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Operating instructions and spare parts list

# XM02

## Horizontal axis



Translation of the original operating instructions

## Documentation XM02

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# General safety regulations

This chapter sets out the fundamental safety regulations that must be followed by the user and third parties using the XM02.

These safety regulations must be read and understood before the XM02 is put into operation.

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## Safety symbols (pictograms)

The following warnings with their meanings can be found in the Gema Switzerland operating instructions. The general safety precautions must also be followed as well as the regulations in the operating instructions.

**DANGER!**

Danger due to electrically live or moving parts. Possible consequences: death or serious injury

**WARNING!**

Improper use of the equipment could damage the machine or cause it to malfunction. Possible consequences: minor injuries or damage to equipment

**INFORMATION!**

Useful tips and other information

---

## Product-specific safety measures

- The installation work to be done by the customer must be carried out according to local regulations.
- Before starting up the plant a check must be made that no foreign objects are in the booth or in the ducting (input and exhaust air)
- It must be ensured, that all components are earthed according to the local regulations before start-up.

## Personnel safety

- The XM02 Horizontal axis may only be switched on and operated after careful reading of this manual. Incorrect operating of the axis and the corresponding control unit can lead to personal injuries as well as damage to the axis or other parts.
- All moving axes must be secured by the customer before start-up and during operation by providing fencing (see the local regulations)!
- Before start-up, the grounding of the axis has to be checked!
- Safety devices may not be dismantled, bypassed or ignored! Open covers hide the danger of injury.
- Safety devices must be held in perfect functioning and may be not put out of operation.
- Maintenance works on the XM02 Horizontal axis may take place only when the plant is stopped! Switch off the plant, lock the main switch and remove the key!

## Safety concept

- The XM02 Horizontal axis is a constituent part of the system and is thus integrated into the safety system of the plant. If it is to be used in a manner outside the scope of the safety concept, then corresponding measures must be taken.
- Only original Gema spare parts should be used! Any warranty claim for damage caused by the use of foreign parts is void.
- Repairs on the axis may only be done by personnel correspondingly trained by Gema.

## Proper use

The XM02 Horizontal axis is only intended for the defined application range. The use outside of this range is considered as not intended use.



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**NOTE:**

**For further information, see the more detailed Gema safety regulations!**

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# About this manual

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## General information

This operating manual contains all important information which you require for the working with the XM02. It will safely guide you through the start-up process and give you references and tips for the optimal use of your new powder coating system.

Information about the function mode of the individual system components - booth, gun control unit, manual gun or powder injector - should be referenced to their corresponding documents.



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### **DANGER:**

#### **Working without operating instructions**

**Working without operating instructions or with individual pages from the operating instructions may result in damage to property and personal injury if relevant safety information is not observed.**

- ▶ Before working with the device, organize the required documents and read the section "Safety regulations".
  - ▶ Work should only be carried out in accordance with the instructions of the relevant documents.
  - ▶ Always work with the complete original document.
-





# Function description

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## Field of application

The XM02 Horizontal axis is designed exclusively to carry and to move horizontally the Gema reciprocators (ZA and YT) as well as the powder coating guns.

Any other use is considered non-compliant. The manufacturer shall not be liable for damage resulting from such use; the user bears sole responsibility for such actions.

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## XM02 Horizontal axis

### Typical characteristics

The XM02 Horizontal axis is used for the coating of parts with different widths. By coating in this way, the powder guns must be driven into each corresponding position for every given width.

The XM02 Horizontal axis is used in connection with the ZA05 reciprocator and YT04 synchronization axis.

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## Special characteristics

The XM02 Horizontal axis is a feeding axis and has the following characteristics:

- Same control as for the ZA reciprocator
- Freely adjustable speed setting on the axes control unit
- Minimum space requirement
- No additional space required for dismantling and service works
- Low overall height
- Manually movable when the control unit is switched off
- Intermediate and larger sizes available in steps of 50 mm

(For more information about the controlling of the axis, see the axes control unit operating manual)

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## Reasonably foreseeable misuse

- Operation in rooms with gases
- Horizontal axis is not anchored firmly to the floor
- The axis mounted on the horizontal axis is not fixed properly
- Incorrect programming of the end points and travel distance
- Operation without the proper training
- Operating the horizontal axis without the protective fence

