

User Manual

**Tunnel door with rack and pinion drive
[TD, TD-S and TD-L]**

Code No. 99-97-4345

Edition: 10/2014 GB

These instructions are a translation of the original instructions!

EC Declaration of conformity



Big Dutchman

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In accordance with EC Directives:

- **Machines 2006/42/EG, Annex II / Part 1 / Chapter A**

Further applicable EC directives:

- Electromagnetic compatibility 2004/108/EC
- Low voltage 2006/95/EC



The product mentioned below was developed, constructed and produced in accordance with the above mentioned EC Directives and under sole responsibility of Big Dutchman.

Description:	System for climate control of barns
Type:	Tunnel doors with rack and pinion drive
System no. and year of construction:	see customer order no.

The following harmonised standards apply:

- EN ISO 12100:2010 Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)
- EN 60204-1:2006/AC:2010: Safety of machinery - Electrical equipment of machines Part 1: General requirements

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16.01.2010

Managing Director



Place

Date

Signer and information regarding signer

Signature

Product information



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Tunnel door with rack and pinion drive type L (TD-L)

The tunnel door "TD" with rack and pinion drive has been available from Big Dutchman for many years (product information 1170). Based on this well-proven design, we added many improved functions to the new tunnel door TD-L, which is available as successor of the TD system as of now. The parts lists of the old TD system will be closed upon publication of this product information.

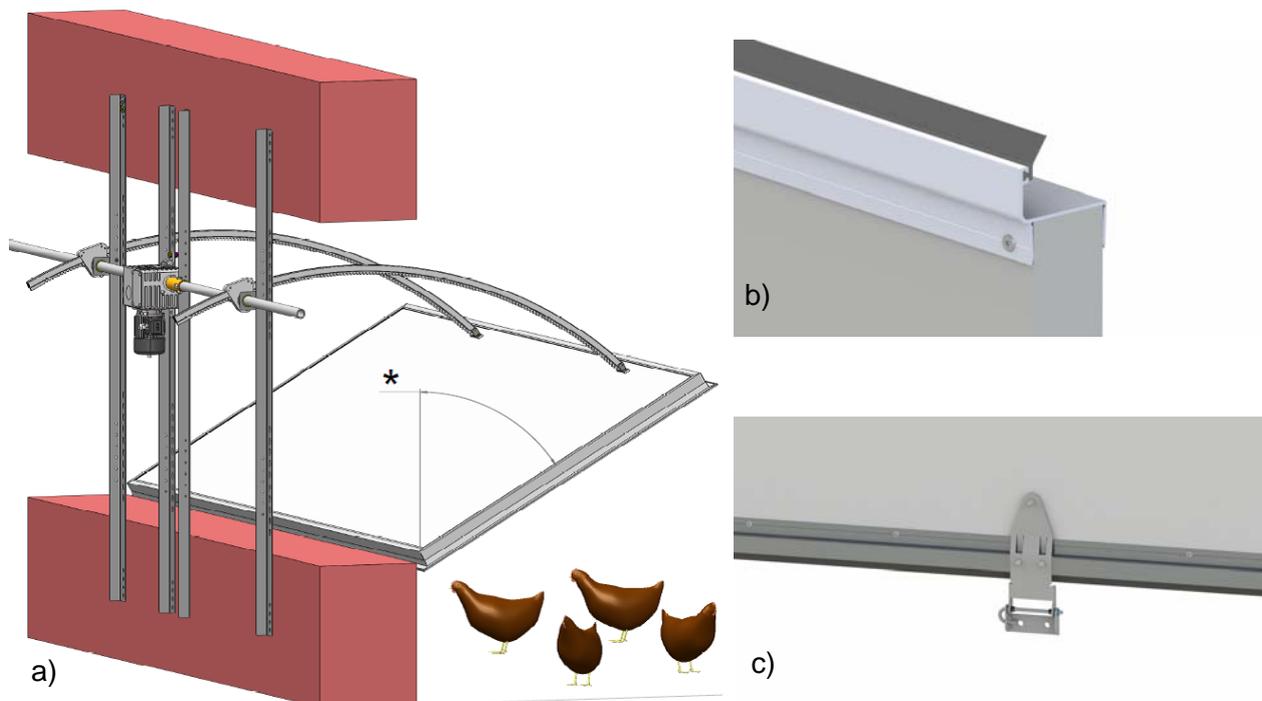


Fig. 1: Maximum door opening is 60° for the standard version (a); tunnel door TD-L with new sealing lip (b) and new hinge (c)

Just like the TD system, the TD-L system consists of:

- 50 mm thick composite boards with a robust, 1.5 mm plastic coating on both sides
- a frame and toothed racks made of aluminium
- hinges, an actuator that opens and closes the door and fastening material

The TD-L system features the following improvements compared to the TD system:

- Better sealing due to very flexible sealing lip
- Less force required for closing, i.e. less toothed racks are necessary, making longer systems possible
- Easier and faster mounting thanks to special hinges
- No gaps in the sealing around the hinges
- Standard version allows a door length of more than 40 m, or more depending on the individual project
- Use of locally sourced, heavy panels (max. 10 kg/m²) instead of XPS panels possible
- Lower price

Special features of the TD-L tunnel door

Sealing lip: The forces required to press the door closed are significantly lower with the newly developed, 23 mm wide sealing lip compared to those of the previous hollow rubber profile. Uneven surfaces of up to 5 mm can still be compensated. The sealing is supplied in bulk and can be cut on site. Subsequent replacement in case of damage is also possible. The groove must be sprayed with the supplied silicone spray before inserting the sealing into the frame profile.

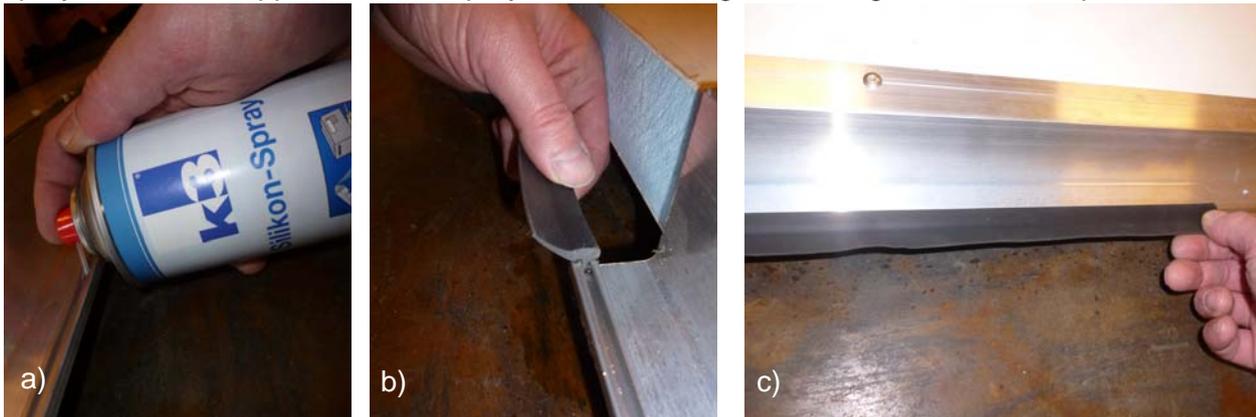


Fig. 2: Inserting the lip sealing (a-c)

Frame profile: The frame profile is made of anodised aluminium and therefore very resistant to corrosion. Both sides of the profile have a groove that facilitates drilling and aligning the holes for the blind rivet during riveting of the profile. Each profile is 5.5 m long.

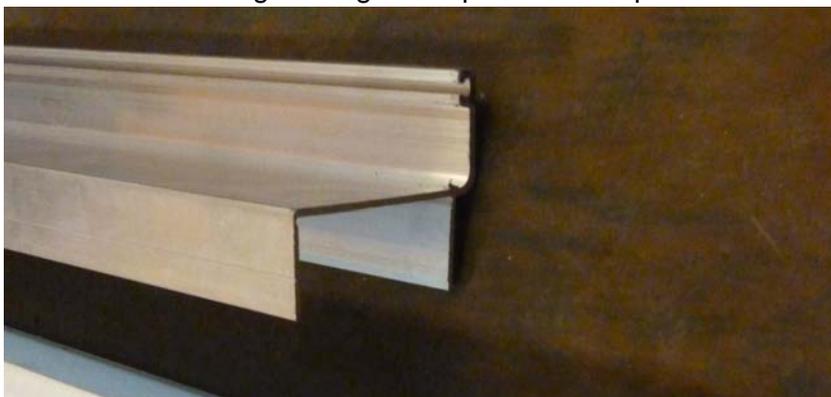


Fig. 3: Frame profile

Hinges: The TD-L tunnel door has special hinges which guarantee that the sealing lip can be applied to the wall without any problems. During mounting, integrated limit stops help to align the hinges correctly, no extra tools required. Additional reinforcing plates at the hinges or cutting the sealing on site is no longer necessary. The TD-L hinge is made of stainless steel with plain bearing bushes made of polyamide. The hinge is corrosion- and maintenance-free.



Fig. 4: Hinge, mounted

Fastening material:

To mount the entire tunnel door at the house, only one set of fastening material is supplied, optionally for:

- **Masonry:** with galvanised wood screws and dowels, for walls made of masonry, concrete and wood
- **Sandwich panels:** with metric stainless steel screws, large-diameter washers and nuts, for walls made of sandwich panels and steel profiles

Delivery of unnecessary fastening material can thus be avoided to a large extent.

Additionally, the starter kit parts lists of all TD systems contain a maintenance switch from now on. This switch must be installed within reach of the drive.

