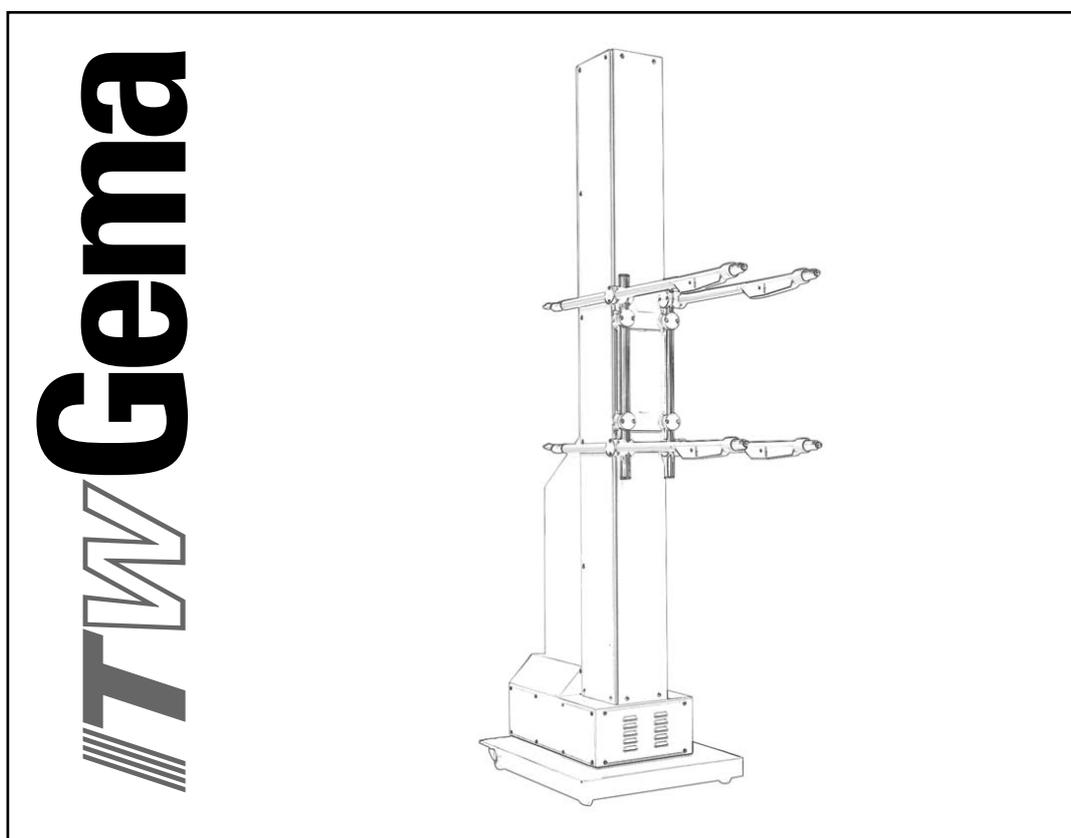

Operating instructions and spare parts list

ZA04 Reciprocator



Documentation ZA04 Reciprocator

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ITW Gema AG
Mövenstrasse 17
9015 St. Gallen
Switzerland

Phone: +41-71-313 83 00
Fax.: +41-71-313 83 83

E-Mail: info@itwgema.ch
Homepage: www.itwgema.ch

Table of contents

General safety regulations	3
Safety symbols (pictograms).....	3
Conformity of use.....	3
Technical safety regulations for stationary electrostatic powder spraying equipment	4
General information	4
Safety conscious working	5
Individual safety regulations for the operating firm and/or operating personnel	5
Notes on special types of hazard.....	6
Safety requirements for electrostatic powder coating.....	7
A summary of the rules and regulations	8
Special security measures	10
Special safety regulations for the ZA04 Reciprocator.....	10
About this manual	11
General information	11
Function description	13
ZA04 Reciprocator	13
Schematic presentation	14
Special characteristics	14
Upgrading with XT09 Horizontal axis.....	14
Technical Data	15
ZA04 Reciprocator	15
Versions	15
Electrical data	15
Drive unit data	16
Dimensions	16
Start-up	17
Preparation for start up	17
Generally.....	17
Reference point.....	18
Electrical connections / cable connections	18
Checkpoints before switching on	19
Grounding / protection type.....	19
Hoses and cables	19
Reference point and mechanical stops.....	19
Setting the lower mechanical stop	21
Setting the upper mechanical stop	21
Maintenance	23
General information	23

Drive unit.....	23
Replacing the drive unit.....	24
Toothed belt.....	25
Tensioning the toothed belt.....	26
Replacing the toothed belt.....	26
Toothed wheel (pulley).....	27
Replacing the upper toothed wheel.....	27
Z carriage - rollers.....	28
Schematic diagrams	29
ZA04 Reciprocator - electrical diagram.....	29
Frequency converter	31
Overview.....	31
General information.....	31
Function/handling.....	32
Access to menus.....	32
Access to menu parameters.....	33
Adjusted parameters.....	33
Replace the frequency converter.....	34
Spare parts list	35
Ordering spare parts.....	35
ZA04 Reciprocator - base.....	36
ZA04 Reciprocator - toothed wheel.....	39
ZA04 Reciprocator - Z carriage (complete).....	40
ZA04 Reciprocator - drive unit (complete).....	41
ZA04 Reciprocator - electrical connections.....	42
ZA04 Reciprocator - frequency converter.....	43
ZA04 Reciprocator - gun holders.....	44
Gun holder for 1-4 guns.....	44
Gun holder for 5-8 guns.....	45
Gun holder for 2x1-4 guns.....	46
Vertical gun holder.....	47
Gun fixtures and collision protection.....	48

General safety regulations

This chapter sets out the fundamental safety regulations that must be followed by the user and third parties using the ZA04 Reciprocator.

These safety regulations must be read and understood before the ZA04 Reciprocator is used.

Safety symbols (pictograms)

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

**DANGER!**

Danger due to live electricity 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

Conformity of use

1. The ZA04 Reciprocator is built to the latest specification and conforms to the recognized technical safety regulations. It is designed for the normal application of powder coating.
2. Any other use is considered as non-conform. The manufacturer is not responsible for damage resulting from improper use of this equipment; the end-user alone is responsible. If the ZA04 Reciprocator is to be used for other purposes or other substances outside of our guidelines then ITW Gema AG should be consulted.
3. Observance of the operating, service and maintenance instructions specified by the manufacturer is also part of conformity of use. The ZA04 Reciprocator should only be used, maintained and started up by trained personnel, who are informed about and are familiar with the possible hazards involved.

4. Start-up (i.e. the execution of a particular operation) is forbidden until it has been established that the ZA04 Reciprocator has been set up and wired according to the guidelines for machinery (98/37 EG). EN 60204-1 (machine safety) must also be observed.
5. Unauthorized modifications to the ZA04 Reciprocator exempts the manufacturer from any liability from resulting damage.
6. The relevant accident prevention regulations, as well as other generally recognized safety regulations, occupational health and structural regulations are to be observed.
7. Furthermore the country-specific safety regulations must be observed.

Explosion protection	Protection type	Temperature class
 	IP54	T6 (zone 21) T4 (zone 22)

Technical safety regulations for stationary electrostatic powder spraying equipment

General information

The powder spraying equipment from ITW Gema is designed with safety in mind and is built according to the latest technological specifications. This equipment can be dangerous if it is not used for its specified purpose. Consequently it should be noted that there exists a danger to life and limb of the user or third party, a danger of damage to the equipment and other machinery belonging to the user and a hazard to the efficient operation of the equipment.

1. The powder spraying equipment should only be started up and used once the operating instructions have been carefully studied. Improper use of the controlling device can lead to accidents, malfunction or damage to the control itself.
2. Before every start-up check the equipment for operational safety (regular servicing is essential)!
3. Safety regulations BGI 764 and VDE regulations DIN VDE 0147, Part 1, must be observed for safe operation.
4. Safety precautions specified by local legislation must be observed.
5. The plug must be disconnected before the machine is opened for repair.
6. The plug and socket connection between the powder spraying equipment and the mains network should only be taken out when the power is switched off.
7. The connecting cable between the controlling device and the spray gun must be set up so that it cannot be damaged during operation. Safety precautions specified by local legislation must be observed!

8. Only original ITW-Gema spare parts should be used, because the explosion protection will also be preserved that way. Damage caused by other parts is not covered by guarantee.
9. If ITW-Gema powder spraying equipment is used in conjunction with machinery from other manufacturers then their safety regulations must also be taken into account.
10. Before starting work familiarize yourself with all installations and operating elements, as well as with their functions! Familiarization during operation is too late!
11. Caution must be exercised when working with a powder/air mixture! A powder/air mixture in the right concentration is flammable! Smoking is forbidden in the entire plant area!
12. As a general rule for all powder spraying installations, persons with pacemakers should never enter high voltage areas or areas with electromagnetic fields. Persons with pacemakers should not enter areas with powder spraying installations!



WARNING!

We emphasize that the customer himself is responsible for the safe operation of equipment. ITW-Gema is in no way responsible for any resulting damages!

Safety conscious working

Each person responsible for the assembly, start-up, operation, service and repair of powder spraying equipment must have read and understood the operating instructions and the "Safety regulations"-chapter. The operator must ensure that the user has had the appropriate training for powder spraying equipment and is aware of the possible sources of danger.

The control units for the spray guns must only be set up and used in zone 22. The spray guns are permitted in the zone 21 created by them.

The powder spraying equipment should only be used by trained and authorized personnel. This applies to modifications to the electrical equipment, which should only be carried out by a specialist.

The operating instructions and the necessary closing down procedures must be followed before any work is carried out concerning the set-up, start-up, operation, modification, operating conditions, mode of operation, servicing, inspection or repairs.