# Technical data

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## XM02

### Electrical data

XM02	
Power supply	230 VAC (from control unit)
Tolerance	± 10%
Power consumption	0.3 kW
Frequency	50/60 Hz
Protection type	IP54
Isolation	Class F
Control unit	CM-30
Temperature range	10°C - 40°C (50°F - 104°F)

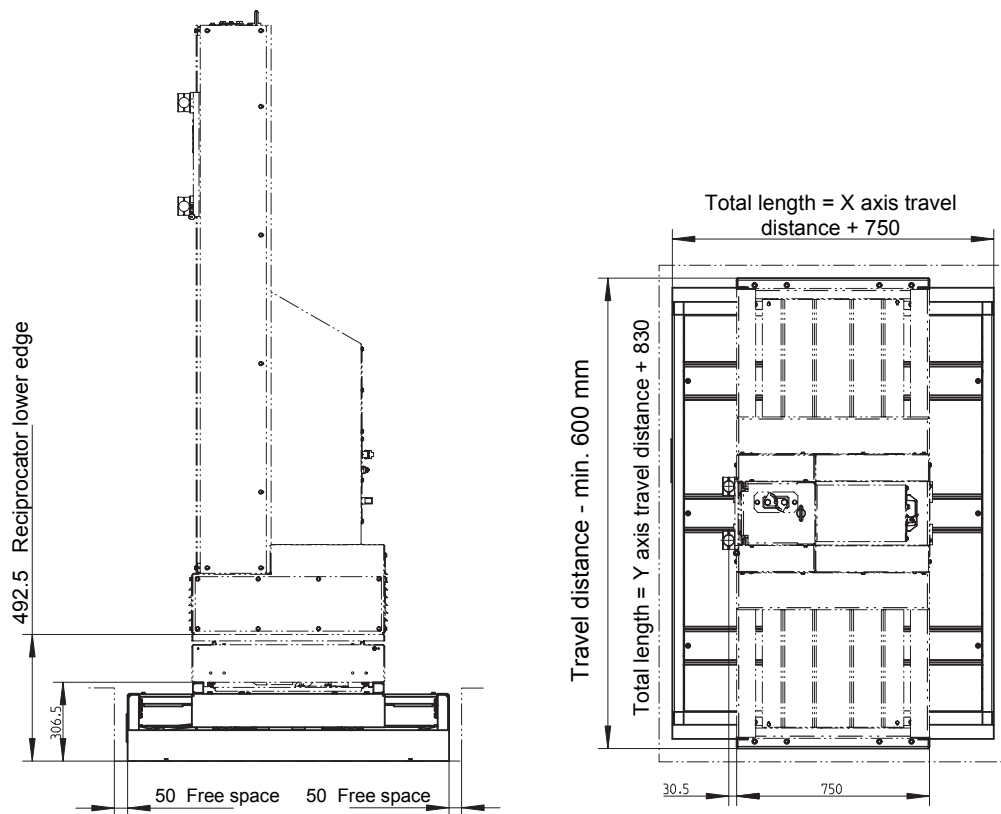
### Mechanical data

XM02	
Speed	0.01-0.6 m/s
Acceleration	0.1-2.0 m/s <sup>2</sup>
Position detection	with incremental pulse generator
Reference point	corresponds to the zero point
Zero point	selectable in both end positions
Travel distance min.	Y axis: 600 mm X axis: 400 mm
Travel distance max.	on request

## Electrical connection

XM02	
Y and Z axis power unit	CM30 Control unit all necessary electrical components are installed in the ZA05 reciprocator (no separate electrical connection to Y axis is necessary)
X axis power unit	CM30 Control unit all necessary electrical components are installed in a controller cabinet: Motor mains cable - 4x1,5 mm <sup>2</sup> Pulse generator extension - 20 m

## Dimensions



### WARNING:

Due to accident risk and depending on the placement of the horizontal axis, the safety barriers have to be placed in accordance to the local regulations!