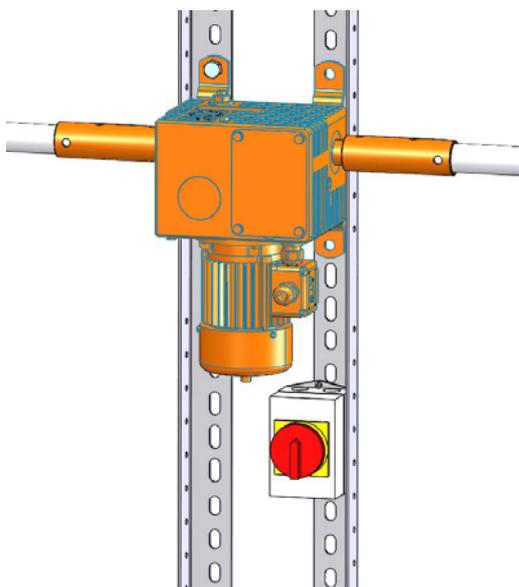


Fig. 5: Maintenance switch for all TD systems from now on

Coding and selecting material

Material for the TD-L tunnel door is compiled in the same way as for the TD tunnel door. TD-L is available with heights of 750, 1000, 1200 and 1500 mm. The material for one opening consists of the following components:

- a starter kit with a length of 3 m of the respective height
- extension kits with a length of 3 m each of the respective height until the required total length is reached, but no more than 12 units (total length: max. 40 m)
- separating plates for each gap in the door, e.g. at each support. To compensate for thermal expansion, a door should have a gap after no more than 15 m.
- suitable sandwich panels with a thickness of 50 mm, e.g. XPS panels
- an actuator

The following parts lists are available for the TD-L tunnel door:

Starter kits for masonry

Code no.	Description
60-49-0400	Starter kit TD-L 3000 - 750 high for masonry
60-49-0405	Starter kit TD-L 3000 - 1000 high for masonry
60-49-0410	Starter kit TD-L 3000 - 1200 high for masonry
60-49-0415	Starter kit TD-L 3000 - 1500 high for masonry

Extension kits for masonry

Code no.	Description
60-49-0401	Extension kit TD-L 3000 - 750 high for masonry
60-49-0406	Extension kit TD-L 3000 - 1000 high for masonry
60-49-0411	Extension kit TD-L 3000 - 1200 high for masonry
60-49-0416	Extension kit TD-L 3000 - 1500 high for masonry

Starter kits for sandwich panels

Code no.	Description
60-49-0402	Starter kit TD-L 3000 - 750 high for sandwich panel
60-49-0407	Starter kit TD-L 3000 - 1000 high for sandwich panel
60-49-0412	Starter kit TD-L 3000 - 1200 high for sandwich panel
60-49-0417	Starter kit TD-L 3000 - 1500 high for sandwich panel

Extension kits for sandwich panels

Code no.	Description
60-49-0403	Extension kit TD-L 3000 - 750 high for sandwich panel
60-49-0408	Extension kit TD-L 3000 - 1000 high for sandwich panel
60-49-0413	Extension kit TD-L 3000 - 1200 high for sandwich panel
60-49-0418	Extension kit TD-L 3000 - 1500 high for sandwich panel

Separating plates (for masonry and sandwich panels)

Code no.	Description
60-49-0404	Separating plate cpl for TD-L 3000 - 750 high
60-49-0409	Separating plate cpl for TD-L 3000 - 1000 high
60-49-0414	Separating plate cpl for TD-L 3000 - 1200 high
60-49-0419	Separating plate cpl for TD-L 3000 - 1500 high

Sandwich panels

Code no.	Description
60-47-5100	Composite board XPS core PVC/PP 1.5 mm 50-3000 x 750 mm
60-47-5101	Composite board XPS core PVC/PP 1.5 mm 50-3000 x 1000 mm
60-47-5102	Composite board XPS core PVC/PP 1.5 mm 50-3000 x 1200 mm
60-47-5103	Composite board XPS core PVC/PP 1.5 mm 50-3000 x 1500 mm

Alternatively, other sandwich panels with a thickness of 50 mm can be used, up to a maximum weight of 10 kg/m².

Actuators

The following overview shows a selection of drives suitable for a mains voltage of 230 V, 50 Hz. Couplings and fastening material to mount the actuators are included in the starter kits of the respective tunnel door.

Code no.	Description	Door height in mm:			
		750	1000	1200	1500
		Max. length of tunnel door in m			
60-50-3330	Actuator/winch motor EWA10 230 V 50 Hz 1.6 A 5.2 rpm 50 Nm travel range 13.5 rpm = 2800 FS63	15	13	12	9
60-50-3288	Actuator/winch motor EWA12 230 V 50 Hz 2.2 A 150 Nm 3.1 rpm travel range 13 rpm = 2800 mm with 4 m cable	40	40	35	27
60-50-3227	Actuator/winch motor EWA10 230 V 50 Hz 3.5 A 3.1 rpm 250 Nm travel range 13.5 rpm = 2800 mm	40	40	40	40

Drives for other voltages and frequencies as well as for operation with 24 volts direct current (e.g. for connection to an emergency opening) are also available. Please contact Engineering if you have questions.

Feedback potentiometer in the TD-L system and general information

The listed actuators include a feedback potentiometer for a door opening of 60 degrees. The feedback signal informs the farm PC about the door's position. This means that any door position can be reached very accurately. If a position is not reached, e.g. because of mechanical blocking, because of an inactive maintenance switch or active motor protection, an alarm is generated. This significantly increases operational reliability.

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1 Basic instructions

	<p>Important:</p> <p>Please take care of these documents and keep them close to the system at all times for quick reference.</p> <p>All persons operating, maintaining and cleaning this system have to be familiar with the contents of these instructions.</p> <p>Observe these security instructions whenever any work is carried out on this system!</p> <p>Manuals can be reordered from Big Dutchman when necessary.</p>
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One of the following information is required to reorder a manual:

- the 8-digit code number of your language version [99-97-xxxx] as stated on your manual's cover;
- the complete title of the manual including information on the type of instruction;
- if stated, the 8-digit universal code number [99-94-xxxx] including information on the required language version.

1.1 Purpose of the BD manuals

Depending on the intended use, **Big Dutchman** provides the following documentation:

1. Assembly manual
2. User manual
3. Operation manual (assembly and use of the system)
4. Spare parts lists
5. "Local add-on manuals": (for products which differ from those of the original manual in specific countries).

The type of instruction of your manual can be found on the cover above the title.

1.2 EC declaration of conformity

We hereby declare that the system described in this manual corresponds to the relevant health and safety requirements according to the EC directive because of its design and construction as introduced to the market by us.

The declaration of conformity can be found at the beginning of the manual.

1.3 Basics

The **Big Dutchman** system has been built with state-of-the-art technology and meets the recognized technical safety requirements. The system is reliable. Upon operation, however, dangers to life and limb of the user or third persons or impairments of the system or other material property are still possible.

The system may only be operated, maintained and repaired

- in accordance with its designated use;
- in an excellent state from the safety and technical point of view;
- by persons who are familiar with the safety regulations.

Should specific problems occur which are not described in detail in these documents, we recommend you contact us for your own safety.

1.4 Explanation of the symbols and structure of these instructions

1.4.1 Structure of the safety instructions in this manual

Basic structure:

Pictograph	Type of danger
	Possible consequence(s) of non-compliance
Signal word	• Measure(s) against the danger

Meaning of the signal words:

Pictograph	Signal word	Meaning	Consequences of non-compliance
Possible personal injuries:			
possible safety symbols: see chapter 1.4.3	DANGER	directly dangerous situation	Will lead to death or severe injuries.
	WARNING	possibly dangerous situation	May lead to death or severe injuries.
	CAUTION	possibly dangerous situation	May lead to minor injuries.
Possible damage to property:			
	CAUTION		May lead to damage to property

1.4.2 Special safety symbols in the manual and on the system

These safety symbols (pictographs) illustrate remaining dangers when handling the system. They are used in the safety instructions of this manual (also refer to chapter 1.4.1) and on the system.

 CAUTION	<p>Safety symbols and instructions on the system must always be easily visible and undamaged.</p> <ul style="list-style-type: none"> • If they are soiled by dust, manure, feed remains, oil or grease, clean them with a water-detergent mixture. • Damaged, lost, or unreadable safety symbols have to be replaced immediately. • If a safety symbol or instruction is fixed to a part to be replaced, ensure that it will be fixed to the new part as well.
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	<p>Warning: general danger</p>
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	<p>Warning: dangerous electric tension</p>
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	<p>Warning: danger of entanglement due to gear wheels</p>
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	<p>Warning: hand injuries</p>
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1.4.3 Structure of the general instructions in the manual

	<p>IMPORTANT!</p> <p>This symbol indicates important information. There is no risk of personal injuries or damage to property.</p>
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1.5 Necessary qualifications of the persons working with the system

1.5.1 Employing external personnel

	<p>IMPORTANT:</p> <p>The supervisor is responsible for the safety of external personnel.</p>
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Maintenance and repair works are frequently carried out by external personnel not familiar with the circumstances specific for the system and the inherent dangers.

You as operator are to survey the personnel and to define responsibilities and powers. Inform these people in detail on the dangers of their area of work. Check their method of working and intervene as soon as possible.

1.5.2 Operation of the system

The system may only be operated by persons who are competent and can guarantee proper handling due to special training or knowledge and practical experience with the system. The system operator or owner has the sole power of decision.

1.5.3 Maintenance and repairs

Maintenance and repair works may only be carried out by persons who are competent and can guarantee proper handling due to special training or knowledge and practical experience with the system. The system operator or owner has the sole power of decision.

1.5.4 Installing the gas supply

All works relating to the gas supply of a device (e.g. laying gas pipes and connecting the device to the gas supply, etc.) may only be carried out by an expert according to the effective DIN standards, DVGW rules, safety regulations and the provisions of the local gas supplier or the applicable national regulations.

1.5.5 Electrical installation

Work on the electric components may only be carried out by technically skilled personnel and according to German Industry Standards, VDE regulations, safety instructions and electro-technical regulations of the power supply industry (EVU) and the applicable national regulations.

1.6 Ordering of spare parts

The exact description of the spare parts to be ordered can be found by means of the position no. in the spare parts list.

	Risk of injury and danger to life
	<p>Operational safety is of paramount importance!</p> <p>Spare parts not released or recommended by Big Dutchman can cause severe injuries as their suitability for Big Dutchman systems cannot be assessed beforehand.</p> <ul style="list-style-type: none"> • Only use spare parts released or recommended by Big Dutchman for your own safety.
WARNING	

Indicate the following when ordering spare parts:

- Code no. and description of the spare part or
Position no. including description and manual number in case of parts that are not encoded;
- Invoice number of the original delivery;
- Current supply, e.g. 230/400 V – 3 Ph – 50/60 Hz.