The powder spray equipment can be turned off by using the main switch or failing that, the emergency shut-down. Individual components can be turned off during operation by using the appropriate switches.

Individual safety regulations for the operating firm and/or operating personnel

1. Any operating method which will negatively influence the technical safety of the powder spraying equipment is to be avoided.
2. The operator should care about no non-authorized personnel works on the powder spraying equipment (e.g. this also includes using the equipment for non-conform work).
3. For dangerous materials, the employer has to provide an operating instructions manual for specifying the dangers arising for hu-

mans and environment by handling dangerous materials, as well as the necessary preventive measures and behavior rules. The operating instructions manual has to be written in an understandable form and in the language of the persons employed, and has to be announced in a suitable place in the working area.

4. The operator is under obligation to check the powder spraying equipment at least once every shift for signs of external damage, defects or changes (including the operating characteristics) which could influence safety and to report them immediately.
5. The operator is obliged to check that the powder spraying equipment is only operated when in satisfactory condition.
6. As far as it is necessary, the operating firm must ensure that the operating personnel wear protective clothing (e.g. facemasks).
7. The operating firm must guarantee cleanliness and an overview of the workplace with suitable instructions and checks in and around the powder spraying equipment.
8. No safety devices should be dismantled or put out of operation. If the dismantling of a safety device for set-up, repair or servicing is necessary, reassembly of the safety devices must take place immediately after the maintenance or repair work is finished. The powder spraying device must be turned off while servicing is carried out. The operator must train and commit the responsible personnel to this.
9. Activities such as checking powder fluidization or checking the high voltage spray gun etc. must be carried out with the powder spraying equipment switched on.

Notes on special types of hazard

Power

It is necessary to refer once more to the danger of life from high voltage current if the shut-down procedures are not observed. High voltage equipment must not be opened - the plug must first be taken out - otherwise there is danger of electric shock.

Powder

Powder/air mixtures can be ignited by sparks. There must be sufficient ventilation in the powder coating booth. Powder lying on the floor around the powder spraying device is a potentially dangerous source of slipping.

Static charges

Static charges can have the following consequences: Charges to people, electric shocks, sparking. Charging of objects must be avoided - see chapter "Earthing".

Grounding/Earthing

All electricity conducting parts and machinery found in the workplace (according to DIN VDE 0745, part 102) must be earthed 1.5 meters either side and 2.5 meters around each booth opening. The earthing resistance must amount to maximally 1 MOhm. The resistance must be tested on a regular basis. The condition of the machinery surroundings as well as the suspension gear must ensure that the machinery remains earthed. If the earthing of the machinery includes the suspension arrangements, then

these must constantly be kept clean in order to guarantee the necessary conductivity. The appropriate measuring devices must be kept ready in the workplace in order to check the earthing.

Compressed air

When there are longer pauses or stand-still times between working, the powder spraying equipment should be drained of compressed air. There is a danger of injury when pneumatic hoses are damaged and from the uncontrolled release and improper use of compressed air.

Crushing and cutting

During operation, moving parts may automatically start to move in the operating area. It must be ensured that only instructed and trained personnel go near these parts. The operator should ensure that barriers comply with the local security regulations.

Access under exceptional circumstances

The operating firm must ensure that local conditions are met when repairs are made to the electronic parts or when the equipment is restarted so that there are additional measures such as barriers to prevent unauthorized access.

Prohibition of unauthorized conversions and modifications to machines

All unauthorized conversions and modifications to electrostatic spraying equipment are forbidden for safety reasons.

The powder spraying equipment should not be used if damaged, the faulty part must be immediately replaced or repaired. Only original ITW-Gema replacement parts should be used. Damage caused by other parts is not covered by guarantee.

Repairs must only be carried out by specialists or in ITW-Gema workshops. Unauthorized conversions and modifications may lead to injury or damage to machinery. The ITW Gema AG guarantee would no longer be valid.

Safety requirements for electrostatic powder coating

1. This equipment is dangerous if the instructions in this operating manual are not followed.
2. All electrostatic conductive parts, in particular the machinery within 5 meters of the coating equipment, must be earthed.
3. The floor of the coating area must conduct electricity (normal concrete is generally conductive).
4. The operating personnel must wear electricity conducting footwear (e.g. leather soles).
5. The operating personnel should hold the gun with bare hands. If gloves are worn, these must also conduct electricity.
6. The supplied earthing cable (green/yellow) must be connected to the earthing screw of the electrostatic powder spraying hand appliance. The earthing cable must have a good metallic connection with the coating booth, the recovery unit and the conveyor chain and with the suspension arrangement of the objects.

7. The electricity and powder supply to the hand guns must be set up so that they are fully protected against heat and chemical damage.
8. The powder coating device may only be switched on once the booth has been started up. If the booth cuts out then the powder coating device must be switched off.
9. The earthing of all electricity conducting devices (e.g. hooks, conveyor chains) must be checked on a weekly basis. The earthing resistance must amount to maximally 1 MOhm.
10. The control device must be switched off if the hand gun is cleaned or the nozzle is changed.
11. When working with cleaning agents there may be a risk of hazardous fumes. The manufacturers instructions must be observed when using such cleaning agents.
12. The manufacturers instructions and the applicable environmental requirements must be observed when disposing of powder lacquer and cleaning agents.
13. If any part of the spray gun is damaged (broken parts, tears) or missing then it should not be used.
14. For your own safety, only use accessories and attachments listed in the operating instructions. The use of other parts can lead to risk of injury. Only original ITW-Gema replacement parts should be used.
15. Repairs must only be carried out by specialists and under no circumstances should they be carried out in the operating area. The former protection must not be reduced.
16. Conditions leading to dangerous levels of dust concentration in the powder spraying booths or in the powder spraying areas must be avoided. There must be sufficient technical ventilation available, to prevent a dust concentration of more than 50% of the lower explosion limit (UEG) (UEG = max. permissible powder/air concentration). If the UEG is not known then a value of 10 g/m³ should be used.

A summary of the rules and regulations

The following is a list of relevant rules and regulations which are to be observed:

Guidelines and regulations, German professional association

BGV A1	Prevention principles
BGV A3	Electrical equipment and material
BGI 764	Electrostatic coating
BGR 132	Guidelines for the avoidance of the dangers of ignition due to electrostatic charging (guideline "Static Electricity")
VDMA 24371	Guidelines for electrostatic coating with synthetic powder ¹⁾ - Part 1 General requirements - Part 2 Examples of use

EN European standards

RL94/9/EC	The approximation of the laws of the Member States relating to apparatus and safety systems for their intended use in potentially explosive atmospheres
EN 12100-1 EN 12100-2	Machine safety ²⁾
EN IEC 60079-0	Electrical equipment for locations where there is danger of explosion ³⁾
EN 50 050	Electrical apparatus for potentially explosive atmospheres - electrostatic hand-held spraying equipment ²⁾
EN 50 053, part 2	Requirements for the selection, installation and use of electrostatic spraying equipment for flammable materials - hand-held electrostatic powder spray guns ²⁾
EN 50 177	Stationary electrostatic spraying equipment for flammable coating powder ²⁾
EN 12981	Coating plants - spray booths for application of organic powder coating material - safety requirements
EN 60 529, identical: DIN 40050	IP-Type protection: contact, foreign bodies and water protection for electrical equipment ²⁾
EN 60 204 identical: DIN VDE 0113	VDE regulations for the setting up of high voltage electrical machine tools and processing machines with mains voltages up to 1000 V ³⁾

VDE (Association of German Engineers) Regulations

DIN VDE 0100	Regulations for setting-up high voltage equipment with mains voltages up to 1000 V ⁴⁾
DIN VDE 0105 part 1 part 4	VDE regulations for the operation of high voltage equipment ⁴⁾ General regulations Supplementary definitions for stationary electrical spraying equipment
DIN VDE 0147 part 1	Setting up stationary electrostatic spraying equipment ⁴⁾
DIN VDE 0165	Setting up electrical equipment in locations in areas with danger of explosion ⁴⁾

Sources:

¹⁾ Carl Heymanns Verlag KG, Luxemburger Strasse 449, 5000 Köln 41, or from the appropriate employers association

²⁾ Beuth Verlag GmbH, Burgrafenstrasse 4, 1000 Berlin 30

³⁾ General secretariat, Rue Bréderode 2, B-1000 Bruxelles, or the appropriate national committee

⁴⁾ VDE Verlag GmbH, Bismarckstrasse 33, 1000 Berlin 12

Special security 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 observed, that all components are grounded according to the local regulations, before start-up

Special safety regulations for the ZA04 Reciprocator

1. The ZA04 Reciprocator should only be started up after carefully reading of these operating instructions. Incorrect settings in the reciprocator control unit can cause accidents, faulty operation or damages to the equipment.
2. **The (motor drive) power of the axis is very much stronger than that of any human being!**
All axis must be made inaccessible during operation (see local safety regulations).
Never stand under the carriage when the reciprocator is switched off!
3. The plug-in connections between the reciprocator control unit and the power section in the ZA04 Reciprocator may only be removed when the power supply is switched off.
4. The connecting cables between the control unit and the reciprocator must be laid in such a way that they cannot be damaged during axes operation. Safety precautions specified by local legislation must be observed!
5. The maximum upper stroke limit of the reciprocator must always be set with reference to the maximum height of the booth gun slots. If a wrong (too high) stroke length is set, this can cause damage to the booth and/or the reciprocator.



Danger:

During a test run, it must be guaranteed that the unit is not damaged by the test! In particular, limitation of the stroke range are to be observed (therefore, see in section "Setting the upper mechanical stop")!