## Controller cabinet

### General information

XM02 - Controller cabinet	
Temperature range	10 °C - +40 °C (+50 °F - +104 °F)
Approvals	unsuitable for zone 22

### Electrical data

XM02 - Controller cabinet	
Nominal input voltage	230 VAC 50/60 Hz
Control signal	CANopen field bus
Protection type	IP54

### Dimensions

XM02 - Controller cabinet	
Width	400 mm
Height	750 mm
Depth	260 mm
Weight	25 kg



# Set-up, assembly and commissioning



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**WARNING:**

**If a free-standing horizontal axis is not anchored firmly to the floor, uncontrolled movement of the machine or insufficient stability can cause injuries.**

- ▶ Firmly anchor the horizontal axis to the floor if it is not mounted to another axis of motion
- 



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**WARNING:**

**The movement of the reciprocator can cause injuries.**

- ▶ Erect a protective fence around the reciprocator so that there is no danger of injury during normal operation.
- 



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**DANGER:**

**Injuries can occur inside the protective fence due to the movement of the reciprocator!**

- ▶ In order to enter the inner area, the door interlocks must be released by the control unit. This release signal may only be activated by technical personnel.
- 

Except for normal operation, all other operating modes must be set up by an authorized technical representative.





# Commissioning

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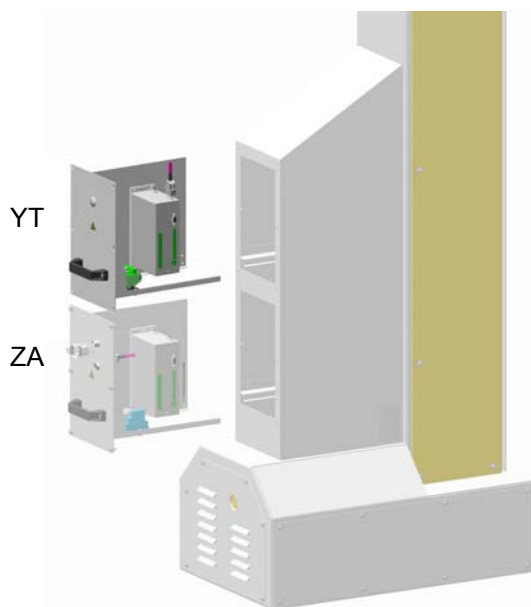
## Assembly of the XM02 Horizontal axis

The axis must be leveled, in order to ensure a safe and perfect operation.  
After positioning, the XT10 Horizontal axis must be firmly fixed on the floor.

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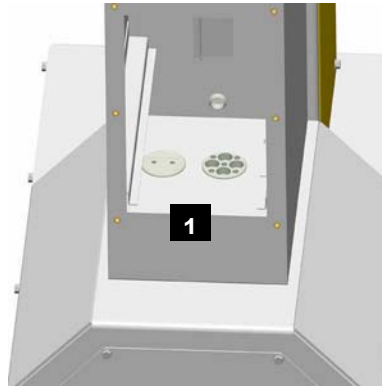
## Connecting the XM02 Horizontal axis to the ZA reciprocator

1. The cables to be connected are lying loose on the carriage plate of the horizontal axis
2. Both cables must be inserted into the cable duct in the ZA reciprocator (1)
3. Loosen the screws on the rear side of the ZA reciprocator and pull out the electrical modules



*Electrical modules in the ZA reciprocator*

4. Break out the required opening in the feedthrough rubber and pull through the cables.



*Cable feed-through in the ZA reciprocator*

5. Connect the cable (according to the enclosed wiring diagram)
6. Push back the electrical modules and fasten them

## Preparation for start-up




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### WARNING:

**Before connecting or switching on the horizontal axis, read carefully these operating instructions!**

- ▶ Before the horizontal axis is put into operation, the upper stroke limit must be set on the reciprocator control unit!

(see the user manual of the axis control unit)

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## General information




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### WARNING:

**Before start-up works are done, make certain that nobody can switch on the horizontal axis!**

- ▶ Switch off and lock the mains switch!

Before starting up, the following checks should be done:

- Check the gun holder and hose holder if they are firmly fitted. Mount the gun holder in such a way that they do not hit the bottom of the booth slots on start-up and cause damage
- Lay out the cables and hoses in such a way that even at the highest stroke no strain can arise
- Make sure that no guns can collide with the work pieces
- Check the grounding of the guns and hose carriers
- Check if the upper and the lower reversing point of the Z carriage are set correctly. The stroke length of the reciprocator must be in the range of the booth opening (collision danger!)
- Make sure that the automatic guns cannot collide with the work pieces (incorrectly adjusted stroke parameters on the reciprocator control unit)

## Reference point

At every start-up after the mains have been interrupted, the reference point of the reciprocator must be referred again (see "Reference point and mechanical stops"). After the reference point is reached, the reciprocator begins to carry out the movements set on the reciprocator control unit.