1.7 Obligations

Closely adhere to the instructions in this manual.

A basic condition for safe operation and trouble-free handling of this system is the knowledge of the basic safety instructions and regulations.

This manual, particularly the safety instructions, must be observed by all persons working on this system. Moreover, the regulations and instructions for the prevention of accidents valid at the respective place of use have to be observed.

The manufacturer is not responsible for any damage to the system resulting from changes not authorized by **Big Dutchman**.

1.8 Warranty and liability

Warranty and liability claims regarding personal injury or property damage are excluded if they result from one or several of the following causes:

- non-designated use of the system;
- improper operation of the system;
- operating the system with defective safety equipment or not duly fixed or not functioning safety and protective devices;
- non-compliance with the instructions in this manual regarding maintenance and upgrading of the system;
- unauthorized modifications to the system;
- improper repairs;
- disasters caused by foreign matter or force majeure.

1.9 Faults and power failures

We recommend the installation of alarm systems for a better control of your production units or the use of an automatic emergency battery system for supplying the system with power in case of a power failure. This will protect your animals and thus your own economic health.

To ensure that the control unit completes all started process steps correctly and shuts down properly in case of a power failure, we recommend the use of a UPS (uninterruptible power supply).

1.10 First aid

In the case of an accident, a first-aid kit must always be available at the place of work, unless otherwise specified. Material taken out and used is to be replaced immediately.

If you need help, describe the accident as follows:

- where it happened
- what happened
- the number of persons injured
- what type of injury
- who is reporting the accident.

1.11 Pollution abatement regulations

All works on and with the installation have to be carried out in compliance with the legal requirements concerning waste prevention and proper recycling / disposal of waste.

Special care has to be taken when carrying out installation, repair and maintenance works, as water pollutants like lubricating grease and oils as well as solvent-containing cleaning solutions may not pollute the soil or reach the canalisation! These materials have to be kept, transported, collected and disposed of in appropriate containers!

1.12 Waste disposal

After repairing the system, dispose of the packing material and remains which cannot be used further according to the legal provisions for recycling.

The same applies to the component parts after putting the installation out of service.

1.13 Notes for use

In the interest of further development, we reserve the right to modify the design and technical data.

No claims can therefore be derived from any information, illustration or drawing and description contained herein. Errors and omissions excepted!

Apart from the safety information in this manual and the obligatory accident prevention regulations applicable in the user's country, please heed the accepted technical rules (safe and expert working in accordance with UVV, VBG, VDE etc.).

1.14 Copyright

This manual is copyrighted. The information and drawings included in this manual shall not be copied without the manufacturer's consent, nor shall they be misused or be disclosed to third parties.

The contents of this manual can be altered without prior notice.

If you find mistakes or unclear information in this manual, please do not hesitate to let us know.

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2 Safety instructions

2.1 Instructions on accident prevention

Before operating, cleaning, maintaining or disassembling this system, the operator or person authorized by him is obliged to instruct any person carrying out any of these works on

- the remaining dangers when carrying out these tasks
- the applicable rules and regulations regarding accident prevention and to ensure they are complied with!

The basis for these are:

- the installation's technical documentation, specifically the included safety instructions,
- the applicable safety and health regulations applicable at the place of work.

2.2 General safety instructions

	Risk of injury
	<p>Children in the area of the system are at risk of injury as they can often not be supervised sufficiently and are not able to recognize hazards.</p>
WARNING	<ul style="list-style-type: none"> • Ensure that children do not use the system as a playground and are not left unsupervised in the vicinity of the system. Explain remaining dangers fully to the children.

The respective safety precautions and other generally accepted regulations regarding safety and operational health have to be observed.

Please check safety and function control devices to ensure safe and accurate operation

- before putting the system into operation again
- in adequate intervals (confer maintenance intervals)
- after modifications or repairs.

Check the proper functioning of the system after any kind of repair works. You may only put the device into operation when all protective system have been put into place again.

Also observe the regulations of local water distribution and power supply companies.

2.3 Personal safety instructions

These safety instructions are intended to make you familiar with important information on the handling of the system. They are important for your safety and for the safety of the system.

The farm staff has to familiarize itself with the function and arrangement of the safety devices, in particular of the emergency stop button.

The farm staff has to regularly participate in health and safety briefings (according to the provisions e.g. by trade associations).

Maintenance works may only be carried out by specially trained personnel.

 WARNING	Risk of injury
	<p>Lack of knowledge about the structural design of the system can lead to injury.</p> <ul style="list-style-type: none"> • Make yourself familiar with the design and construction of the system under sufficient lighting! • Inform yourself as responsible person for the system and your employees about the remaining dangers in connection with this system!

2.3.1 Personal protective equipment and measures

 WARNING	Risk of injury
	<p>The following instructions apply to all works carried out on the system.</p> <ul style="list-style-type: none"> • Wear close-fitting protective clothing and protective footwear. • Use protective gloves where there is a risk of hand injuries and safety goggles where there is a risk of eye injuries. • Do not wear any rings, necklaces, watches, scarves, ties or other items which could get caught in parts of the system. • Make sure that long hair is always tied back. Hair can get caught in powered or rotating working units or parts of the installation, resulting in severe injuries. • When working underneath the installation always wear a hard hat!

2.4 Use of electrical appliances

You as the person responsible for the system or his agent have to ensure that the system with its electrical appliances is operated and maintained according to the local electro-technical regulations.

 	Risk of injury and danger to life
	<p>Dangerous electric tension may be bare in the case of open control units and may cause severe injuries or lead to death!</p> <ul style="list-style-type: none"> • Be aware of the danger and keep workers of other professions away from the danger zone. • Installations and works on electric components/building units may only be carried out by qualified persons according to electro-technical regulations (e.g. EN 60204, DIN VDE 0100/0113/0160).
WARNING	

- Immediately switch off the system in the event of malfunctions of the power supply units. Check that the electrical equipment is not alive.
- Check the electrical wiring and cables for recognisable damage before putting the system into operation again. Replace damaged wiring and cables before taking the system into operation.
- Only use the fuses indicated in the circuit diagram.

	Danger of short circuits
	<p>Never repair or shut defective fuses.</p> <ul style="list-style-type: none"> • Defective fuses should be replaced by new ones immediately.
WARNING	

- Never cover an electrical motor. This can cause high temperatures resulting in fires and the destruction of the equipment.
- Always keep the control cabinet and all terminal and connection boxes of the system locked.
- Damaged or broken plugs should be immediately replaced by an electrician.
- Do not pull the plug from the socket at the flexible cable.
- For the respective connections please see the enclosed connecting plan of the system parts delivered.

2.5 Special safety instructions

2.5.1 Danger zones

The individual zones of the **Big Dutchman** system are constructed differently. There are several ejecting, rotating or sliding parts that might be a risk if you are not familiar with their type of construction.

 WARNING	Risk of injury
	<p>Lack of knowledge regarding the system's type of construction increases the risk of injury.</p> <ul style="list-style-type: none"> • Never reach into the running system. First stop the system and secure it against an inadvertent restart. • Assure yourself before reaching into the system that the main switch is in the OFF position and cannot be put in the ON position without your knowledge.

The system has been equipped with all mechanisms that guarantee a safe operation. In places where the danger zone could not be safeguarded totally, in consideration of the operational reliability, safety signs have been placed. They indicate remaining technical dangers when handling the system and give information on how to avoid these dangers.

For your safety, the following safety symbols have been fixed to the system. Please make yourself familiar with the meaning of these systems. The following explanatory notes will provide you with detailed information.

	<p>GENERAL DANGER!</p> <p>System starts working automatically. Before starting any repair, maintenance or cleaning works, put main switch to "OFF"!</p>
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	<p>GENERAL DANGER!</p> <p>Read the manual.</p>
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 CAUTION	Safety symbols and instructions on the system must always be easily visible and undamaged.
	<ul style="list-style-type: none"> • If they are soiled by dust, manure, feed remains, oil or grease, clean them with a water-detergent mixture. • Damaged, lost, or unreadable safety symbols have to be replaced immediately. • If a safety symbol or instruction is fixed to a part to be replaced, ensure that it will be fixed to the new part as well.

2.5.2 Entire system

 WARNING	Risk of injury
	<p>Parts lying about on the system and in its vicinity can cause persons to stumble and/or fall and thus risk injuring themselves by contact with system components.</p> <p>Lack of knowledge about the structural design of the system can lead to injury.</p> <p>Party lying about in or on the components can lead to serious damage of the system.</p> <ul style="list-style-type: none"> • Never deposit objects (e.g. spare parts, replaced parts, tools, cleaning tools etc.) in the accessible areas of the system or in the surrounding areas have having carried out works on the system! • Make yourself familiar with the design and construction of the system under sufficient lighting! If this is not possible, inform yourself about any remaining dangers in connection with this system! • Before restarting the system, assure yourself that all loose or replaced parts have been removed from the system components! • The device may only be put into operation after all protective systems have been put into place again and are functioning.

Only use suitable tools and observe the local accident prevention regulations.

Ensure that the system is switched off before performing any service, repair or cleaning work or rectification of functional defects. Disconnect the system from the power supply and secure it against reactivation.

Protect the system by means of a sign fixed to the main switch reading "Do not put into operation!". Refer to maintenance works if necessary.

After any maintenance and repair works, check the proper functioning of the system.

2.5.3 Individual parts

2.5.3.1 Electrical components

	Risk of electric shocks and short circuits
	<p>Live parts may be bare while different kinds of work are carried out. Touching live parts might lead to injuries caused by electric shock and short circuits.</p>
WARNING	<ul style="list-style-type: none"> • Before performing any repair or maintenance work, turn the main switch to "OFF" and display a sign warning that repair or maintenance work is in progress! • Never touch bare electrical components. Equipment with bare electrical components must not be used by the farm staff.