6. When repairing the reciprocator, both the reciprocator control unit and the reciprocator must be disconnected from the mains according to the local safety regulations!
7. Repairs may be made only by authorized ITW Gema Service Centers. Arbitrary, unauthorized repairs can lead to injuries and damage to the equipment. The ITW Gema AG guarantee would no longer be valid.
8. Only original ITW Gema spare parts should be used! The use of spare parts from other manufacturers will invalidate the ITW Gema guarantee conditions!
9. We emphasize that the customer himself is responsible for the safe operation of equipment. ITW Gema AG is in no way responsible for any resulting damages!

About this manual

General information

This operating manual contains all important information which you require for the working with the ZA04 Reciprocator. 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.

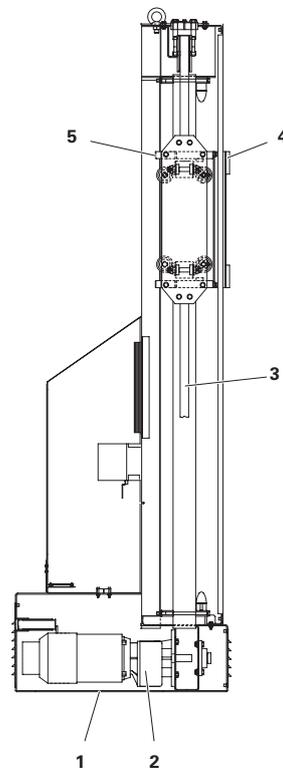
Information about the function mode of the individual system components - reciprocators, booths, powder gun control units, powder guns etc. - should be referenced to their corresponding documents.

Function description

ZA04 Reciprocator

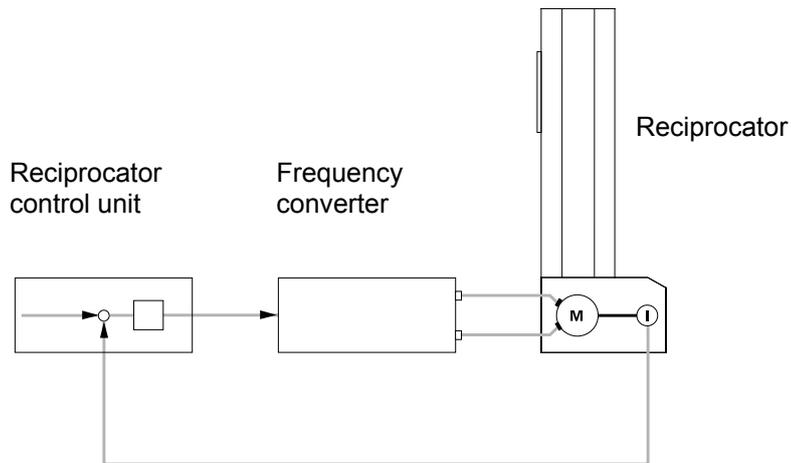
The ZA04 Reciprocator (moving axis) was designed for automatic coating with powder guns. The reciprocator carriage oscillates vertically on the column. The movement sequences (stroke and stroke speed) are controlled by the reciprocator control unit.

The gun holders are fitted on the shield (4) of the Z carriage (5). The Z carriage (5) is moved up and down by a toothed belt (3) on rollers on the central column, inside the reciprocator. This vertical column serves also as a runway for the rollers. The drive unit (2) and the electrical connection are installed in the reciprocator base (1). An incremental pulse generator, which is installed in the motor case, enables the exact positioning of the Z carriage.



ZA04 Reciprocator - vertical cross-section

Schematic presentation



Schematic presentation

Special characteristics

The ZA04 Reciprocator is conspicuous because of its rugged construction, a new drive system and an improved Z axis carriage design.

Further characteristics are:

- 50 kg load capacity for automatic gun and gun holders
- Integrated holding brake
- Quiet running
- Large speed, maximum acceleration and braking action
- Safe operation and simple maintenance
- High efficiency due to low energy consumption
- Designed for continuous operation
- Mobile version available
- IP54 protection type
- 4 standard stroke heights available: 1.3 m, 1.8 m, 2.3 m, 2.8 m
- Intermediate and over sizing in steps of 250 mm

Upgrading with XT09 Horizontal axis

If necessary, the ZA04 Reciprocator can be equipped with the XT09 horizontal axis. The horizontal axle XT09 extends the travel distance and the functionality of the reciprocator.

Technical Data

ZA04 Reciprocator

Versions

The ZA04 Reciprocator is available, depending on operational area, in four versions with different standard stroke heights.

Reciprocator	ZA04-13	ZA04-18	ZA04-23	ZA04-28
Reciprocator height	2.385 m	2.885 m	3.385 m	3.885 m
Stroke length	up to 1.3 m	up to 1.8 m	up to 2.3 m	up to 2.8 m
Stroke speed	0.08 up to 0.6 m/s			
Acceleration	0.1-2.0 m/s ²			
Position detection	Incremental pulse generator			
Max. lifting weight	max. 50 kg on the Z carriage			

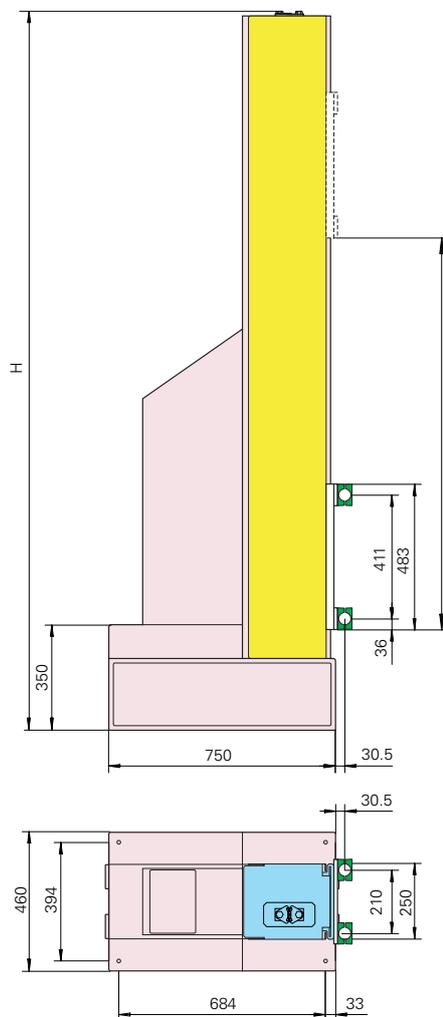
Electrical data

Reciprocator ZA04	
Voltage	230 VAC (from control unit)
Tolerance	± 10%
Power consumption	1.1 kW
Frequency	50/60 Hz
Protection type	IP54
Isolation	Class F
Control unit	OptiMove CR04/CR05/CR06
Temperature range	0°C - 40°C (32°F - 104°F)

Drive unit data

Reciprocator ZA04	
Drive unit	Asynchronous three-phase AC motor
Performance	0.75 kW
Motor voltage/frequency	3x230 V, 87 Hz
Electrical wiring	Triangle/three phase
Motor RPM	2450 1/min
Drive torque	80 Nm
Brake torque	10 Nm
Type of lubricant	Shell Omala 220
Lubricant quantity	0.25 liters

Dimensions



ZA04 Reciprocator - dimensions

Start-up

Preparation for start up



Attention:

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

Before the reciprocator is put into operation, the upper stroke limit must be adjusted on the reciprocator control unit!

(see therefore the reciprocator control unit operating instructions)

Generally



Attention:

Before start up works are done, make certain that nobody can switch on the reciprocator! Switch off and lock the mains switch!

Before every start-up, following checks should be done:

- Check the gun holder and hose holder if they are firmly fitted. Fit the gun holders 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 opening of the booth (collision danger!)
- Make sure that the automatic guns cannot collide with the work pieces (incorrectly set 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 control unit.

Before starting operation, the upper stroke limit of the reciprocator must be set on the reciprocator control unit! (see the corresponding reciprocator control unit operating instructions)



Attention:

Incorrect setting of the upper stroke limit can cause damages to the booth and/or reciprocator and to the powder guns!

Electrical connections / cable connections



ZA04 Reciprocator - connections



OptiMove control unit - connections

- The ZA04 power supply line is connected to the **2.2 Drive supply** (Drive I/O) port on the reciprocator control unit by the ZA04 power supply cable
- The ZA04 Drive I/O port is connected to the **2.3 Drive I/O** port on the reciprocator control unit by the ZA04 signal cable

Checkpoints before switching on

Before each 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



Attention:

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

Grounding / protection type

All metal parts of the reciprocator must be grounded according to the local safety regulations. The gun holders must be connected to the grounding screw on the reciprocator base by the grounding strip.

All electrical installations are implemented in accordance with IP54 protection type regulations.

