutes, which must then be acknowledged with a key at the door control unit.

Passing through the door in locked emergency exit system (RWS) – unsecured operation

- By activating the release elements of the TSA 160 Invers (switch pad, radar alarm), the door opens automatically using spring tension and closes itself following the elapse of the hold-open time set on the swing door drive. For safety reasons, safety sensors for safeguarding the swivelling range are also recommended here.

Technical data

Escape door opener 331

- unlocks the door in accordance with the closed current principle
- Operating voltage 24 V DC
- Current consumption 160 mA
- Compressive strength 7500 N

Fig. 82 -1 · Escape door opener

Fig. 82 -2 · Catch lock

Catch lock 807/10

- Counterpiece to the escape door opener

Swing door drive TSA 160 NT Inverse

- Opening using spring mechanism and adjustable hydraulic valves
- Closing using hydraulic pump system
- Variations for one-leaf and two-leaf doors
- Outer dimensions of the drive: 690 x 100 x 120 mm
- Casement widths: max. 1400 mm
- Casement weights: max. 250 kg
- Output voltage: 24 V DC
- Operating voltage: 230 VAC
- Power consumption: 300 W
- Please see planning document TSA 160 for further information

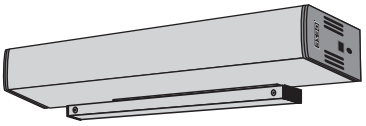


Fig. 82 -3 · Swing door drive

Control elements

possible drive types include:
- Motion detector
- Switch
- Key switch
- Number code lock
- Safety sensors
- Emergency stop switch
- Main switch

Power supply

For uninterrupted emergency power supply

- USV 700 (e.g. for a one-leaf automatic swing door drive) 700 VA
- USV 1000 (e.g. for two one-leaf doors or one two-leaf automatic swing door drive) 1000 VA
- Power pack 24 V

Please see the brochure "GEZE control elements" for further information regarding the drive elements listed above.

12.4 RWA EM "OPEN" - electromagnetic

For vertical inward opening bottom, top, pivot and side hung windows

- Casement widths from 300 mm to 1000 mm (top hung) or 1200 mm (bottom hung) with magnetic primary lock
- Casement width up to 2000 mm (top hung) or 2400 mm (bottom hung) with magnetic primary lock, connecting rod and secondary locking device.

System design

① Magnetic primary lock E8/a for 24 V DC with casement bracket for timber and alloy windows.

② Mechanical secondary lock C8/b, with casement bracket for overlap and flush-closing windows for wide casements.

③ Connecting rod for mechanical connection of primary and secondary lock.

④ Spring arm, with frame and casement bracket, with opening buffer. Spring pressure, spring stroke and spring tension are adjusted to the window system.

⑥ Smoke and heat switch (ceiling-mounted), Type 142 with with plinth for automatic triggering.

⑦ Pushbutton E 45 "OPEN with light" with viewing panel, lockable. Location on the ground floor and upper floors, additionally at other positions.

⑧ Mains rectifier E 8g/24 V DC. Capacity corresponding to the number of magnetic locks and smoke switches.

⑨ Emergency power supply unit E 250/24 V DC with integrated battery, to bridge short-term power outages.