Before the horizontal axis is put into operation, the travel distance must be set on the axis control unit (see therefore the corresponding axis control unit operating manual)!



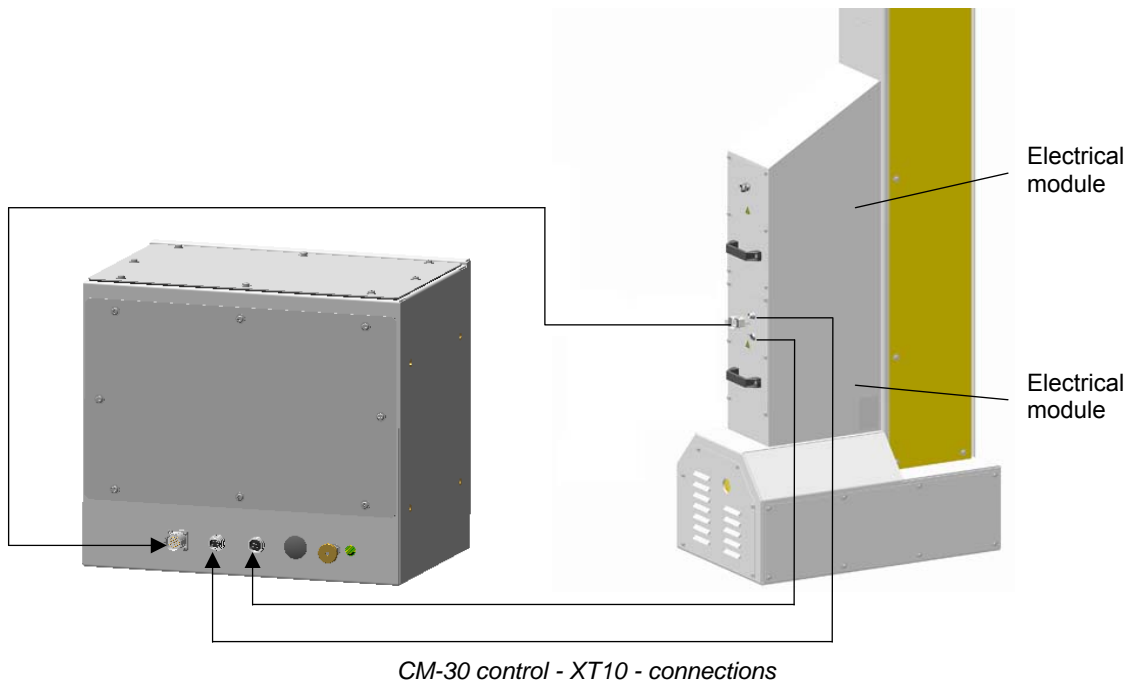

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### WARNING:

**Incorrect setting of the travel distance can cause damages to the reciprocator, to the booth and/or to the applicators!**

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## Electrical connections / cable connections



### NOTE:

All internal connections between the XT10 axis and the electrical module are to be made according to the enclosed wiring diagram.

## Checkpoints before switching on

Before switching on, the following checks should be done:

- Check if the cables and hoses are laid out correctly
- Check if the guns have a clear run and do not touch the booth slots
- Check the distance between the work pieces and the guns



### WARNING:

Before connecting or switching on the horizontal axis, read carefully these operating instructions!

## Grounding / protection type

All metal parts of the horizontal axis must be grounded according to the local safety regulations. The grounding screw is located on the horizontal axis base.

All electrical installations are implemented in accordance to VDE IP54 protection type regulations!

## Hoses and cables

All movable hoses and cables must be laid out in such a way that they are neither subjected to any loads nor can hang on other parts. The electric cables of the reciprocators must be protected from mechanical damage.

## Reference point and mechanical stops

The reference point serves as starting point for the axis control unit for calculating the reversing points as well as the maximum travel distance.