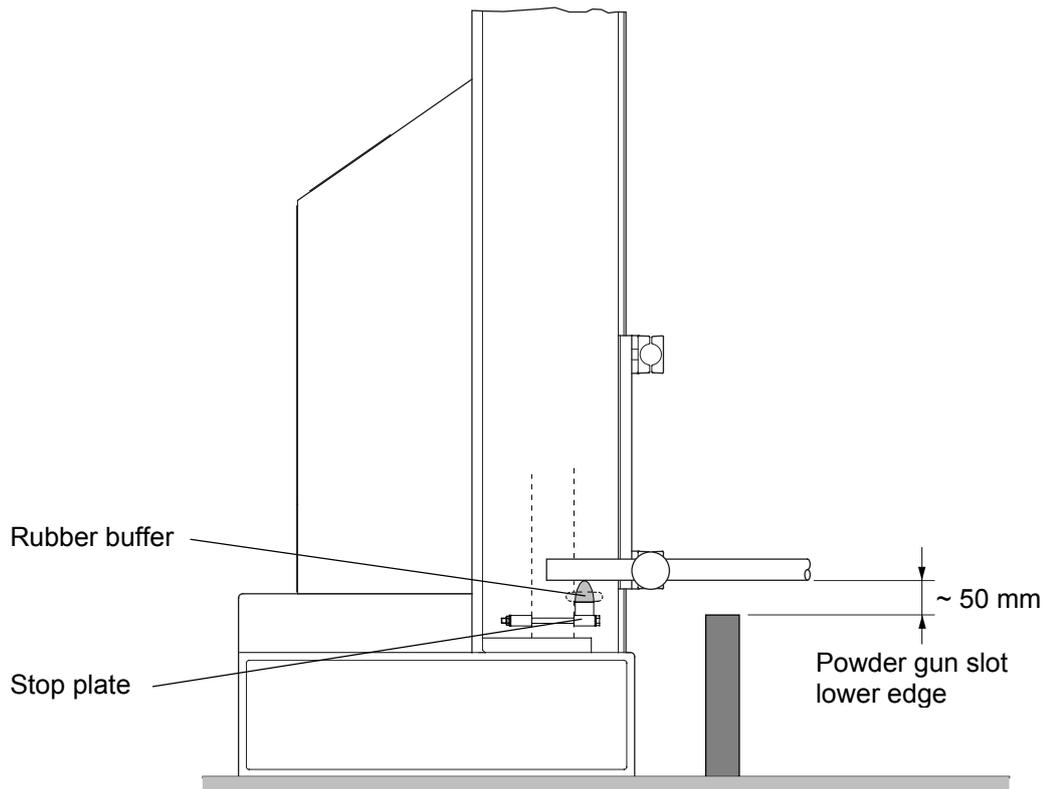
Hoses and cables

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 reciprocator(s) must be protected from mechanical damage.

Reference point and mechanical stops

The reference point serves for the reciprocator control unit as starting point for calculating the upper and lower reversing point and the maximum stroke.

Each time the reciprocator is switched on, the control unit requires that the Z carriage travels to the reference point (zero point). The Z carriage travels to the mechanical stop, that means onto the rubber buffer and afterwards 50 mm upward. This position is saved now as point of reference and remains stored up to the next tension interruption.



ZA04 Reciprocator - reference point and mechanical stops



Attention:

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

It must be noted that the axis, in reference travel, moves up to 25 mm below the control's zero point, therefore the mechanical stop must be adapted to the gun slots!

An ITW Gema service engineer sets the position of the upper and the lower stop plate when the reciprocator is assembled.



Attention:

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

Setting the lower mechanical stop



Attention:

The adjustment of the lower mechanical stop must take place without load and by moving axis out of service!

Procedure:

1. Release the brake switch manually
2. Let the Z carriage sink down until the powder gun holder is approximately 50 mm above the edge of the gun slot
3. Remove the boarding (side panels)
4. Loosen the nuts of the lower stop plate and push it up to the Z carriage
5. Tighten the nuts
6. Replace the side panel

Setting the upper mechanical stop



Attention:

The adjustment of the upper mechanical stop must take place without load and by moving axis out of service!

To set the upper mechanical stop, the stop position must be measured - therefore, the max. height of the powder gun slots on the cab must be considered.



Attention:

A wrong (too high) adjusted stroke length can cause damage to the booth and/or the reciprocator!

Procedure:

1. Remove the boarding (side panels)
2. Loosen the nuts of the upper stop plate and push it up to the measured position
3. Tighten the nuts
4. Replace the side panel



Attention:

After adjusting the mechanical stops, the system parameter for the upper stroke limit must be checked on the reciprocator control unit; the value may not be larger than the maximum stroke possible between the stops!

Maintenance

General information



Attention:

Before doing maintenance works to the reciprocator, always be sure that nobody can switch on the reciprocator!

The reciprocator must be free of load and out of service!

The ZA04 Reciprocator was designed to operate with a minimum of maintenance. The gearbox of the three-phase AC motor is self-lubricating and maintenance-free.

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

Blow off the outside of the reciprocator with compressed air or wipe down with a soft cloth from top to bottom at least once a week. If necessary, blow out the slots.

Drive unit



Attention:

Before doing maintenance works to the drive unit, always be sure that the reciprocator is free of load and out of service!

The gearbox of the three-phase AC motor is self-lubricating and maintenance-free.

Observe the outside contamination of the housing - 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 once a month for oil loss. If the drive unit gearbox has to be changed for any reason, the complete unit must be replaced!



Attention:

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

Replacing the drive unit

If it is necessary to replace the gearbox, the complete motor unit must be dismantled from the reciprocator base. Therefore, the reciprocator must be free of load and out of service.

Procedure:

1. Release the motor brake (12) manually, let the Z carriage (10) move down onto the lower stop
2. Remove all cover plates from the reciprocator
3. Remove the locking plates (7) and loosen the tensioning screws, so that the toothed belt (3) is slack
4. Loosen the lower clamp plate with the toothed belt on the Z carriage (10) and set it down. Note the position of the clamp plate on the toothed belt holder, because it must be fitted in approximately the same position on assembly
5. Loosen the grub screw on the clamp ring in front of the flange bearing (2)
6. Use a hammer and a suitable drift (from the side, in the hole of the clamp ring) to release the clamp ring from the motor spindle (counter-clockwise)
7. Remove the clamp ring, but do not remove the flange bearing (2)!



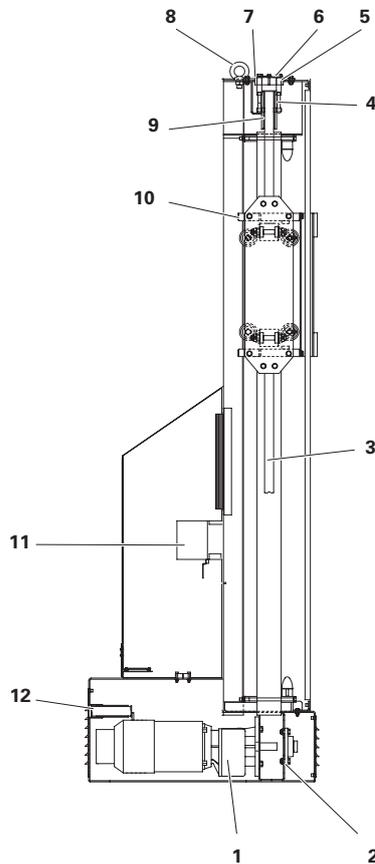
ZA04 Reciprocator - flange bearing

8. If the grub screw or the hole is not accessible, release the brake manually and turn the drive wheel by hand to a suitable position
9. Open the terminal box open, loosen the engine cables, loosen the motor brake cable (see electrical diagram)
Consider the engine cables order!
10. Disconnect the incremental pulse generator cable from connection X8 (see ZA04 Reciprocator - electrical diagram)
11. Open the cable lead-through by unscrewing one half of the clamping profile and only loosening the other half
12. Support the back of the motor in such a way it remains balanced and does not tilt backwards, when the motor flange screws are loosen
13. Remove the screws and carefully remove the motor from the rear of the reciprocator base

**Attention:**

Take particular care of the motor connection cable!
Since the cable lies quite down, the cable isolation can be damaged at a sharp edge when removing the motor.

The installation takes place exactly in the reverse order!



ZA04 Reciprocator

Toothed belt

The toothed drive belt **(3)** should be checked regularly because it is exposed to large loads when in operation:

- The toothed belt **(3)** should be checked weekly for contamination. Powder deposits should be removed with a vacuum cleaner, as this can influence the quiet running of the reciprocator and shorten the life of the toothed belt
- Check the upper and lower toothed wheel **(9)** weekly for contamination and wear and remove powder deposits with a vacuum cleaner
- Switch on the reciprocator and check the Z carriage **(10)** for quiet running. Check the toothed belt **(3)** for elongation and/or wear (noisy running, strong vibration of the belt when reversing the direction of travel)

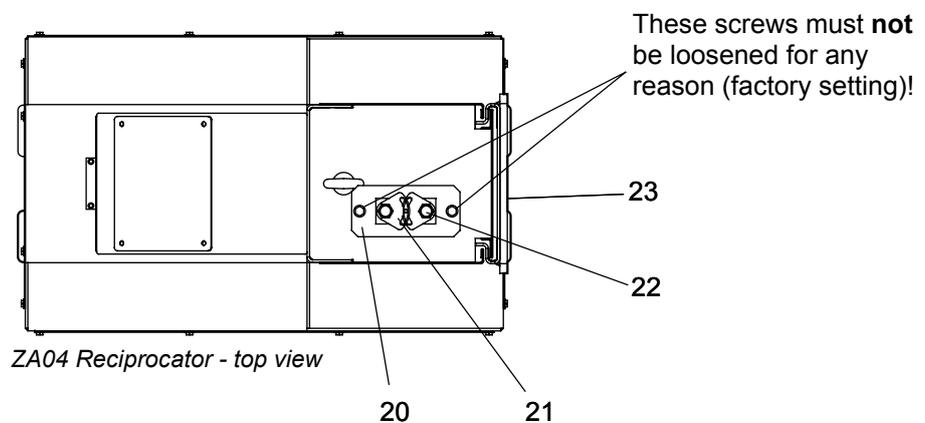


Attention:

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

Tensioning the toothed belt

- Remove the locking plates (21)
- Tighten the toothed belt evenly with the tensioning screws (22)
- The guide plate (20) must not be unscrewed for any reason (factory setting)!