2.6 Safety contrivances

 	Risk of injury and danger of life
	<p>Defective or disassembled safety contrivances may cause severe injuries or lead to death!</p>
WARNING	<ul style="list-style-type: none"> • It is strictly forbidden to remove or put out of operation any safety contrivance. • Should the safety contrivances be damaged, the system has to be put out of operation immediately. The main switch must be locked in neutral position and any damage must be eliminated. • Before putting the system into operation again, make sure that all safety contrivances are assembled correctly and are functioning after works on the system have been carried out.

2.7 Dangers resulting from non-compliance with the safety instructions

Lack of compliance with these instructions can cause severe danger to personal life and limb and damage the environment or the installation and may lead to the forfeiture of any damage claims. The non-compliance with these instructions can specifically lead to:

- failure of vital functions of the system,
- failure of prescribed maintenance methods,
- risk of injury due to electrical, mechanical and chemical influences.

2.8 Warnings and safety instructions on the tunnel door

	<p>The tunnel door may only be operated when the pictographs are placed on the predetermined positions.</p> <p>If necessary, these can be ordered from Big Dutchman and stuck on at site.</p>
--	--

Position the pictographs 00-00-1434 always centrally between the window clamps or between the reinforcement plates. Stick the pictograph 00-00-1434 on the tunnel door from inside and outside. It must be clearly visible even if the tunnel door is closed.

The plate is pasted with the pictographs 00-00-1438 on the front and back.

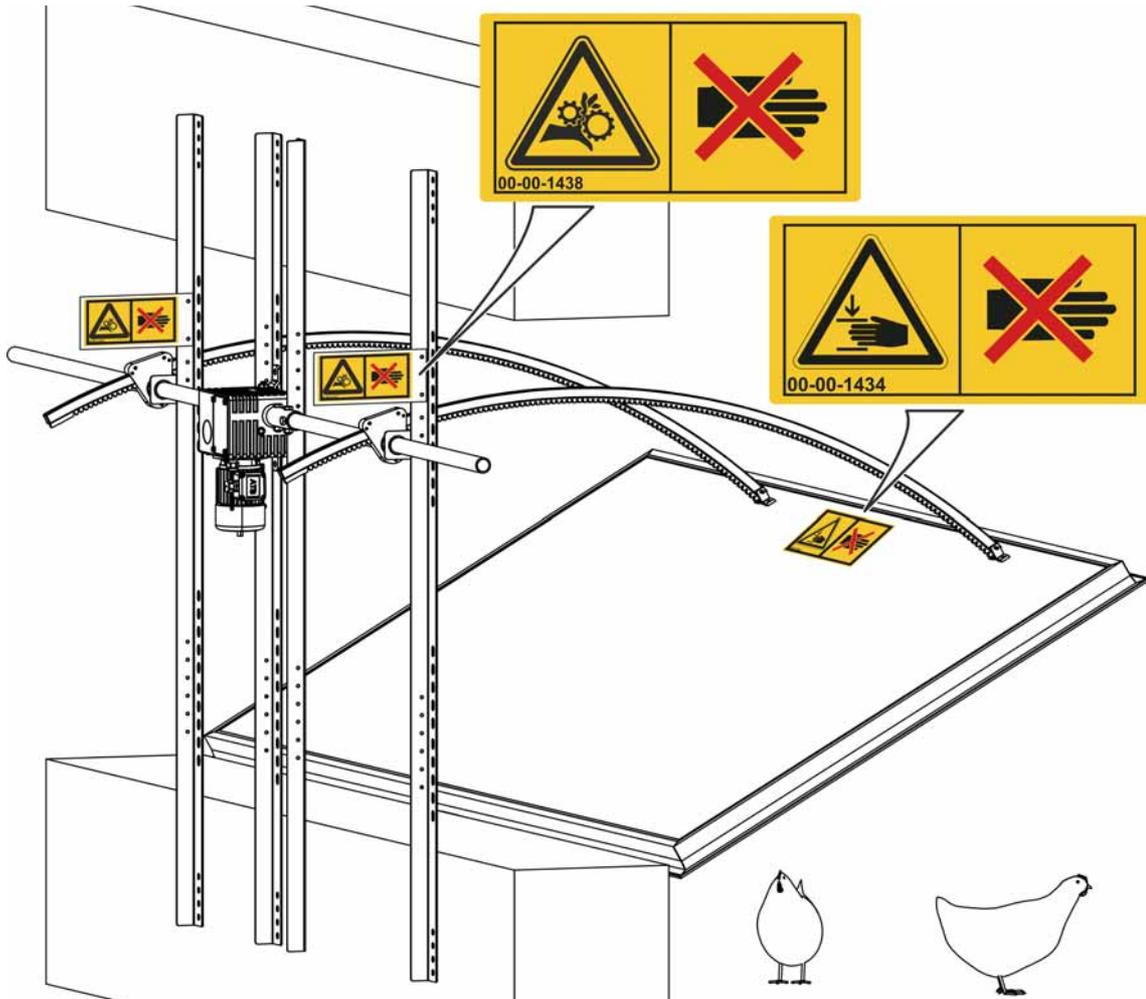


Figure 2-1: Position of the pictographs / tunnel door towards the inside of the house

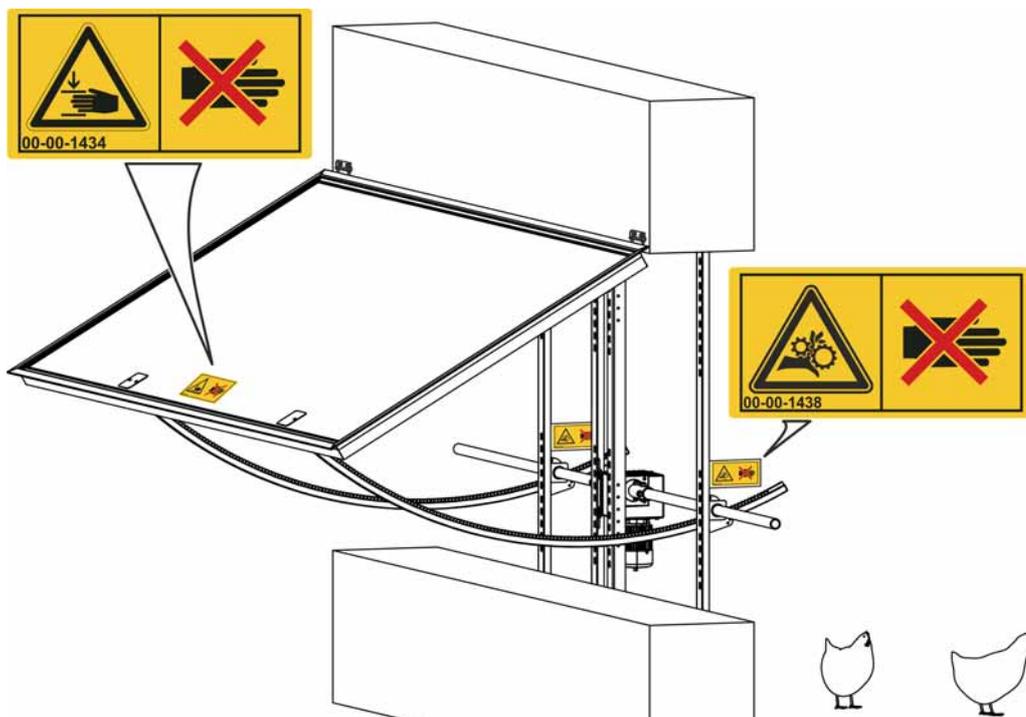


Figure 2-2: Position of the pictographs / tunnel door towards the outside of the house

3 Product outline

Tunnel doors are used for the ventilation of large quantities of air. Position, distances and number of tunnel doors depend on the ventilation system of the house. The figure 3-1 shows an example of an installation of two tunnel doors in a house with single tunnel ventilation.

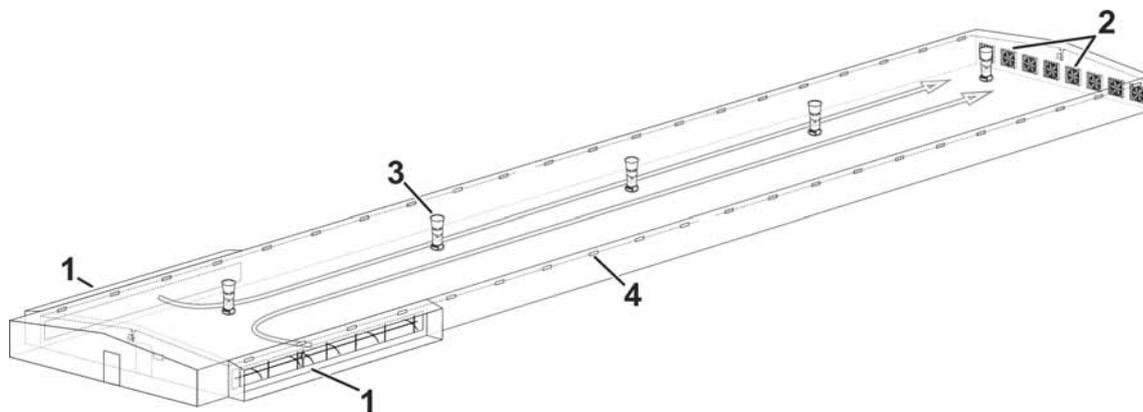


Figure 3-1: Example of a ventilation system (tunnel ventilation)

Pos.	Description
1	Tunnel doors
2	Gable fans
3	Exhaust air chimneys
4	Fresh air inlets

The tunnel door is an insulated intake air flap developed by **Big Dutchman** which is installed in the side wall of the house.

The tunnel door opens and closes by means of rack and pinion driven by an EWA winch motor. Thanks to the high-quality frame from aluminium as well as an elastic rubber lip, the tunnel door is very well sealed in closed condition.

The composite board with a surface coating of 1.5 mm from PVC is characterised by a high thermal insulation and can be cleaned by means of a high-pressure cleaner without any problems.