Each time the reciprocator is switched on, the control unit requests that the carriage travels to the reference point (zero point). The carriage travels to the mechanical stop, which means onto the rubber buffer.

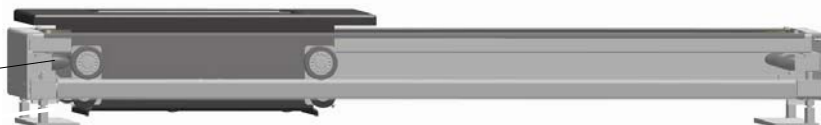
The control unit notes this and gives the distance how far the carriage must travel from this position to decompress the rubber buffer. The standard value for the X axis is 30, that means 30 mm away from the mechanical stop. For this reason, the Axis control unit must be programmed in such a way that the reference point is always 30 mm before the lowest mechanical stop (zero point).



### WARNING!

**In order to avoid damages to the booth, to the gun holders etc. the reference point must be set before the first start-up!**

Rubber buffer



*XT10 horizontal axis - reference point and mechanical stops*



### WARNING:

**In order to avoid damages to the booth or the gun holders, the reference point must be checked before the first start-up and if necessary, reset!**

**It must be noted that the axes in reference travel moves up to 30 mm behind the control's zero point!**



### WARNING:

**The reference point must be referenced before each start-up (at each switching on, after an interruption of the power supply etc.)!**

---

## Initial start-up



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**DANGER!****Danger of accident!**

- ▶ Never stand on the horizontal axis or under the carriage of the vertical axis when it is in operation!
- 



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**WARNING:****The power of the horizontal axis is much stronger than that of a human being!**

- ▶ All axes must be secured against admittance during operation (see local regulations).
- 

Before start-up the horizontal axis, the following points must be noted:

The frame and the drive carriage of the axis **must** be grounded!  
The grounding of the frame must be done by the customer

Adapt the system parameters in the axes control unit (see the axes control unit operating instructions)

In addition, the following checks are necessary before the initial start-up:

Travel distance

Check by moving manually, as well as in accordance to the axes control operating manual

Control unit

Check the cable connections (correct connections, squeezed parts, cable lengths, cable movement etc.)

Stability

Horizontal axis and carriage plate must be stable!

# Maintenance



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**DANGER:**

**Injuries can occur inside the protective fence due to the movement of the reciprocator!**

- ▶ In order to enter the inner area, the door interlocks must be released by the control unit. This release signal may only be activated by technical personnel.
- 

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## General information



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**WARNING:**

**Before maintenance work can be carried out on the horizontal axis, it must be ensured that the horizontal axis cannot be turned on by third parties!**

- ▶ The horizontal axis has to be free of load and disconnected from mains!
- 

The XM02 horizontal axis was designed to operate with a minimum of maintenance. The motor gear box is self-lubricating and maintenance-free.

Regular maintenance and inspection of the horizontal axis increases the working reliability and avoids damages, repair downtimes etc.!

## Maintenance schedule


**NOTE:**

The following maintenance schedule is based on operation of 8 hours per day.

Time interval	Maintenance works
weekly	- Blow off the outside of the horizontal axis with compressed air or clean it with a soft cloth at least once a week.
monthly	- Check the drive unit gearbox for oil loss - Check the interior of the horizontal axis for deposits of powder dust and if present, clean it
every 6 months	- Check the drive belt for wear and tension - Check the rollers on the carriage for free movement and wear - Check the running surfaces for wear and deposits and, if present, clean them


**NOTE:**

The parts, which are to be replaced during maintenance work, are available as spare parts. Please refer to the spare parts list too!

## Drive unit


**DANGER:**

During assembly, cleaning, maintenance and commissioning when close to energized components, an electrical shock can cause serious injury or death.

- ▶ All work must be carried out only by technical personnel and when no power is applied!

The motor gear box is self-lubricating and maintenance-free.

Observe the contamination of the enclosure - strong contamination on the outside can increase the operating temperature of the drive unit!

Therefore, clean the drive unit from time to time (with a vacuum cleaner etc.). Check the drive unit gearbox monthly for oil loss. If the drive unit gearbox has to be changed for any reason, the complete unit has to be replaced!



## Replacing the drive unit




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### WARNING!