Replacing the toothed belt

Procedure:

1. Release the motor brake (12) manually, let the Z carriage (10) move down onto the lower stop
2. Switch off the electric power
3. Remove the boarding (side panels)
4. Remove the locking plates (21) and loosen the tensioning screws, so that the toothed belt (3) is slack
5. Loosen the lower clamp plate with the toothed belt on the Z carriage (10) and set it down. Note the position of the clamp plate on the toothed belt holder, because it must be fitted in approximately the same position on assembly
6. Remove the damaged toothed belt from the reciprocator column
7. Remove the screws from upper clamp plate and remove the toothed belt when it is completely outside of the reciprocator
8. Screw on the new toothed belt at the upper clamp plate
9. Pass the loose end of the toothed belt over the upper toothed wheel from inside the reciprocator column
10. Screw on the toothed belt at the lower clamp plate
11. Tension the toothed belt, but do not over-stretch (see chapter "Tensioning the toothed belt")

Toothed wheel (pulley)

Replacing the upper toothed wheel



Attention!

Trained personnel should only carry out the following work!

Procedure:

1. Release the motor brake (12) manually, let the Z carriage (10) move down onto the lower stop
2. Switch off the electric power
3. Remove the boarding (side panels)
4. Remove the locking plates (21) and loosen the tensioning screws, so that the toothed belt (3) is slack
5. Completely remove the front tensioning screw



Attention, danger of accident!

The Z carriage must definitely rest on the rubber buffer, before this tensioning screw is removed!

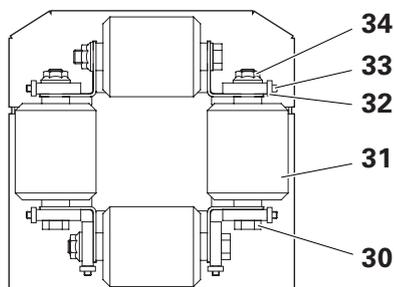
6. Support the upper toothed wheel (9) tight in one hand whilst the eye bolt is being removed from the spindle
7. Remove the toothed belt (3) from the toothed wheel
8. Remove the toothed wheel (9) and replace it

The installation takes place exactly in the reverse order!

- If necessary, remove the service cover on the reciprocator base (1), to check if the toothed belt (3) is sitting correctly on the toothed drive wheel
- Let the Z carriage slowly run up and down the column a few times, to see if the toothed belt must be tensioned more

Z carriage - rollers

If the Z carriage (10) starts to vibrate excessively during operation, especially at the reversing points, in most cases the cause lies in too much play in the carriage rollers or even loose rollers



Z carriage - rollers

In this case, proceed as follows:

1. Release the motor brake (12) manually, let the Z carriage (10) move down onto the lower stop
2. Switch off the electric power
3. Remove the boarding (side panels)
4. Loosen the locking nut (32) on the grub screw (33)
5. Loosen the nut (34) on the roller axle bolt (30)



Attention:

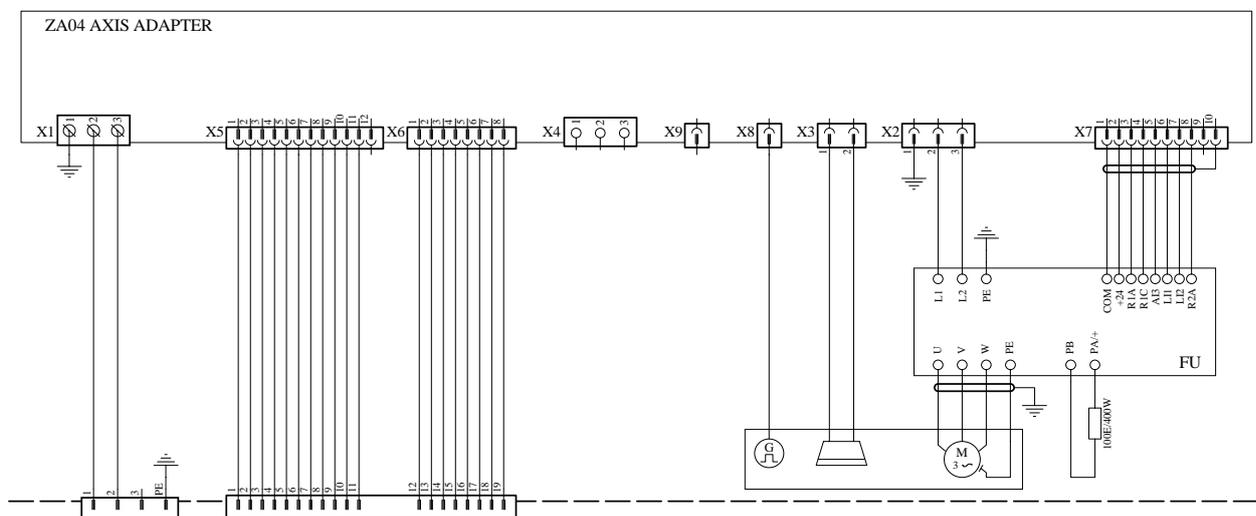
Never loosen more than one roller at the same time! Adjust only one roller after another!

6. Adjust the roller pressure with the grub screw, in such a way that the roller (31) can just be turned by hand
7. Tighten the screw (30)
8. Lock the counter nuts (33) firmly on the grub screws
9. Fit the panels again and firmly screw on

The Z carriage should run evenly and quietly again!

Schematic diagrams

ZA04 Reciprocator - electrical diagram



ZA04 Reciprocator - electrical diagram

- | | |
|---------------------------|---|
| X1 Mains connection | X6 Drive I/O connection |
| X2 Power supply for FU* | X7 Signal connection for FU* |
| X3 Motor brake connection | X8 Incremental pulse generator connection |
| X4 Empty | X9 empty |
| X5 Drive I/O connection | |

* FU = Frequency converter

Frequency converter

Overview



Frequency converter

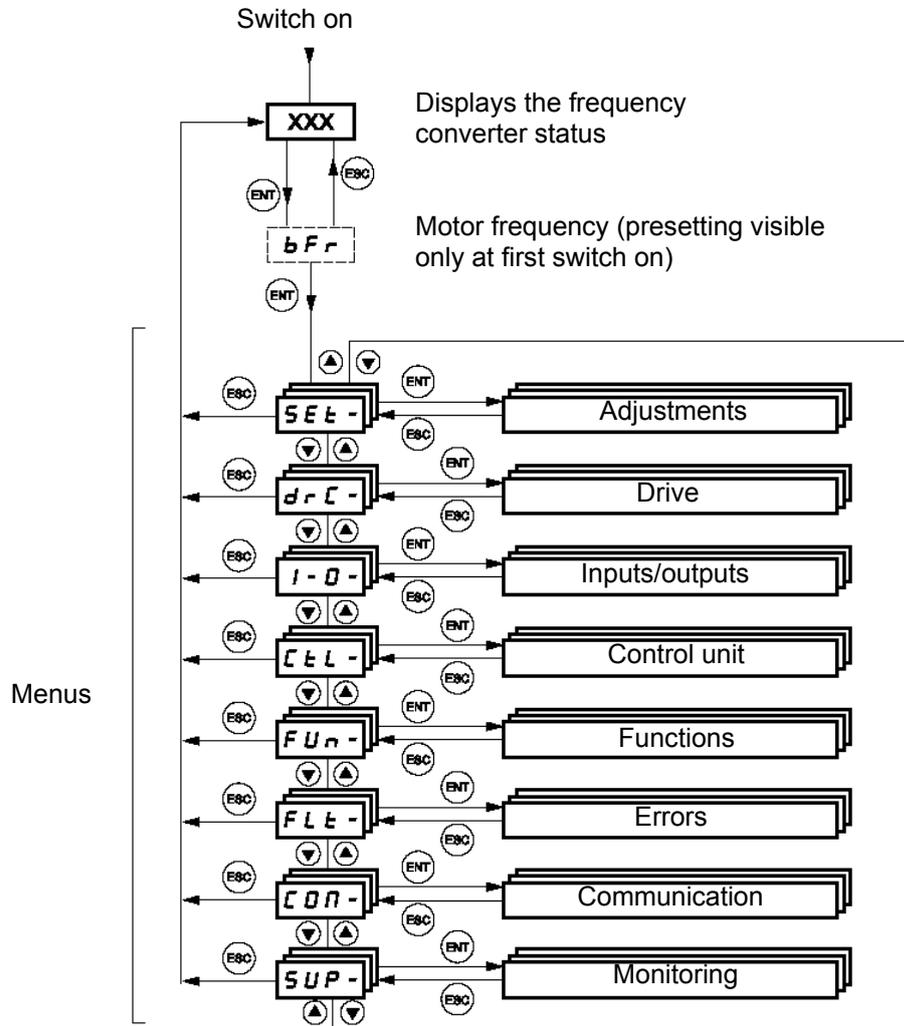
General information

The frequency converter in the ZA04 Reciprocator is installed for power adjustment. The parameters of this device are already adjusted to the ITW Gema specific values and therefore may never be changed.

All adjustments of stroke, speed of etc. can be made at the OptiMove control (for details, see in the corresponding manual of the frequency converter).

Function/handling

Access to menus



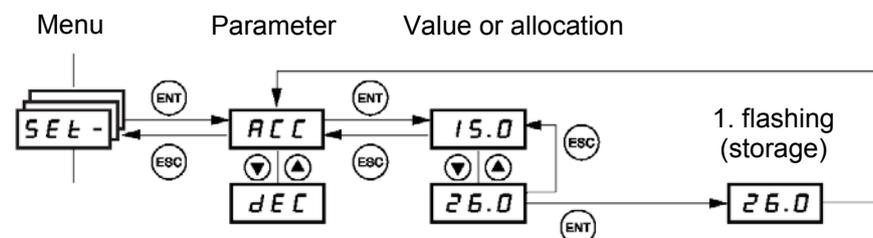
Frequency converter - access to menus

Access to menu parameters

The storage/recording of the indicated selection takes place with **ENT**

The display flashes during storage.