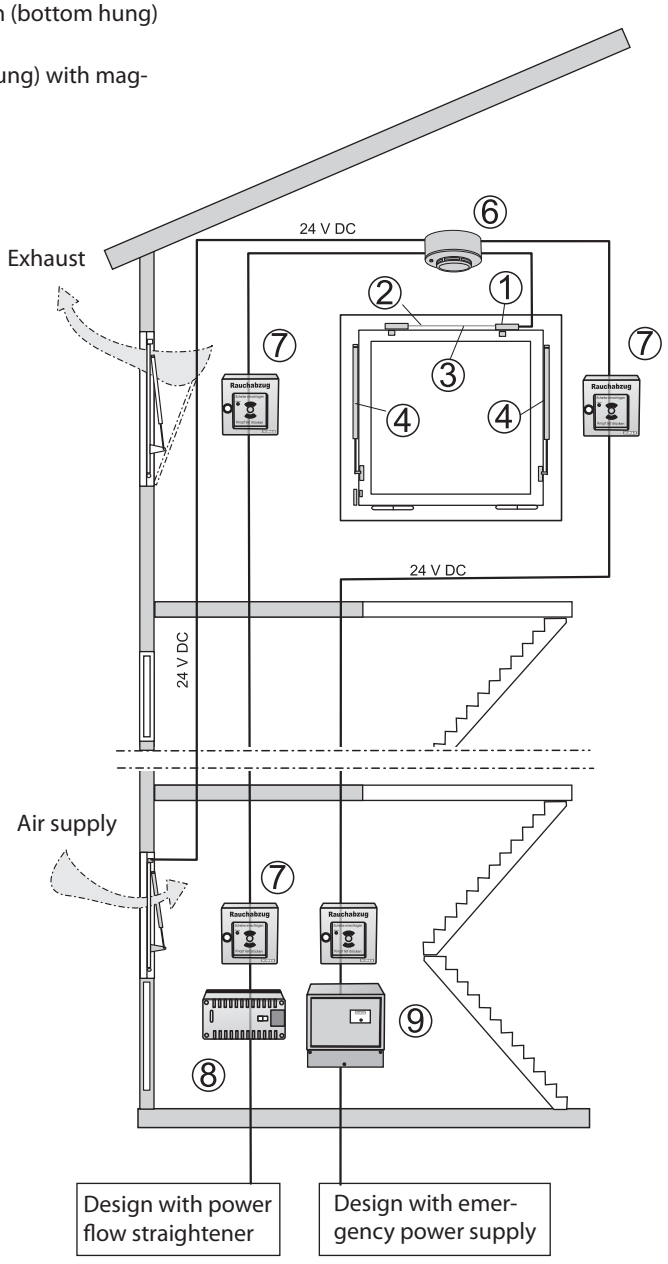


Fig. 83 -1 · System overview of the RWA EM

Functional description

The magnet initial locking device and mechanical secondary locking device hold the window casement safely closed against the pressure force of the spring arms and the wind force.
The magnet in the initial locking device is under continuous current and holds the bar in the end position against the pressure springs (closed current principle).

Opening the windows by interrupting the closed circuit

Manual triggering:
- By activating the pushbutton or other devices for current interruption

Automatic alarm release**:**
- By activating the smoke and heat switches
- In case of power failure (only in the version with mains rectifier)

Manual closing of the window

The closed circuit flow must be recreated by resetting the switch or smoke and heat alarms. Closing the window manually against the pressure force of the spring arms and the magnet pressing in the magnet initial locking device.
By using an emergency power supply, unintended opening of the windows during short current interruption is avoided because there is then an automatic switch to battery operation.
The smoke and heat extraction system is not advisible for windows which can only be closed using ladders or scaffolding.
The system must be closed manually, this is also to be observed for the semi-annual performance testing.

For further information regarding the range of application, please see the mounting instructions RWA EM-, CO_2-open

Technical data

Electromagnetic locking device

- pre-mounted units
- Housing and underlay puffer made of light alloy anodised EV1
- Current consumption per primary lock 0.13 A
- For side hung windows: Casement height min. 1.5 x casement width

Secondary lock

- mechanical
- can be coupled to a primary lock with connecting rod

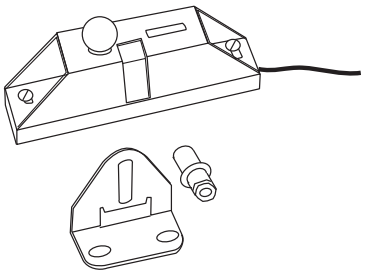


Fig. 85 -1 · Electromagnetic locking device and secondary locking device

Spring arm

- safe, space-saving and dirt protected unit
- pre-mounted unit (EV1)
- with opening buffer
- up to max. 30 kg/m² panel weight
- stroke 150 - 300 mm
- pulling force 150 - 250 N
- opening angle to 70° depending on stroke and casement height