**There is the risk of burns if contact is made with electrical components that have become overheated!**

- ▶ All work must be carried out only by technical personnel and when no power is applied!
- 

If it is necessary to replace a drive unit gearbox, the complete motor unit must be dismantled from the horizontal axis. Therefore, the horizontal axis has to be free of load and disconnected from mains.

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## Drive belt




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### WARNING:

**Injuries can arise if fingers, hair or articles of clothing get caught between the drive belt and the drive wheel or toothed wheel.**

- ▶ All work must be carried out only by technical personnel
- 

The toothed drive belt should be checked regularly because it is exposed to large loads when in operation.




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### WARNING:

**The drive belt should be checked for wear and tension every 6 months. Powder deposits should be removed with a vacuum cleaner, because this can influence the quiet running and shorten the service life of the drive belt**

- Switch on the horizontal axis and check the drive belt for elongation or wear (noisy running, strong vibration of the belt when reversing the direction of travel)
- 



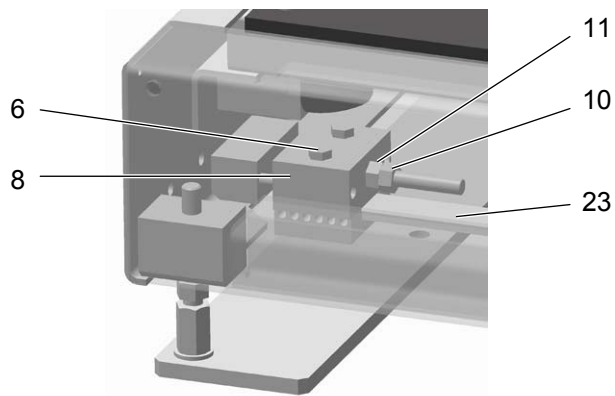

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### WARNING:

**For safety reasons, two people should always carry out the following maintenance work!**

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## Tensioning the drive belt



*YT04 Horizontal axis - Tensioning the drive belt*

- Clamp the drive belt (**23**) with the clamp block (**8**) and tighten the screws (**6**)
- Tension the drive belt with the tensioning screw (**11**), so that the drive belt will deflect 2-3 cm
- Tighten the lock nut (**10**)

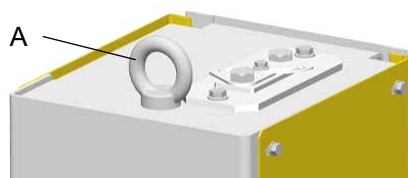
# Decommissioning, storage

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## Introduction

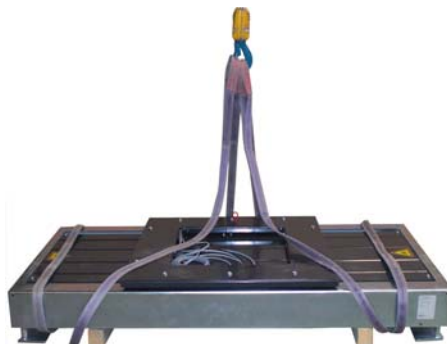
### Safety rules

Before lifting a reciprocator off of its horizontal axes, it must be secured from falling over with a lifting device such as a crane, fork lift, etc. The point of attachment is the eye bolt (A) at the top of the reciprocator.



*ZA.. reciprocator - Top view*

The horizontal axes should be lifted up using lifting straps:



### Requirements on personnel carrying out the work

All work should be carried out only by authorized technical personnel.

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## Storage conditions

### Type of storage

For safety reasons, horizontal axes should only be stored in a horizontal position.

### Storage duration

If the physical conditions are maintained, the unit can be stored indefinitely.

### Space requirements

The space requirements correspond to the sizes of the axes of motion.

The load-bearing capacity of the floor should be at least 200 kg/m<sup>2</sup>.

There are no special requirements concerning distance to neighboring equipment.

### Physical requirements

Storage must be inside a dry building at a temperature between 5 – 50 °C.

### Hazard notes

There is no danger to personnel or the environment if the unit is stored properly.

---

## Shut-down

### Decommissioning

Before starting any kind of work, the axes of motion must be disconnected from the power supply:

- Unplug the power cable
- Unplug the ground cable

### Cleaning

The running surfaces of horizontal axis must be thoroughly cleaned.