Example:



Frequency converter - Access to menus/storage

Adjusted parameters

Menu "SET - "	Code	Value
	ACC	0.1 sec.
	DEC	0.1 sec.
	HSP	110 Hz
	ITH	3.7 A
	FLG	40 %
	TDC1	1.0 sec.
	SDC1	3.7 A
	SFR	16 kHz

Menu "DRC - "	Code	Value
	FRS	87 Hz
	NCR	3.0 A
	NSP	2540 rpm
	COS	0.8
	RSC	Active
	TUN	Pon
	NRD	No
	SFR	16 kHz
	TFR	110 kHz
	SRF	Yes

Menu "I-O - "	Code	Value
	CRL3	5.0 mA

Menu "CTL - "	Code	Value
	LAC	L2
	FR1	AI3

Menu "FUN - "	Code	Value
	RPC - BRA	No
	LC2 - LC2	LI6
	CL2	3.0 A



Notice:

The resetting of the frequency converter on the Gema factory setting is made by the FSC parameter in the menu "DRC"!

Maintenance

The frequency converter (FU) does not need a preventing maintenance. However, it is recommended to carry out the following inspections by the user in regular intervals:

- Check condition and tightness of the cable connections
- Check the efficacy of the ventilation (average life span of the fan approx. 3-5 years)
- Remove the dust from frequency converter (FU)

Replace the frequency converter

If an exchange of the frequency converter was made, it is to be noted that all shielded cables are properly attached again on the EMV plate!



Attention:

The cover plate of the frequency converter is to be kept always closed!

Before interferences are done in the device, the power supply must be switched off! After switching off the power supply, wait at least 10 min. before working on the equipment, because the internal condensers need this time for discharging!

Spare parts list

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** ZA04 Reciprocator,
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 yard/meter ware is always marked with an *.

The wear 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)



WARNING!

Only original ITW-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 ITW Gema guarantee conditions!

ZA04 Reciprocator - base

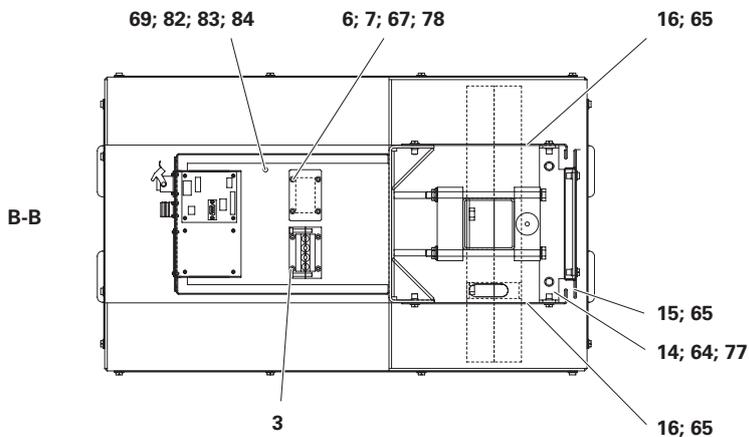
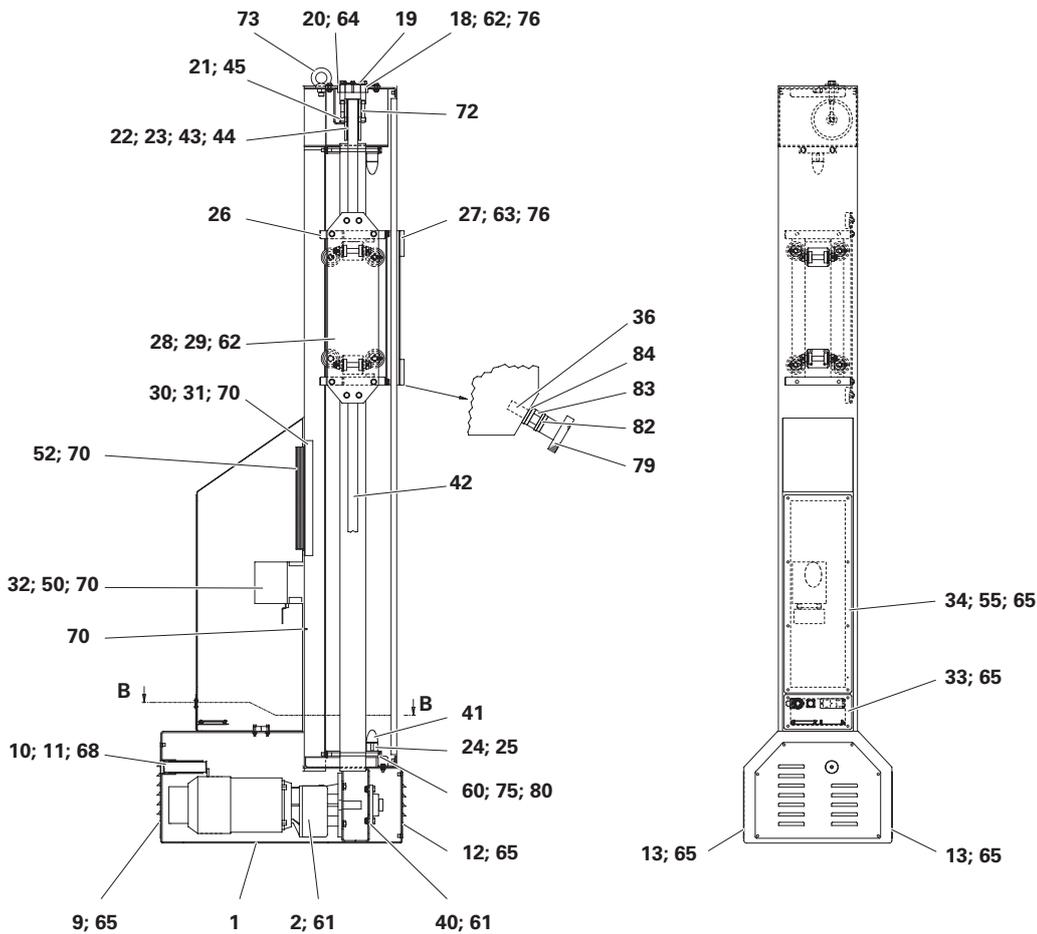
1	Reciprocator base - complete	---
2	Drive unit - complete, see "ZA04 Reciprocator - drive unit (complete)"	396 001
3	Cable connection - complete	388 408
6	Gasket	386 855
7	Blind plate	386 863
9	Service cover	386 448
10	Switch plate	386 464
11	Switch lever	386 456
12	Service cover	386 472
13	Service cover	386 480
14	Holder	386 499
15	Panel - front	
	ZA04-13	386 545
	ZA04-18	386 553
	ZA04-23	386 561
	ZA04-28	386 570
	ZA04-33/38	1004 455*
16	Panel - lateral	
	ZA04-13	386 502
	ZA04-18	386 510
	ZA04-23	386 529
	ZA04-28	386 537
	ZA04-33/38	1004 454*
18	Guide plate, see "ZA04 Reciprocator - toothed wheel"	386 588
19	Tensioning screws, see "ZA04 Reciprocator - toothed wheel"	386 596#
20	Locking plate, see "ZA04 Reciprocator - toothed wheel"	386 634
21	Toothed wheel spindle, see "ZA04 Reciprocator - toothed wheel"	386 766
22	Toothed wheel spindle, see "ZA04 Reciprocator - toothed wheel"	386 600
23	Spacer ring - Ø 28/31 mm, see "ZA04 Reciprocator - toothed wheel"	386 618
24	Stop plate	386 782
25	Counter profile	386 774
26	Z carriage - complete, see "ZA04 Reciprocator - Z carriage (complete)"	386 669
27	Gun holder plate - complete	386 693
	Gun holder plate - special (not shown)	1004 453
	Spacer (not shown)	1004 456
28	Toothed belt holder	386 707
29	Clamp plate	345 067

ZA04 Reciprocator - base

30	Heat sink	386 740
31	Gasket	386 758
32	ZA04 cable set	396 036

* Please indicate length

Wearing part



ZA04 Reciprocator - base

ZA04 Reciprocator - base

34	Cover plate	386 723
36	Threaded bolt - M6x35 mm, brass	389 838
40	Flange bearing - Ø 25 mm	264 210
41	Rubber buffer - Ø 35x40 mm, M8	211 664#
42	Toothed belt, see "ZA04 Reciprocator - toothed wheel"	103 730#*
43	Bearing - Ø 15 / 32x9 mm, see "ZA04 Reciprocator - toothed wheel"	241 709
44	Snap ring - I-32	245 780
45	Snap ring - A-15	233 617
50	Frequency converter - 1,1 kW	268 810
52	Brake resistor - 100 Ω/400 W	264 172
53	Shield clamp for motor cable (not shown)	264 318
55	Adhesive sealing strip - 6x2 mm	103 357
60	Hexagon screw - M10x180 mm, gal.	201 855
61	Hexagon screw - M10x25 mm, gal.	214 116
62	Hexagon ratchet screw - M8x20 mm, gal.	244 422
63	Hexagon ratchet screw - M8x16 mm, gal.	244 457
64	Hexagon ratchet screw - M6x20 mm, gal.	244 414
65	Cap screw K-SI - M6x16 mm, gal. Eco-Fix	243 833
67	Allen screw - M5x16 mm, gal.	216 356
68	Countersunk screw K-SI - M5x10 mm, gal.	214 671
69	Hexagon screw - M6x30 mm, brass	215 279
70	Allen screw - M4x12 mm, gal.	216 275
72	Eyebolt - M10x60 mm, gal.	264 202
73	Ring screw - M16, gal.	264 415
75	Hexagon nut - M10, black	234 656
76	Hexagon nut - M8, gal.	244 449
77	Hexagon nut - M6, gal.	244 430
79	Milled nut - M6, brass	200 433
80	Ribbed washer - M10, gal.	237 981
82	Shake proof washer A type - M6 R	216 054
83	Hexagon nut - M6, gal.	205 095
84	Washer - Ø 6,4/12,5x1,6 gal.	216 020