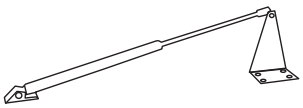


Fig. 85 -2 · Spring arm

E 250 N Emergency power supply 24 V AC / 1.2 A

- See system TÖ-OPEN for technical data

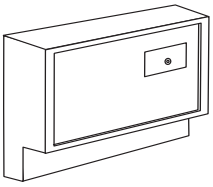


Fig. 85 -3 · Emergency power supply unit

Power flow straightener		
	E8g / 24 V DC	**NAG03 / 24 V DC**
Input voltage	230 V AC	230 V AC
Output voltage	24 V DC	24 V DC
Power	0.4 A	0.9 A
Protection type	IP 20	IP 30
Number of magnet locking devices that can be connected	max. 2 magnet locking devices without smoke switch	max. 5 magnet locking devices with smoke switch max. 7 magnet locking devices without smoke switch
Plastic housing	light grey	white

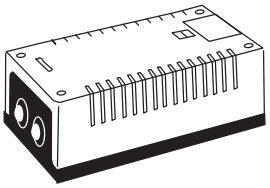


Fig. 85 -4 · Mains rectifier

12.5 RWA-CO_2 "OPEN"

Vertically installed inward opening bottom, top and pivoted sash windows

- Casement width up to 1000 mm (top hung) or 1200 mm (bottom hung) with CO_2 primary lock
- Casement width up to 2000 mm (top hung) or 2400 mm (bottom hung) with CO_2 primary lock, connecting rod and secondary locking device.

▸ System design CO_2 "Open" unit with manual trigger

(1) CO_2 primary lock for pressure gas or pressure air with casement brackets, for timber and alloy casements.

(2) Magnetic secondary locking device, with 2 casement brackets for timber and alloy casements.

(3) Connecting rod for mechanical connection of primary to secondary locking device.

(4) Spring arm, with frame and casement brackets, with opening buffer. Spring pressure and spring stroke are adjusted to the window system.

(5) Alarm box with integrated flap valve, for manual triggering a) without visual display b) with visual display.

(6) Copper pipe 6 x 1 mm.

(7) T-fitting, for copper pipe 6 x 1 mm.

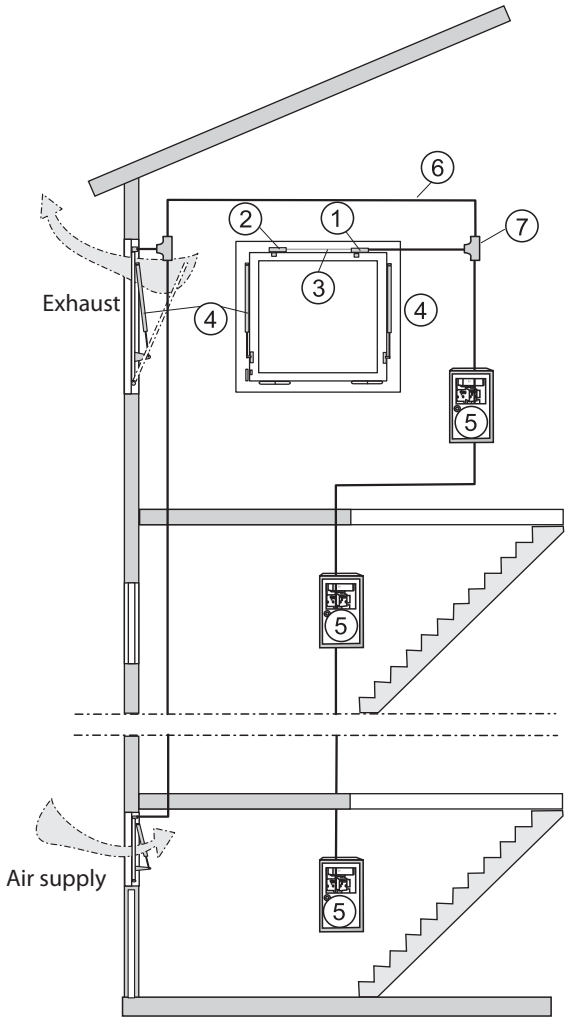


Fig. 86 -1 · System overview of theRWA-CO_2

▸ Functional description

The CO_2 initial locking device and mechanical secondary locking device hold the window casement safely closed against the pressure force fo the spring arms and the wind force.
The bar in the initial locking device is under spring pressure. The initial locking device has a pressure cylinder connected to the trigger stations via a copper line.