Figure 3-2: Tunnel door with joint below - opening towards the inside of the house

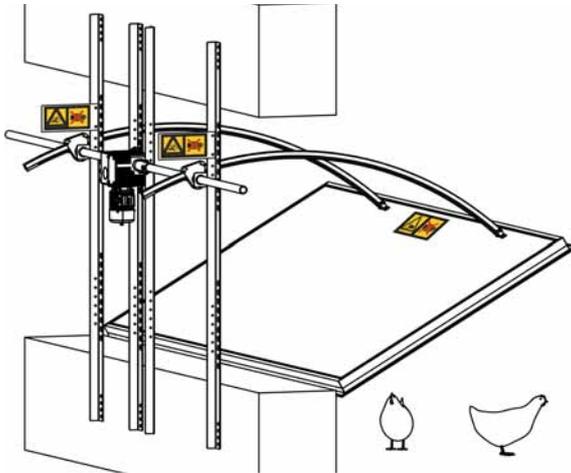
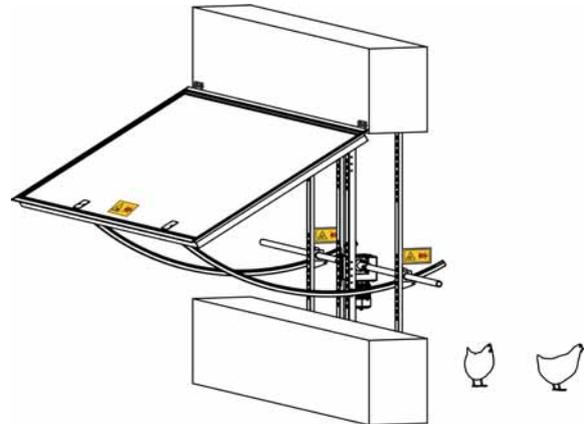


Figure 3-3: Tunnel door with joint on top - opening towards the outside of the house



This kind of opening should not be installed together with a Pad-Cooling system since the door prevents a straight air flow.

A tunnel door consists of:

- a 3 m long starter kit
- several extension kits with a length of 3 m each until the required total length is reached
- separating plates as required
- a winch motor EWA

3.1 Technical data

3.1.1 Dimensions of the tunnel door

The length of a tunnel door is 40 m maximally.

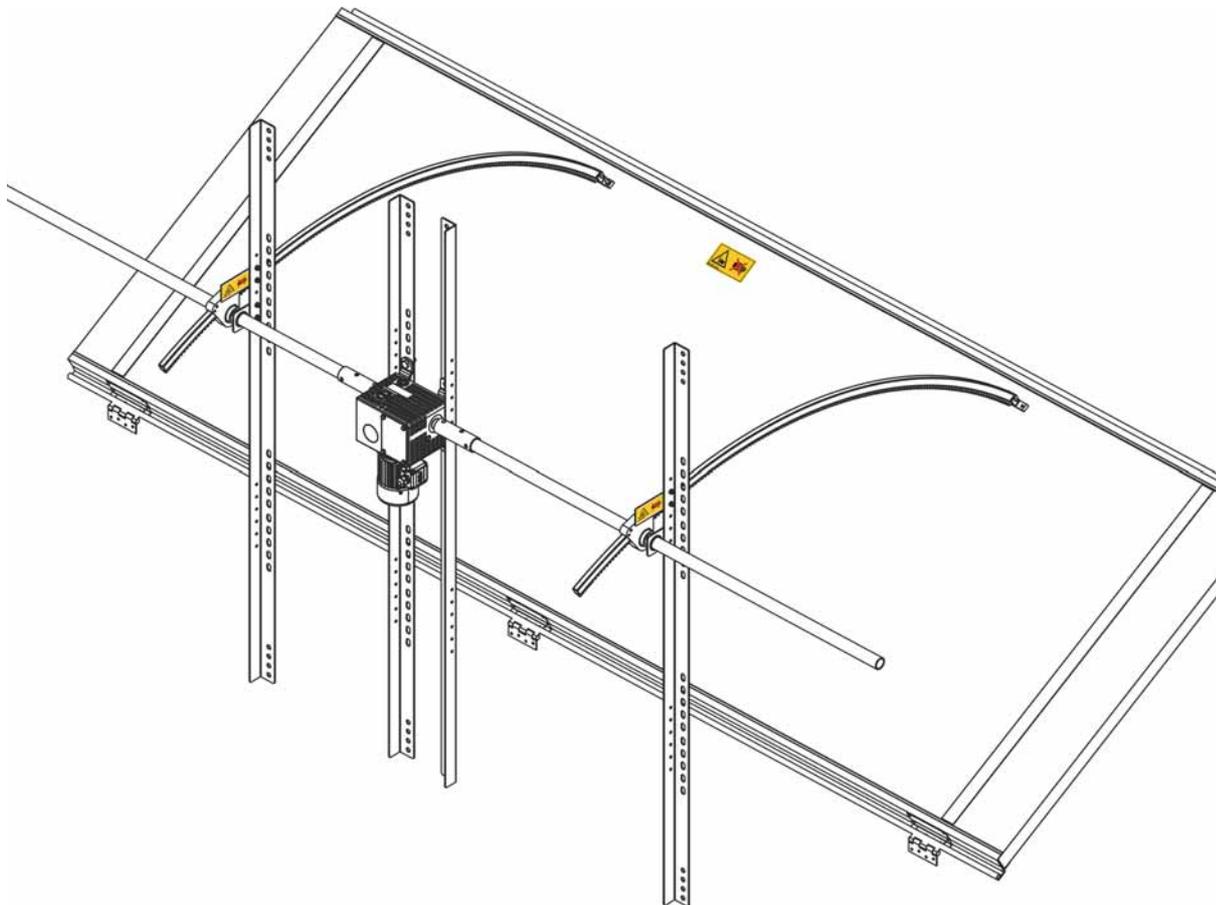


Figure 3-4: Tunnel door with rack and pinion drive

It can be ordered with heights of 750, 1000, 1200 and 1500 mm in elements with a width of 3 m each.

H in mm	750	1000	1200	1500
Y in mm	700	950	1100	1350
X in mm (minimum distance)	1300		1400	
L in mm	900-1100			
A in mm	60-360			

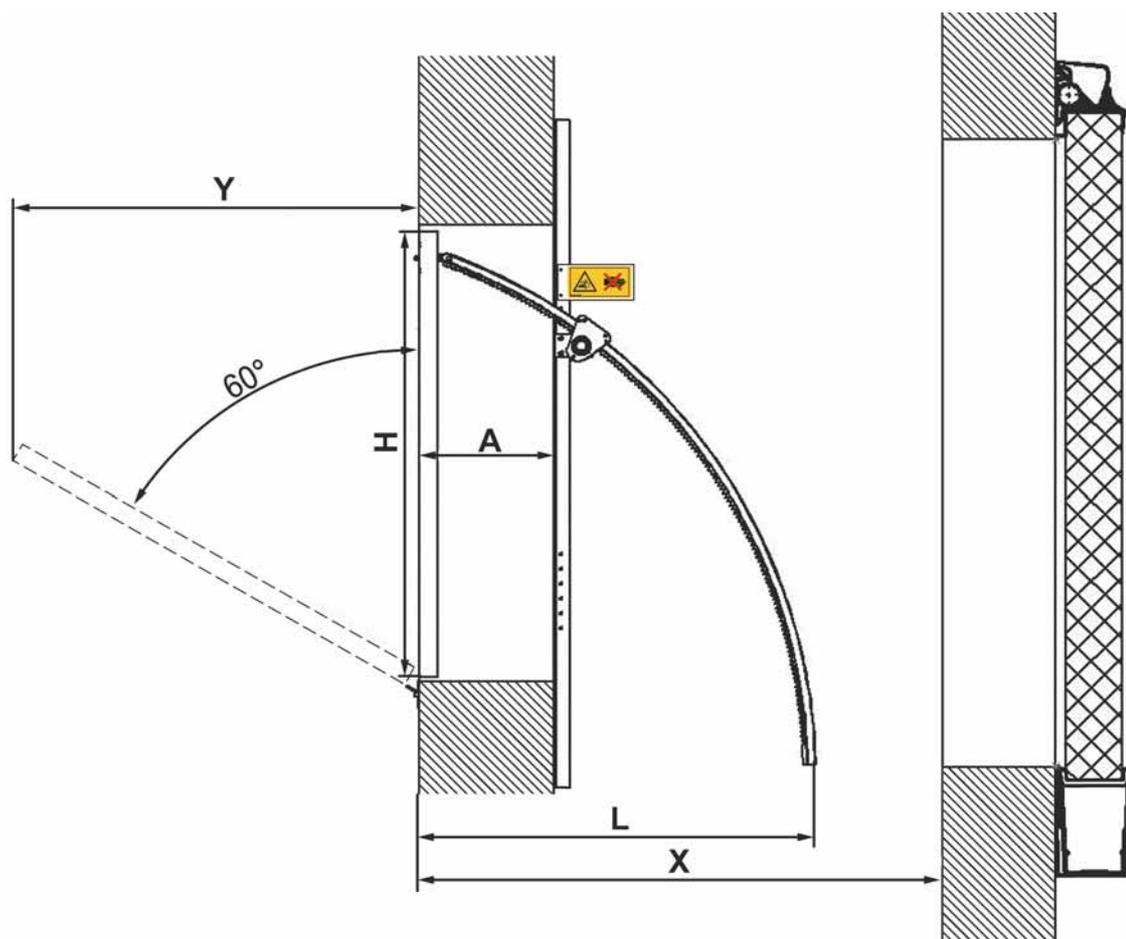


Figure 3-5: Dimensions of the tunnel door (60° = maximum opening)

3.1.2 Power data winch motor

The power data of the winch motor EWA can be found on the type plate. The type plate is fixed directly on the servomotor.

3.2 Designated use

The **Big Dutchman** tunnel doors serve for guiding fresh air directly into the house.

The **Big Dutchman** system may only be used according to its designated use.

Every other use is considered non-designated use. The manufacturer does not accept liability for damages resulting from other uses, the user alone has to bear the risk. The designated use also includes the exact following of the operation, maintenance and repair conditions as prescribed by the manufacturer.