* Please indicate length

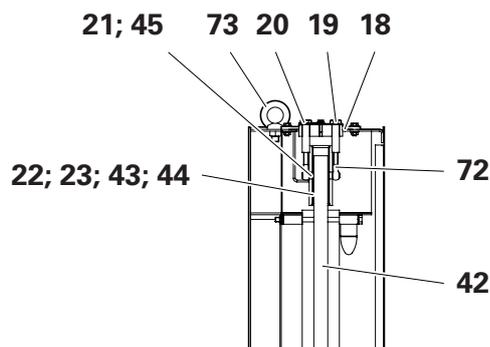
Wearing part

ZA04 Reciprocator - toothed wheel

18	Guide plate	386 588
19	Tensioning screws	386 596#
20	Locking plate	386 634
21	Toothed wheel spindle	386 766
22	Toothed wheel	386 600
23	Spacer ring - Ø 28/31 mm, 9x11 mm	386 618
42	Toothed belt	103 730#*
	ZA04-13 - L=4215 mm	
	ZA04-18 - L=5215 mm	
	ZA04-23 - L=6215 mm	
	ZA04-28 - L=7215 mm	
43	Bearing - Ø 15/32x9 mm	241 709
44	Snap ring - I-32	245 780
45	Snap ring - A-15	233 617
72	Eyebolt - M10x60 mm	264 202
73	Ring screw - M16	264 415

* Please indicate length

Wearing part

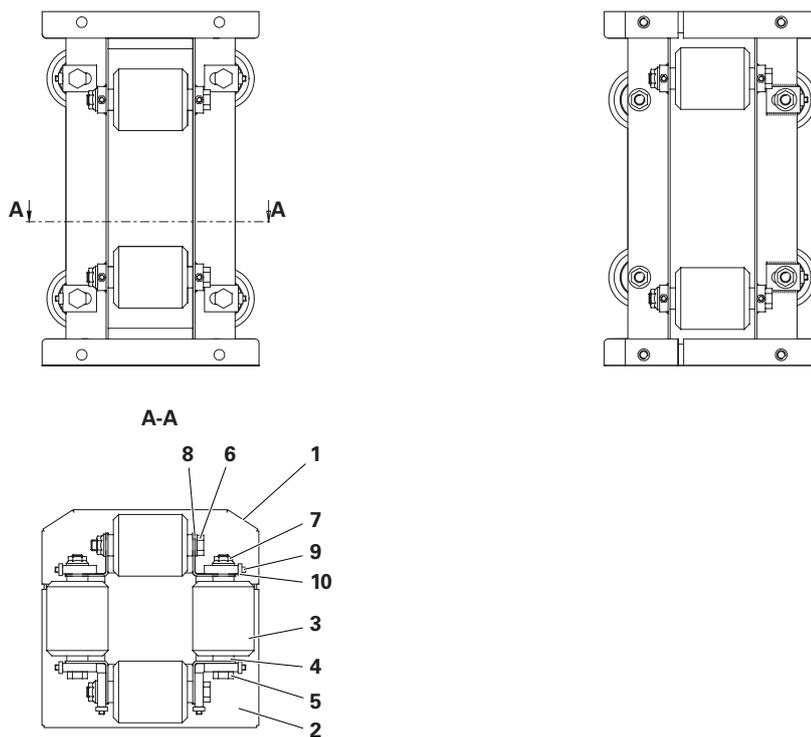


ZA04 Reciprocator - toothed wheel

ZA04 Reciprocator - Z carriage (complete)

1	Carriage - fixed side	386 677
2	Carriage - adjustable side	386 685
3	Roller - complete	307 165#
4	Spacer sleeve	308 013
5	Hexagon screw - M10x110 mm	214 221
6	Hexagon screw - M10x100 mm	214 213
7	Hexagon nut - M10, black	234 656
8	Washer - Ø 10,5x21x2 mm	215 821
9	Allen grub screw - M5x16 mm	237 744
10	Hexagon nut - M5	205 150

Wearing part



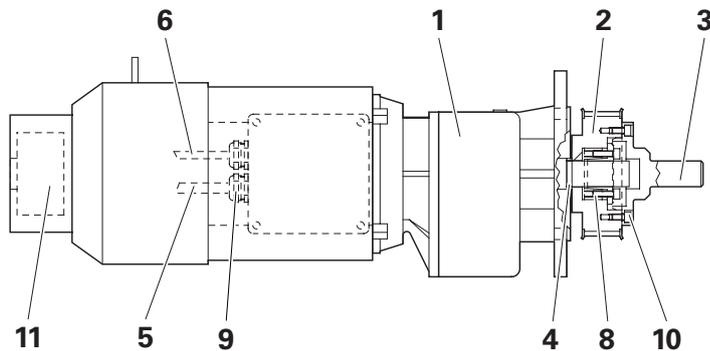
ZA04 Reciprocator - Z carriage (complete)

ZA04 Reciprocator - drive unit (complete)

1	Drive-gearbox unit (with pulse generator) - compl. (incl. pos. 9, without pos. 5 and 6)	396 001
2	Drive wheel - below	386 642
3	Bearing pin	386 650
4	Spacer ring - Ø 25,2/30x5 mm	386 626
5	Motor cable ZA04 - L=1,40 m	395 986
6	ZA04 brake connection cable	395 994
8	Tensioning set - Ø 25 mm, 50x22 mm	264 199
9	Stuffing box - PG16, Ø 8-15 mm	204 366
10	Hexagon cylinder screw - M6x12 mm	216 402
11	Pulse generator	268 925

* Please indicate length

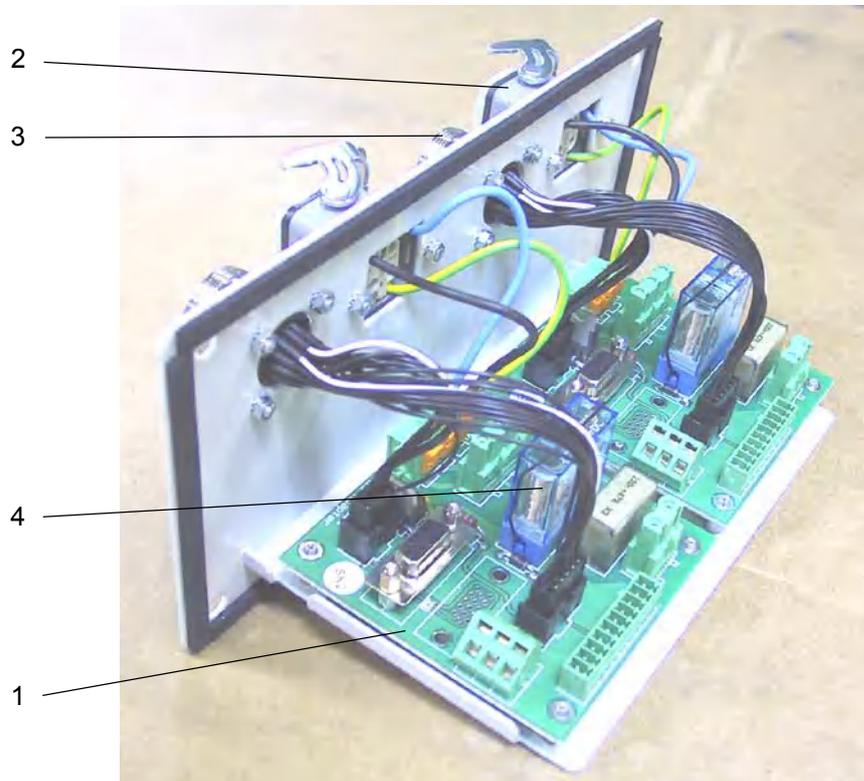
Wearing part



ZA04 Reciprocator - drive unit (complete)

ZA04 Reciprocator - electrical connections

1	Axis adapter - complete	1000 247
2	ZA04 power supply	1000 311
3	Drive I/O connection	1000 313
4	24VDC relay for motor brake	250 961
	ZA04 power supply cable - L=20m	1000 280
	ZA04 signal cable - L=20m	1000 281



ZA04 Reciprocator - electrical connections

ZA04 Reciprocator - frequency converter

1	Frequency converter - 1,1 kW/1,5 HP	268 810
2	Frequency converter mains connection	1000 312
3	Frequency converter signal connection	1000 314



ZA04 Reciprocator - frequency converter

ZA04 Reciprocator - gun holders



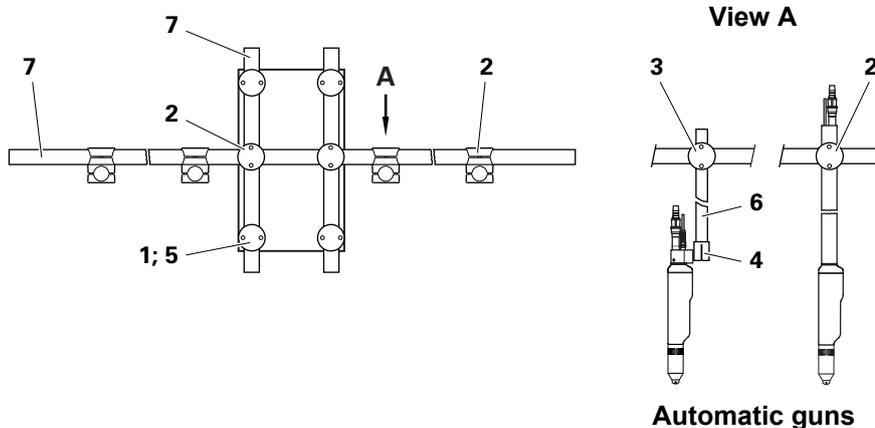
Notice:

The following examples show a possible configuration of gun holders. Please contact the ITW Gema Service Department in the case of special configurations!