The trigger station (alarm box) is equipped with CO_2 cartridges. These CO_2cartridges include the energy to trigger the window, independent of other energy sources.
According to the number of pressure cylinders and line lenth, the size of the CO_2 cartridges must be determined.

Opening the window

- When activating the trigger station, the CO_2 cartridge is pierced. The CO_2 gas flows through the copper line to the pressure cylinders in the initial locking devices.
- The pressure cylinders activate the bars on the windows. The spring arms under voltage open the windows.

Manual closing of the window

- The casements are pressed together manually against the pressure force of the spring arms. The bars automatically latch in the locking devices.
- After closing the pierced CO_2cartridges in the trigger station have to exchanged.
- Alarm boxes from whose positions the windows to be opened can be seen do not have to have a visual display.
- This smoke and heat extraction system is not advisible for windows which are located at a high position and can only be closed using ladders or scaffolding, e.g. following each semi-annual performance testing.

Technical data

CO_2 primary locking device

- pre-mounted units
- Housing and underlay puffer made of light alloy anodised EV1
- with connecting rod and secondary locking device
- Connection to copper pipe 6 x 1 mm

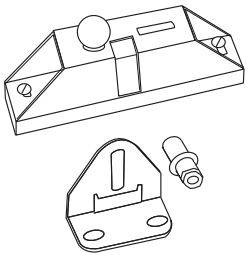


Fig. 87 -1 · CO_2 primary and secondary locking device

Secondary locking device

- mechanical

Spring arm

- Technical features, see smoke and heat extraction system electromagnet-Open
- opening angle to 70° depending on stroke and casement height

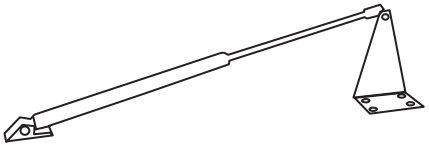


Fig. 87 -2 · Spring arm

Alarm box

- Vision panel made of glass (2 mm) in the door
- Lockable door
- CO_2 cartridges 18 g
- Press in the vision panel in event of an alarm
- max.10 primary locking devices and 70 m copper pipe 6 x 1 mm
- Surface and flush mounting

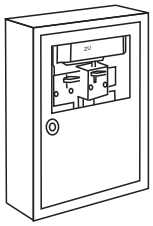


Fig. 87 -3 · Alarm box

13 Connecting and cable diagrams

13.1 Cable lengths and cross-sections

The cable cross-section necessary between the electric drive and emergency power supply unit is determined by the current consumption of the drives and the respective line length. Because these lengths are different in each construction project and we do not want to use different clamps based on the object for each control system, we equip the control systems E 260 with clamps for line cross-sections of 4 mm² The cross-section resulting in accordance with the formula listed below must be observed to keep the total line resistence and thus the voltage drop on the motors low. It does not result based on the maximum current.
Therefore it is permissible and also common to connect cables with a cross-section of 4 mm² to the control systems and to distribute the lines in an additional connector (in the control system or outside, near the control system) according to the lines. Accordingly large cable cross-sections (for high line lengths) can then be laid further from this connector.