---

## Maintenance during storage

### Maintenance schedule

No maintenance schedule is necessary.

### Maintenance works

During long-term storage, periodically perform a visual check for corrosion.

# Packing, transport

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## Introduction

This chapter describes special precautions that must be taken during internal transport of the product if:

- the customer himself must pack, transport and ship the product, such as to have renovations or service work carried out by the manufacturer

or

- the product must be shipped for disposal (recycling).

### Requirements on personnel carrying out the work

All work must be carried out by personnel trained in packing machines.

---

## Packing material

### Selection of packing material

Suitably stable wood packing material must be used.

### Procedure when packing

Transport the unit only in a horizontal position.

---

## Transport

### Data concerning goods to be transported

The space requirements correspond to the size of the axes of motion plus the packaging.

### Loading, transferring the load, unloading

At least one fork lift must be available.



# Fault clearance

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## Troubleshooting




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**WARNING:**

Faults may be fixed by trained personnel only!

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Error/fault	Procedures/remedy
Reciprocator with carriage plate is waggling	Check the connecting bolts between reciprocator, carriage plate and the carriage for tightness  Adjust the counter rollers without clearance by the corresponding screws on the running wheel bearing/guide wheel bearing (see also the spare parts list)  <b>WARNING:</b> In no case press the counter rollers, otherwise they wear quickly!
Reference point not reached	Remove the powder accumulation on the running surfaces  Check for a foreign body - if present, remove it  Check the XM02 Horizontal axis for proper running (move manually)  Consider the indications in the axes control unit operating manual!





# Spare parts list

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## Ordering spare parts

When ordering spare parts for powder coating equipment, please indicate the following specifications:

- Type and serial number of your powder coating equipment
- Order number, quantity and description of each spare part

**Example:**

- **Type** XM02  
**Serial number** 1234 5678
- Order no. 203 386, 1 piece, Clamp - Ø 18/15 mm

When ordering cable or hose material, the required length must also be given. The spare part numbers of this bulk stock is always marked with an \*.

Wearing parts are always marked with a #.

All dimensions of plastic hoses are specified with the external and internal diameter:

**Example:**

Ø 8/6 mm, 8 mm outside diameter (o/d) / 6 mm inside diameter (i/d)



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**WARNING!**

**Only original Gema spare parts should be used, because the explosion protection will also be preserved that way! The use of spare parts from other manufacturers will invalidate the Gema guarantee conditions!**

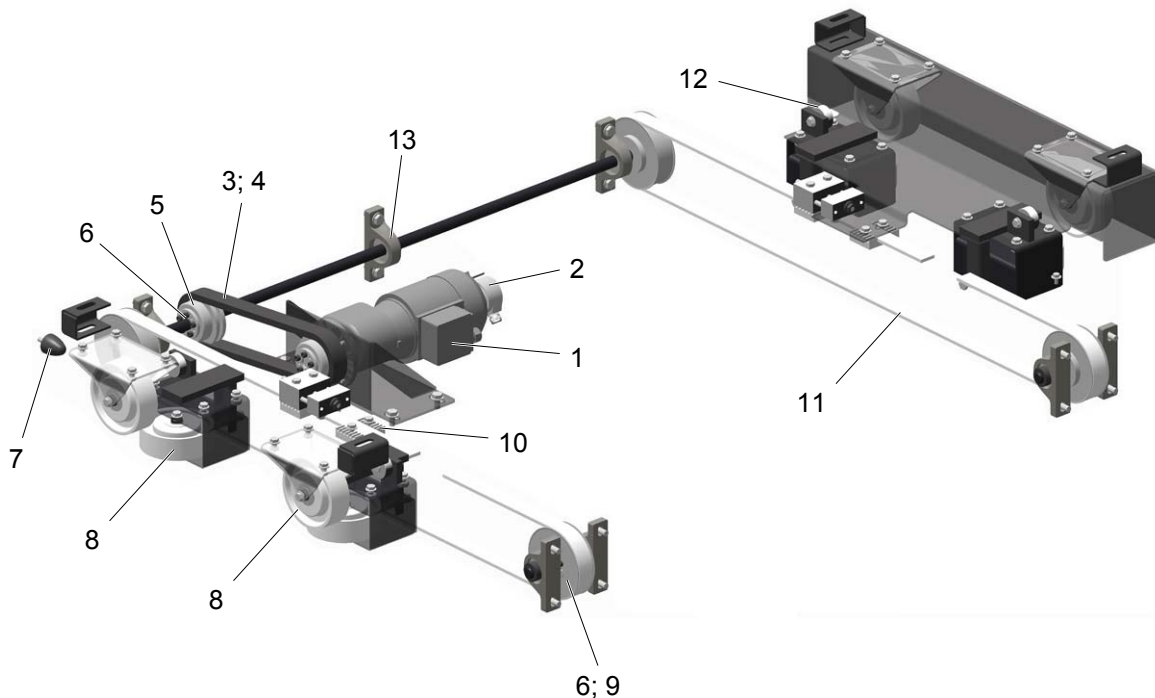
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## XM02 Horizontal axis - spare parts list