Gun holder for 1-4 guns

1	Clamp element-half (order by pairs)	363 987
2	Cross clamping element - Ø 40/40 mm	363 910
3	Cross clamping element - Ø 40/30 mm	363 936
	Cross clamping element - Ø 30/30 mm	363 952
4	see gun fixtures etc.	
5	Allen cylinder screw - M8x50 mm	235 113
6	Tube - Ø 30x600 mm	337 528
	Tube - Ø 30x800 mm	337 536
	Tube - Ø 30x1000 mm	337 544
	Tube - Ø 30 mm	103 306*
6.1	Tube plug - Ø 30 mm, for pos. 6	236 373
7	Tube - Ø 40x600 mm	337 552
	Tube - Ø 40x1000 mm	337 560
	Tube - Ø 40x1500 mm	337 579
	Tube - Ø 40x2000 mm	337 587
	Tube - Ø 40 mm	103 314*
7.1	Tube plug - Ø 40 mm, for pos. 7	236 381

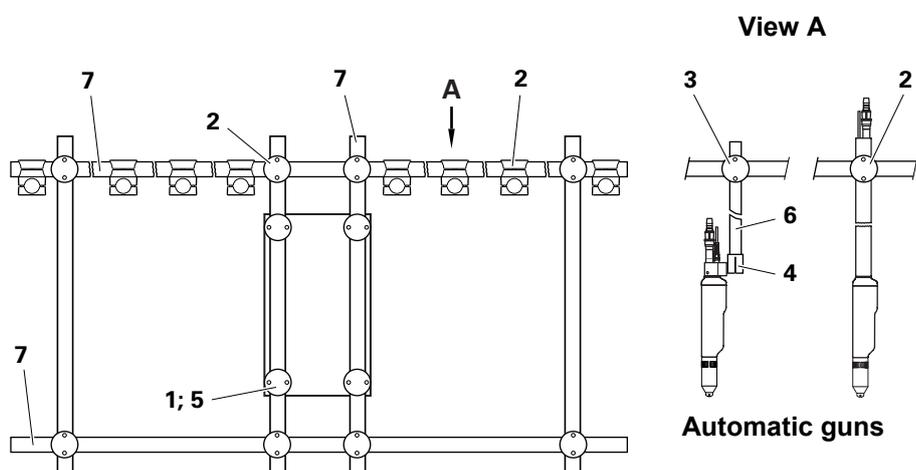
* Please indicate length



Gun holder for 5-8 guns

1	Clamp element-half (order by pairs)	363 987
2	Cross clamping element - Ø 40/40 mm	363 910
3	Cross clamping element - Ø 40/30 mm	363 936
	Cross clamping element - Ø 30/30 mm	363 952
4	see gun fixtures etc.	
5	Allen cylinder screw - M8x50 mm	235 113
6	Tube - Ø 30x600 mm	337 528
	Tube - Ø 30x800 mm	337 536
	Tube - Ø 30x1000 mm	337 544
	Tube - Ø 30 mm	103 306*
6.1	Tube plug - Ø 30 mm, for pos. 6	236 373
7	Tube - Ø 40x600 mm	337 552
	Tube - Ø 40x1000 mm	337 560
	Tube - Ø 40x1500 mm	337 579
	Tube - Ø 40x2000 mm	337 587
	Tube - Ø 40 mm	103 314*
7.1	Tube plug - Ø 40 mm, for pos. 7	236 381

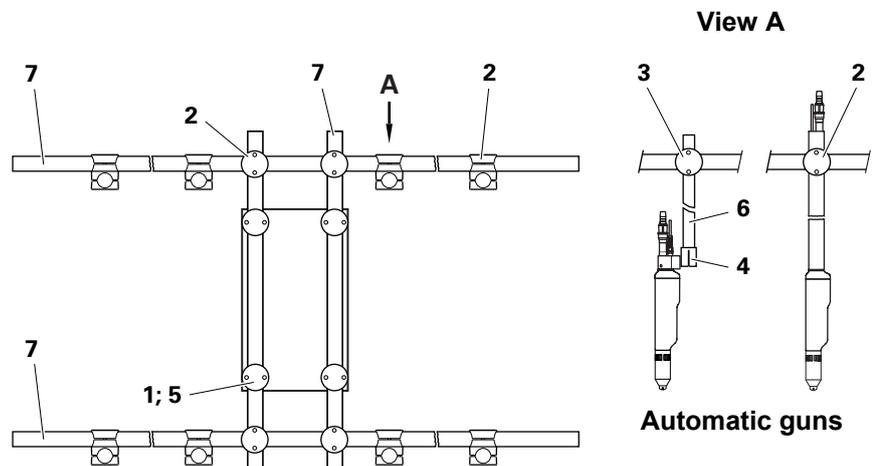
* Please indicate length



Gun holder for 2x1-4 guns

1	Clamp element-half (order by pairs)	363 987
2	Cross clamping element - Ø 40/40 mm	363 910
3	Cross clamping element - Ø 40/30 mm	363 936
	Cross clamping element - Ø 30/30 mm	363 952
4	see gun fixtures etc.	
5	Allen cylinder screw - M8x50 mm	235 113
6	Tube - Ø 30x600 mm	337 528
	Tube - Ø 30x800 mm	337 536
	Tube - Ø 30x1000 mm	337 544
	Tube - Ø 30 mm	103 306*
6.1	Tube plug - Ø 30 mm, for pos. 6	236 373
7	Tube - Ø 40x600 mm	337 552
	Tube - Ø 40x1000 mm	337 560
	Tube - Ø 40x1500 mm	337 579
	Tube - Ø 40x2000 mm	337 587
	Tube - Ø 40 mm	103 314*
7.1	Tube plug - Ø 40 mm, for pos. 7	236 381

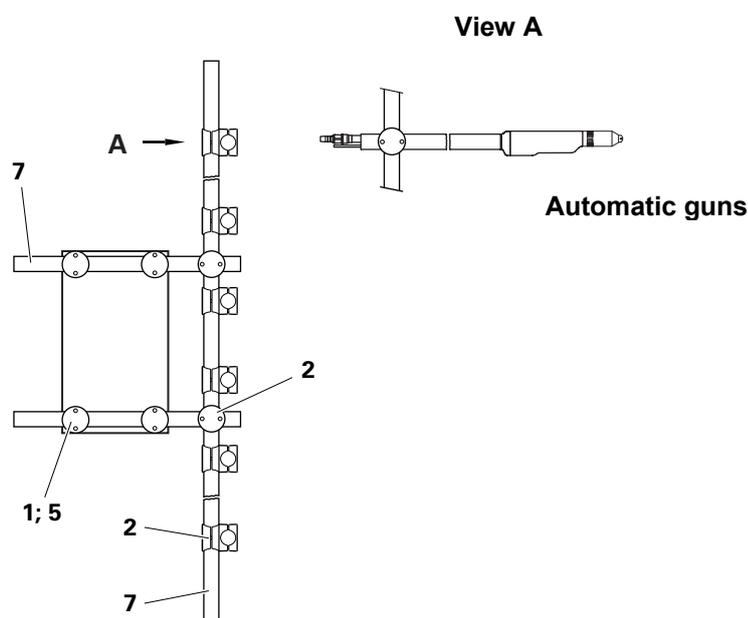
* Please indicate length



Vertical gun holder

1	Clamp element-half (order by pairs)	363 987
2	Cross clamping element - Ø 40/40 mm	363 910
3	Cross clamping element - Ø 40/30 mm	363 936
	Cross clamping element - Ø 30/30 mm	363 952
4	see gun fixtures etc.	
5	Allen cylinder screw - M8x50 mm	235 113
6	Tube - Ø 30x600 mm	337 528
	Tube - Ø 30x800 mm	337 536
	Tube - Ø 30x1000 mm	337 544
	Tube - Ø 30 mm	103 306*
6.1	Tube plug - Ø 30 mm, for pos. 6	236 373
7	Tube - Ø 40x600 mm	337 552
	Tube - Ø 40x1000 mm	337 560
	Tube - Ø 40x1500 mm	337 579
	Tube - Ø 40x2000 mm	337 587
	Tube - Ø 40 mm	103 314*
7.1	Tube plug - Ø 40 mm, for pos. 7	236 381

* Please indicate length

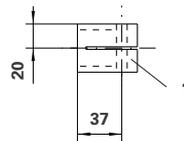


Gun fixtures and collision protection

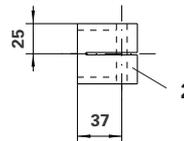
1	Gun fixture - Ø 30 mm	350 150
2	Gun fixture - Ø 39 mm (for plastic tube only)	354 317
2	Gun fixture - Ø 40 mm	1000 507
3	Gun fixture - Ø 40 mm (transverse)	356 670
4	Collision protection - Ø 30 mm (for ZA axis)	364 215
5	Blind piece complete - Ø 30 mm (for ZA axis)	364 231
6	Collision protection - Ø 30 mm (for YT axis)	364 223
7	Blind piece complete - Ø 30 mm (for YT axis)	364 240

Gun fixtures

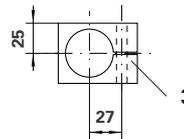
Ø 30



Ø 39/Ø 40

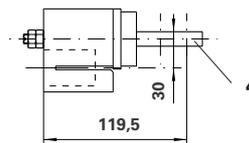


Ø 40

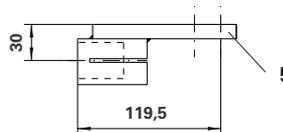


Collision protections

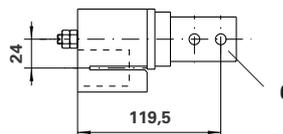
Ø 30



Ø 30



Ø 30



Ø 30