General formular for required cable cross-section depending on cable length and total current:

$$\text{necessary cable cross-section} = \frac{\text{Cable length x total current of all drives}}{73}$$

Maximum permissible line length depending on total current and cable cross-section

Cross-section	E 260 N2 to N32				
	1 A	2 A	4 A	6 A	10 A
1.5 mm²	100 m	50 m	25 m	16 m	10 m
2.5 mm²	180 m	90 m	45 m	30 m	18 m
4.0 mm	280 m	140 m	70 m	45 m	28 m

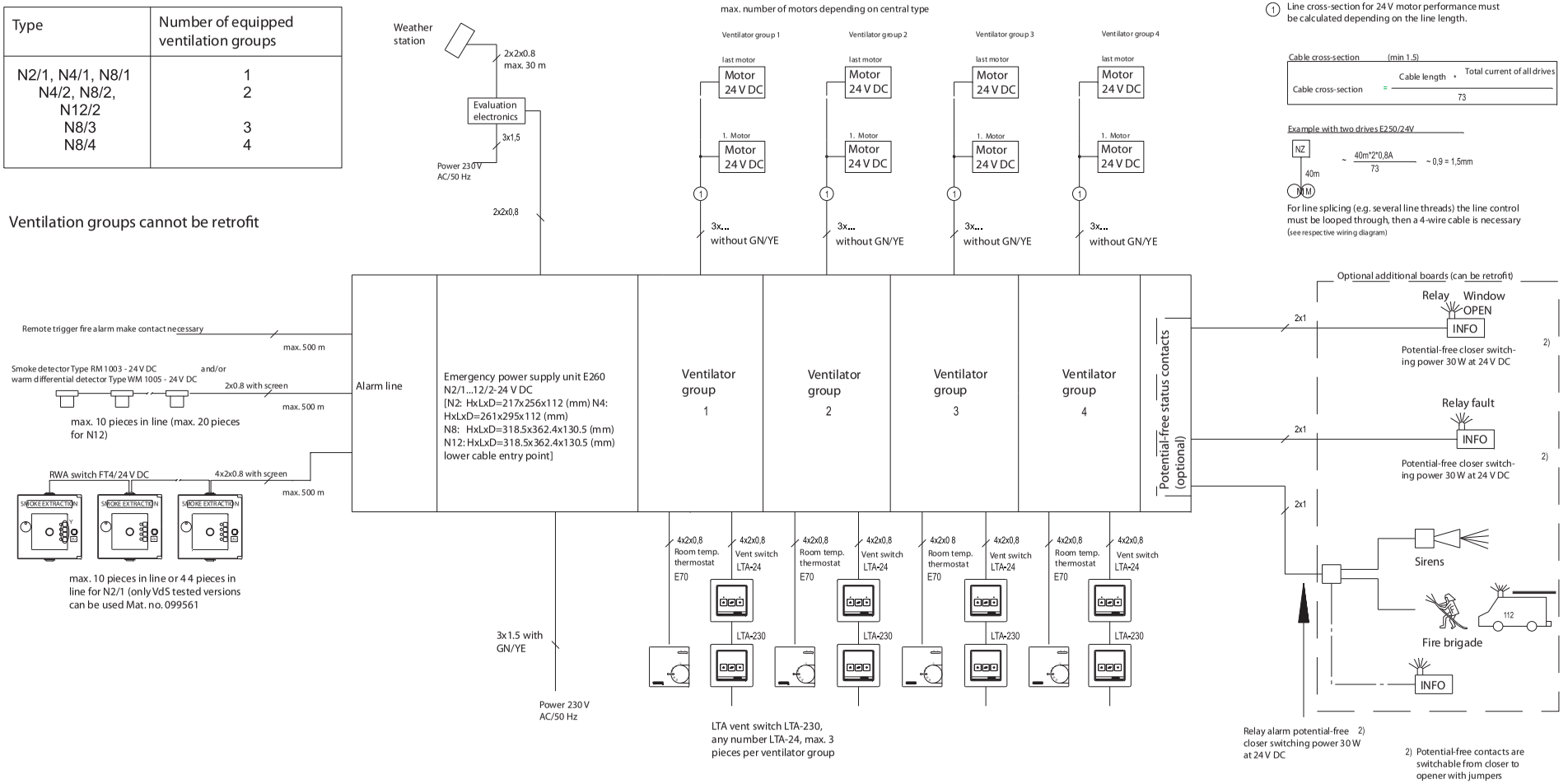
Minimum cross-section: 1.5 mm²
Maximum cross-section: 4.0 mm² for all types

Legend to the cable plan

Line cross-section for 24 V motor performance must be calculated depending on the line length. Cable cross-section min. 1.5 mm². For line splicing (e.g. several line threads) the line control must be looped through, then a 4-wire cable is necessary, see respective wiring diagram.