3.3 Avoidance of foreseeable misuse

The following uses of the **Big Dutchman** tunnel doors are not permitted and are considered improper use:

- The use outdoor, especially in areas that are susceptible to frost.
- The use of the system where the temperature inside the house is below 0°C.
- Utilising the system with aggressive and/or corrosive materials in quantities that do not constitute good professional practise.
- Mechanical loading of the system in excess of normal loads intended for the system with the housing of laying birds.

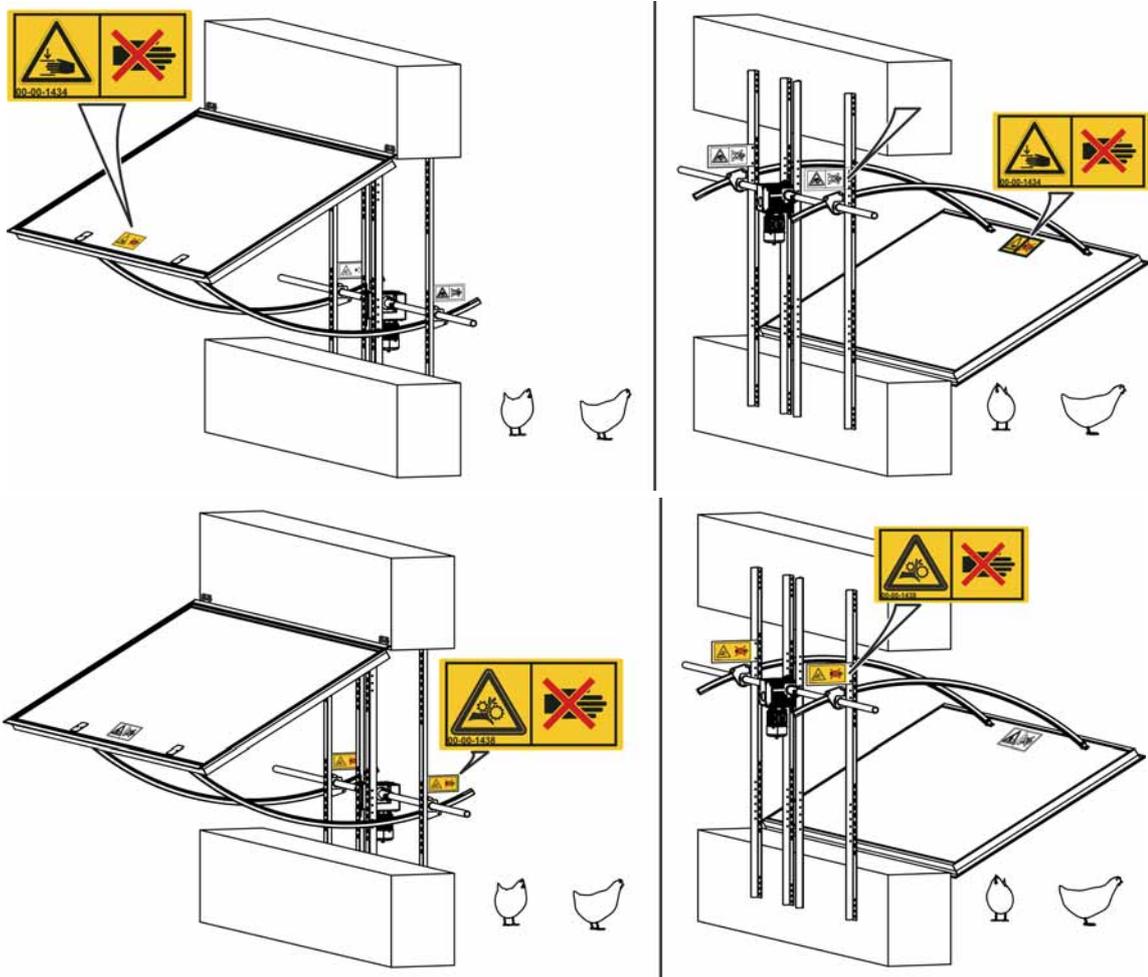
A non-designated use will lead to a liability exclusion by **Big Dutchman**.

The operator of the system exclusively bears the risk resulting from misuse!

4 Initial operation

4.1 Before initial operation

	<p>The tunnel flap may only be operated when the pictographs have been fixed to the predetermined positions and the notes under chapter 1 "Basic instructions" and chapter 2 "Safety instructions" are considered!</p>
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 <p>WARNING</p>	<p>Risk of injury</p> <p>Persons staying in the zone of the tunnel door to be adjusted are in danger of being crushed.</p> <ul style="list-style-type: none"> • Make sure that no persons stay in the adjustment area of the tunnel door.,
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 WARNING	Risk of injury
	<p>Danger of extremities, hair or clothing being pulled in the housings for rack and pinion.</p> <ul style="list-style-type: none"> • Wear close fitting protective clothing. • Use safety gloves. • Do not wear any rings, necklaces, watches, scarves, ties or other items which could get caught in parts of the system. • Make sure that long hair is always tied back.

Secure the area of the tunnel door against unauthorized access (=> 9 "Glossary") through following measures:

- With pad cooling system:
Secure the intermediate range between pads and rack and pinion by doors to be provided at site with a lock.
- Without pad cooling system:
If the bottom edge of the tunnel flap is below 2.70 over the ground, a fencing is to be provided at site around the complete tunnel door.
- Fence the entire premises.

4.2 Adjusting the winch motors

In the operation manual for the EWA winch motor you will find more detailed information regarding the adjustment of the start and end positions as well as the electrical connecting plans.

Start position:

- the closed position of the tunnel door

End position:

- the maximum opening of 60 % of the tunnel door

	<p>If you do not have this manual, you can order this under the following number: 99-94-0389 (winch motor EWA 10-16 / operating instructions)</p>
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5 Operation

The operation manual for the EWA winch motor includes more detailed information about the operation of the winch motor.



If you do not have this manual, you can order this under the following number: 99-94-0389 (winch motor EWA 10-16 / operating instructions)

6 Maintenance

6.1 Greasing the rack and pinion drives

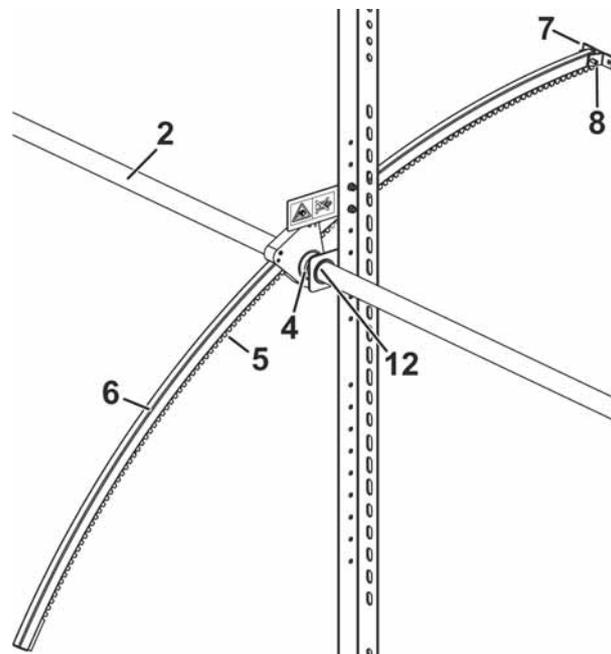
The maintenance of the rack and pinion is to be carried out **yearly** .

 WARNING	Risk of entanglement
	<p>An unintentional switching on of the winch motor can lead to injury due to entanglement at the rack and pinion.</p> <ul style="list-style-type: none"> • Switch off the drive before working on the mechanics and secured against unintentional switching on!

1. Remove dirt and deposits from the toothed racks.
2. Apply a thin layer of grease on the tothing of the rack and pinion (Pos. 5) on the entire length. **Apply a thin lubricating film and do not grease the back of the toothed rack.**

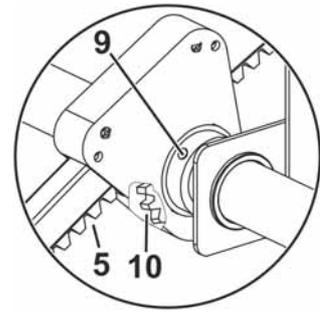
Grease the pinion bearings (Pos. 4) and bolts (Pos. 8)

We recommend to use a brush for applying the grease. Use the following lubricants: 60-50-3366 *Lubricating grease for toothed rack ZLF2 can 1 kg.*



3. Do not use grease for the plain bearing plate (Pos. 12); these should be oiled with sinter oil!
4. Check the grub screws (Pos. 9), bolts (Pos. 8) and window clamps (Pos. 7) for tightness. Tighten the grub screws with 6 Nm.
5. Check the alignment of the toothed racks (toothed rack (Pos. 6) at an angle of 90° towards the drive shaft (Pos. 2).

6. Check the toothed rack for wear, particularly at the tothing (Pos. 5) and pinion (Pos. 10). If there are damages, pointed tooth tips, obvious striation or production of chips, the toothed racks have to be replaced.
7. Carry out a test run. Remove excess grease after a complete opening and closing process.



Never grease the hinges of the **tunnel door with rack and pinion drive type L** since there are bushes from polyamide in the hinges!

In case of the tunnel doors type TD and TD-S a greasing makes sense since the hinges are completely from stainless steel.

In the operation manual for the EWA winch motor you will find further information regarding the maintenance of the winch motor.



If you do not have this manual, you can order this under the following number: 99-94-0389 (winch motor EWA 10-16 / operating instructions)



6.2 Adjusting the toothed rack

If you have replaced a toothed rack or if the door does not close correctly, the toothed rack has to be adjusted if necessary. Proceed as follows:

1. Close the tunnel door by moving the winch motor to the starting position.
2. Then pull by hand at the toothed rack to be adjusted so that the tunnel door sits close to the wall (closed position). Tighten the four grub screws in the housing of the toothed rack in steps of 2 Nm to max. 8 Nm while pulling at the rack.
3. Repeat this procedure with other racks if necessary. Nearly the same pre-tension must exist at all racks.