1	Motor drive unit - complete	1003 823
2	Pulse generator for pos. 1	268 925
3	R-chain, duplex - 1/2x5/16 mm, 870 mm	on request #
4	Connecting piece, duplex - 1/2x5/16 mm	221 708#
5	Chain wheel	317 446
6	Clamping set	257 583
7	Rubber buffer - 35x40 mm	211 664
8	Polyamide wheel - Ø 125 mm	264 776#
9	Toothed drive belt wheel	369 748#
10	Clamp plate	345 067
11	Toothed belt (length = 2 X strokes + 1480 mm)	103 730#*
12	Guiding roller - Ø 15/40x15.9 mm	264 857#
13	Pedestal bearing	201 375

# Wearing part

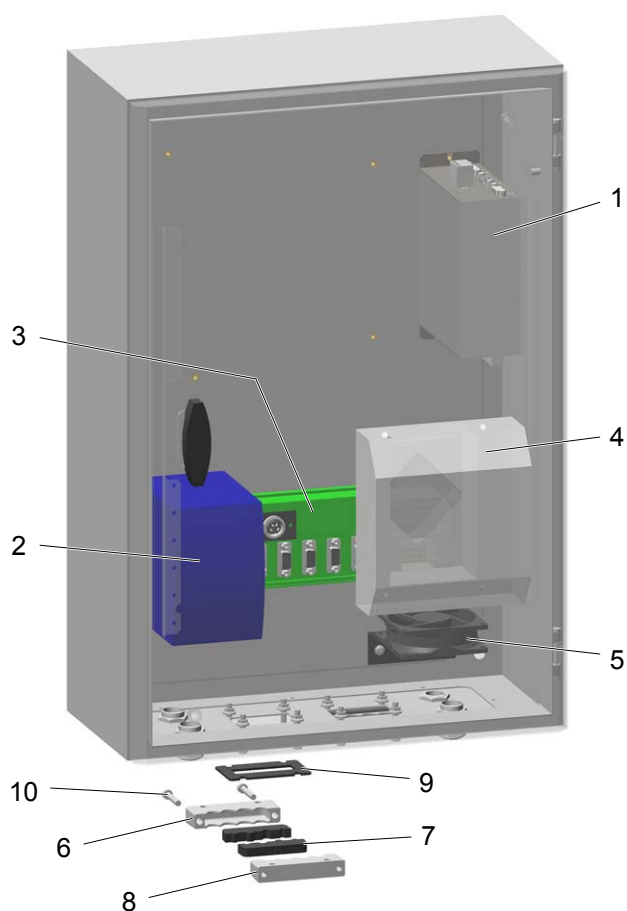
\* Please indicate length



XM02 Horizontal axis - spare parts

## Controller cabinet - spare parts list

1	Position regulator CDB-X	1003 986
2	Switching power supply 24 VDC, 20 W	1007 615
3	Can-Hub - V3.0, complete	1001 787
4	Peltier cooler - 24 VDC, 30 W	1005 583
5	Axial flow fan - 24 VDC	1007 614
6	Clamping profile SS	386 820
7	Cable bush - 2+2	386 847
8	Clamping profile GS	386 839
9	Gasket	386 855
10	Allen cylinder screw - M5x30 mm	216 372



*XM02 Horizontal axis - controller cabinet*