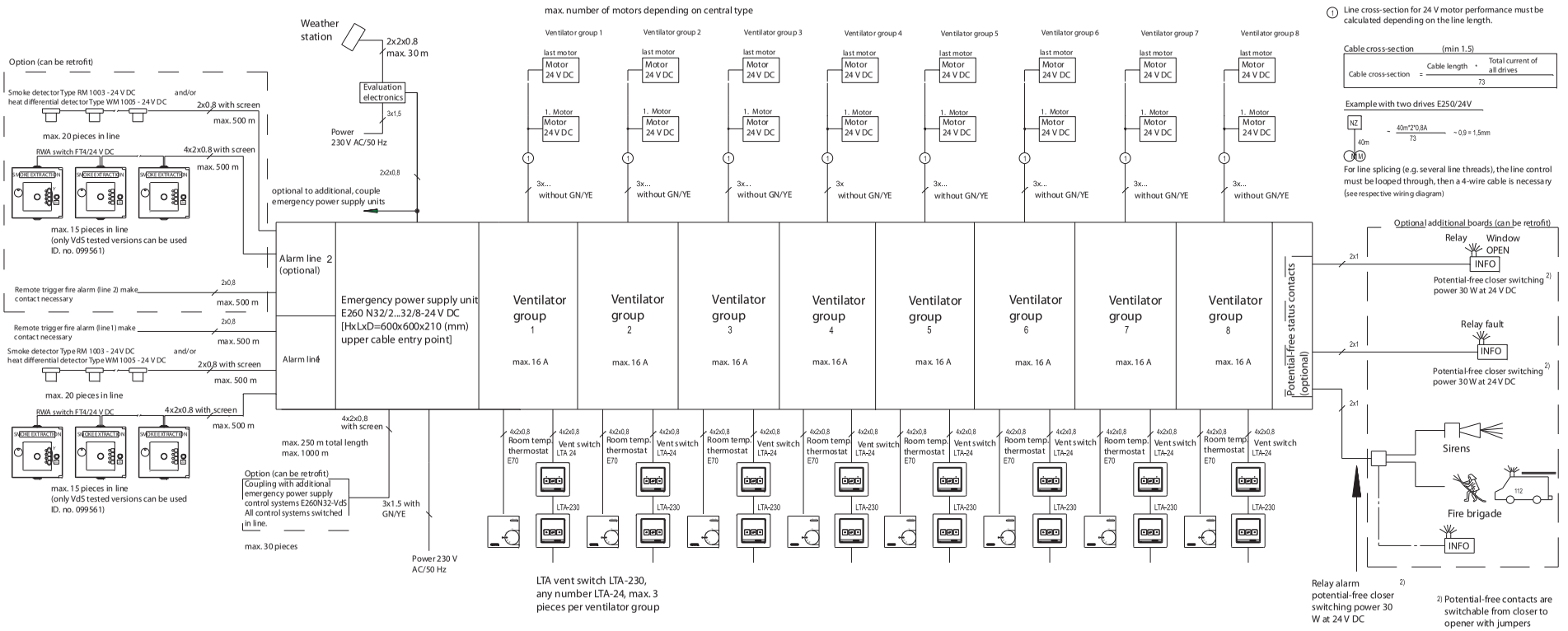
Type	Number of equipped ventilation groups
N2/1, N4/1, N8/1	1
N4/2, N8/2, N12/2	2
N8/3	3
N8/4	4

Ventilation groups cannot be retrofit



13.2 Cable diagram: Emergency power supply unit E260 N2/1 to N12/2 24 V DC - VdS

Drawing no. 37101-9-0951



13.3 Cable diagram: Emergency power supply unit E260 N32/2 to N32/8 24 V DC - VdS

Drawing no. 37101-9-0955

ID. No. 131635 · Vers. 01 · EN 10 / 08 · Subject to alterations

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