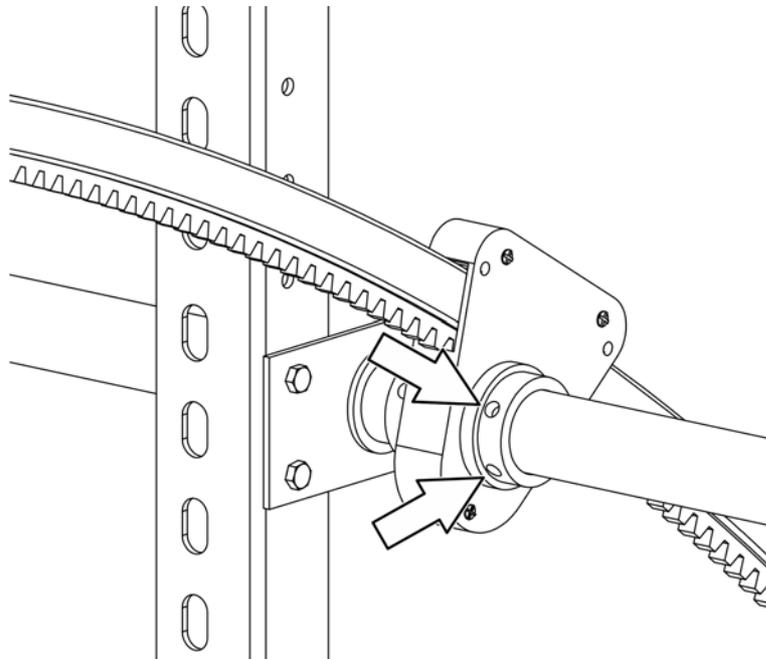


Figure 6-1: Holes for screwing in the grub screws

6.3 Cleaning



Check the elevator drives for possible dust deposits.
These must be removed to prevent overheating of the winch motors!
Do not use a high-pressure cleaner and no cleaning agents!

Clean the winch motor with a dry hand brush. Use a damp cloth with a mild cleaning agent if necessary. No water must enter the vent of the gear.

The tunnel door can easily be cleaned by means of the high-pressure cleaner.

Grease the rack and pinion after cleaning as described under chapter 6.1 "Greasing the rack and pinion drives" .

7 Fault Clearance

 WARNING	Risk of entanglement
	<p>An unintentional switching on of the winch motor can lead to injury due to entanglement at the rack and pinion.</p> <ul style="list-style-type: none"> Switch off the drive before working on the mechanics and secured against unintentional switching on!

In the operation manual for the EWA winch motor you will find detailed information on how to eliminate faults at the winch motor.

	<p>If you do not have this manual, you can order this under the following number: 99-94-0389 (winch motor EWA 10-16 / operating instructions)</p>
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Fault	Cause	Remedy
Tunnel door does not close correctly at some positions.	Toothed rack(s) adjusted	<p>Move the tunnel door into closed position and switch off the winch motor. Secure it against unintentional switching on.</p> <p>Adjust the corresponding toothed rack(s). (=> 6.2 "Adjusting the toothed rack")</p>
Tunnel door does not close correctly to the left	Limit switch of the winch motor not correctly adjusted	Observe the notes in the operation manual for the EWA winch motor.

Fault	Cause	Remedy
Unusual noises at the rack	Toothed rack is dirty	Switch off the winch motor. Secure it against unintentional switching on. Remove dirt and deposits at the toothed rack and grease it (=> 6 "Maintenance")
	Toothed racks not correctly aligned.	Align the toothed rack correctly. The angle between toothed rack and drive rollers must be 90°. Replace the toothed racks if necessary.
	Toothed rack or pinion worn out, damaged or broken.	Replace the toothed racks.

8 Spare parts



Please also consult the respective assembly manuals for tunnel door when assembling the spare parts.

The manuals can be ordered under following code number if necessary.

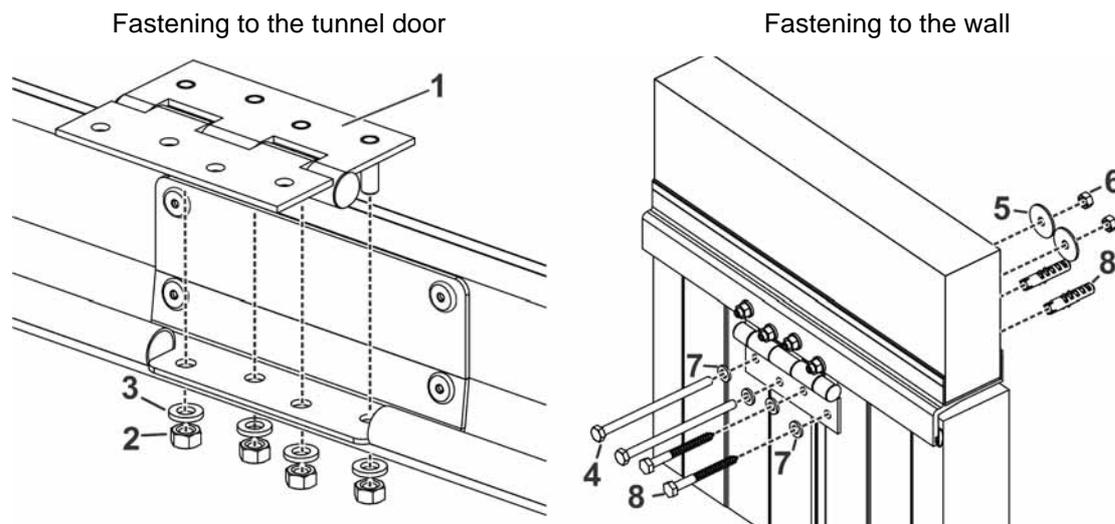
99-94-0378 Manual universal: Tunnel door with rack drive/assembly (TD)

99-94-0392 Manual universal: Tunnel door with rack drive type S / assembly (TD-S)

99-94-0547 Manual universal: Tunnel door w/rack drive type L (TD-L)

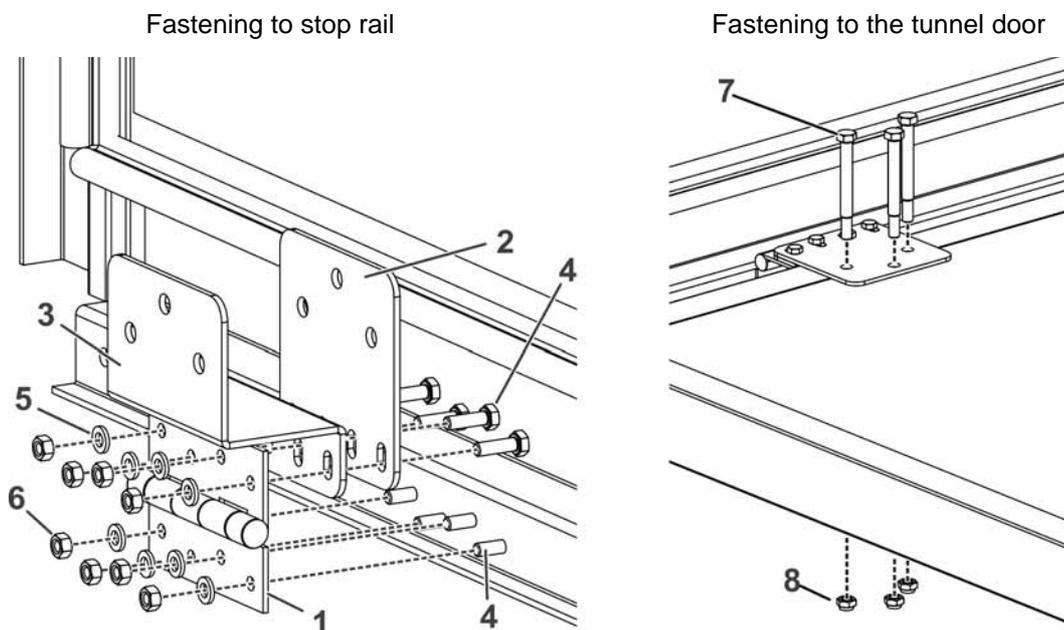
8.1 Tunnel door

8.1.1 Hinge for type TD



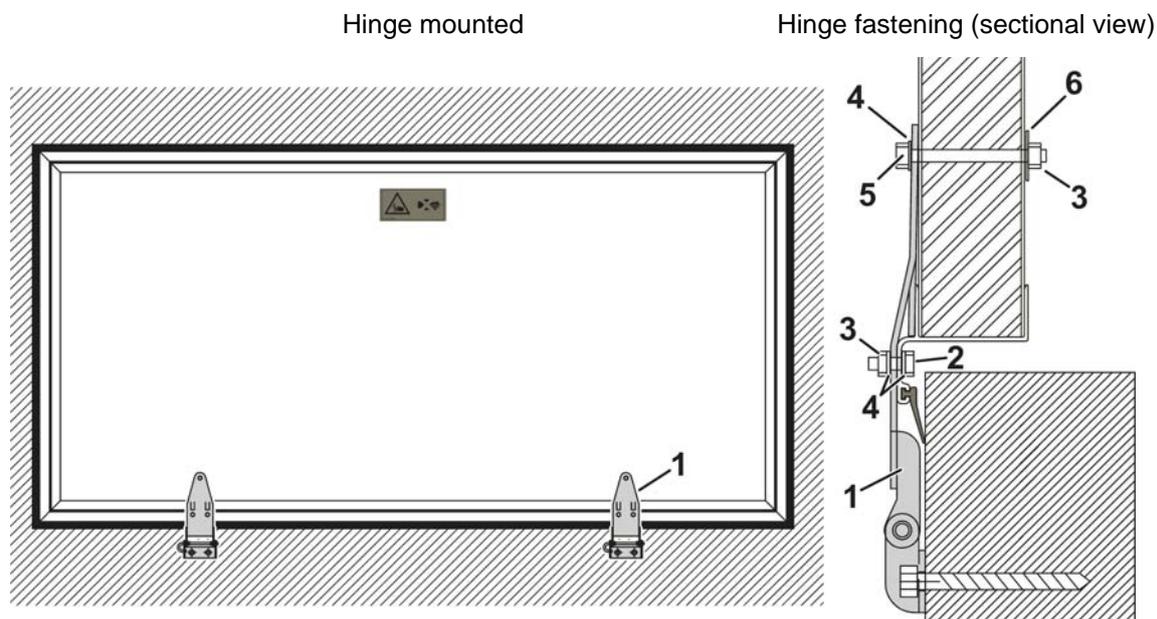
Pos.	Code no.	Description
1	83-04-5555	Hinge-joint 75 x 100 mm SST, with set screw
2	99-20-1102	Hexagon nut M 6 SST DIN 934
3	99-20-1602	Washer SST A 6.4 DIN 125
Following items have to be ordered for fastening to "sandwich panel":		
4	99-10-1490	Hexagon head screw M 6x 100 DIN 933 SST
5	99-20-1604	Washer A 6.4x25x1.5 DIN 9054 stainless steel
6	99-20-1102	Hexagon nut M 6 SST DIN 934
7	99-20-1602	Washer SST A 6.4 DIN 125
Following items have to be ordered for fastening to "wood, concrete or stone":		
7	99-20-1602	Washer SST A 6.4 DIN 125
8	99-20-1479	Hexagon head wood screw 6 x 50 DIN 571 SST
9	99-98-3781	Dowel universal UX 8 50 without collar

8.1.2 Hinge for type TD-S



Pos.	Code no.	Description
1	36-00-6208	Hinge 75 x 100 mm SST
2	83-05-4269	Counter plate for hinge 75 x 100mm
3	83-05-4265	Flap for hinge 75 x 100mm
4	99-20-1420	Hexagon head screw M 6x 20 DIN 933 SST
5	99-20-1602	Washer SST A 6.4 DIN 125
6	99-20-1102	Hexagon nut M 6 SST DIN 934
7	99-10-1317	Hexagon head screw M 8 x 80 galv. DIN 933 8.8
8	99-20-1064	Self-locking counter nut M 8 DIN 985-6 galv.

8.1.3 Hinge for type TD-L



Pos.	Code no.	Description
1	60-49-0420	Hinge cpl f/TD-L
In case of a fastening to "alu profile", please order the following items as needed:		
2	99-20-1404	Hexagon head screw M 6x 16 DIN 933 SST
3	99-20-1131	Self-locking counter nut M 6 SST 1.4401 DIN 985 A4-80 Gleitmo 627 (=> 9 "Glossary")
4	99-20-1602	Washer SST A 6.4 DIN 125
In case of a fastening to "composite board", please order the following items as needed:		
3	99-20-1131	Self-locking counter nut M 6 SST 1.4401 DIN 985 A4-80 Gleitmo 627 (=> 9 "Glossary")
4	99-20-1602	Washer SST A 6.4 DIN 125
5	99-10-1486	Hexagon head screw M 6x 60 DIN 933 SST
6	99-20-1604	Washer A 6.4x25x1.5 DIN 9054 stainless steel
In case of a fastening to "brickwork", please order the following items as needed:		
	99-20-1408	Hexagon head wood screw 8 x 80 DIN 571 SST
	99-98-3784	Dowel universal UX 10 x 60 without collar
	99-20-1600	Washer SST A 8.4 DIN 125
If required, the following items have to be ordered for fastening to "sandwich panel":		
	99-20-1412	Hexagon head screw M 8x100 DIN 933 SST
	99-20-1176	Hexagon nut M 8 SST DIN 934
	99-20-1600	Washer SST A 8.4 DIN 125
	99-20-1616	Washer A 8.4 x 40 x 1.5 SST

8.2 Drive unit

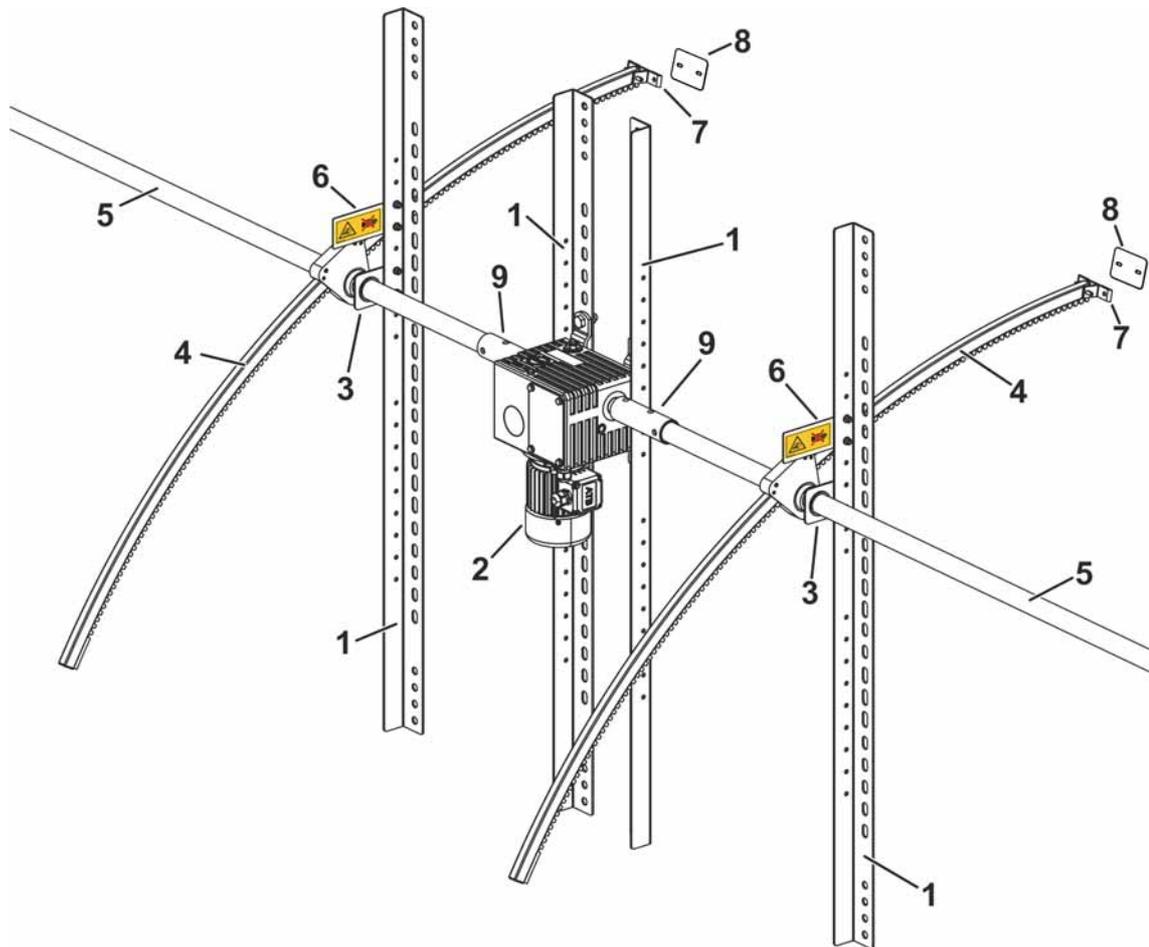


Figure 8-1: Spare parts drive unit

Pos.	Code no.	Description
1	83-06-8459	Angle 1300 for TD 750 - 1000
	83-07-1524	Angle 1800 for TD 1200 - 1500
2		Winch motor EWA
3	60-50-3206	Plain bearing plate galv H=70 for tube 1"
4		Toothed rack complete
	60-50-3363	Toothed rack AZD 0512 curved 1500 mm long without window clamp
	60-50-3361	Toothed rack AZD 0512 curved 1800 mm long without window clamp
	60-50-3362	Housing for toothed rack for ventilation AZD with window clamp 600N, straight and bent
5	99-40-3813	Tube 1" x 6000 galv. DIN EN 10255
6	83-13-8174	Plate with pictograph danger of drawing-in by toothed rack (00-00-1438)
7		Window clamp 600N
8	83-04-5602	Reinforcement plate for top piece of toothed rack
9	60-50-3232	Bush coupling 132 mm for EWA 10/12/14

Fastening material for angle profile:

Pos.	Code no.	Description
For the version "brickwork" you have to order the following as needed:		
	99-20-1408	Hexagon head wood screw 8 x 80 DIN 571 SST
	99-98-3783	Dowel universal UX 12 x 70 without collar
	99-50-1483	Washer A 10.5 x 30 x 2.5 DIN 9021 galv.
For the version "sandwich panel" you have to order the following as needed:		
	99-20-1472	Hexagon head screw M 10 x 100 galv. DIN 933
	99-20-1500	Hexagon nut M 10 SST DIN 934
	99-20-1616	Washer A 8.4 x 40 x 1.5 SST

If the winch motor (Pos. 2) must be replaced, please indicate the specifications on the type plate of the winch motor in your order.

Optionally, we also offer winch motors with other voltages and frequencies as well as winch motors with feedback potentiometer for monitoring and continuous control of the opening.

9 Glossary

Anodisation:

(from anodising aluminium, abbreviation for electrolytic oxidation of aluminium) describes a surface technology for producing a protective layer on aluminium by oxidation. In the process, the upper metal layer is converted to oxide; this protects the layers underneath against corrosion.

Corrosion:

The reaction between a material and its environment which has a measurable effect on the material and can interfere with the function of a component or system.

Designated use:

is the designated use of product in accordance with its intended purpose.

GLEITMO coating:

describes a coating which is applied on an individual part or mass-produced part by dipping and subsequent drying. This guarantees that the exact friction value for screws or similar according to the VDI technical rule can be observed.

Incorrect use:

is improper use of a product, not in accordance with its intended purpose.

State of the art:

represents the technical possibilities at a certain point in time, based on validated scientific and technical knowledge.

Supervisor:

is a reliable person who is familiar with the work and authorized to issue instructions. He ensures that the work is performed safely. He must have sufficient technical knowledge.

Unauthorised access:

indicates the unauthorised access to a locality. It is at the discretion of the owner who gets the permission to enter a locality.