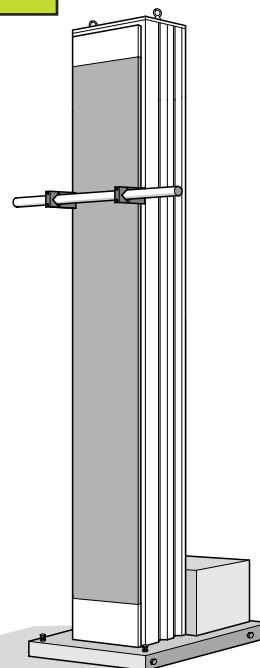




From February 1st, 2017 SAMES Technologies SAS becomes SAMES KREMLIN SAS  
*A partir du 1/02/17, SAMES Technologies SAS devient SAMES KREMLIN SAS*



DES00132

# User manual

## Reciprocator RFV 2000

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# Reciprocator RFV 2000

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## 1. Health and safety instructions



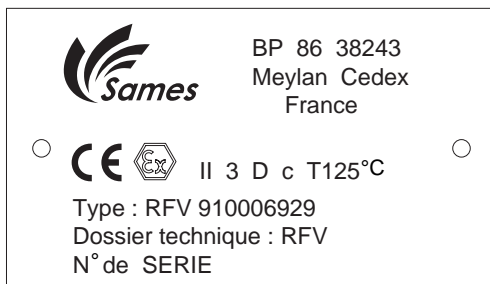
**WARNING :** This document contains links with the following manuals:

- [see RT Nr 6316](#) for the “installation” manual of REV 600 (control module).
- [see RT Nr 6317](#) for the “operator” manual REV 600 (control module).
- [see RT Nr 6364](#) for the electric systems
- [see RT Nr 7025](#) for the RFV reciprocator in and out positioner.

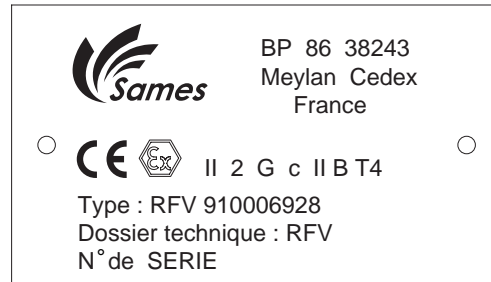
### 1.1. Configuration of the certified equipment

The whole of these user manuals defines the configuration of the certified equipment.

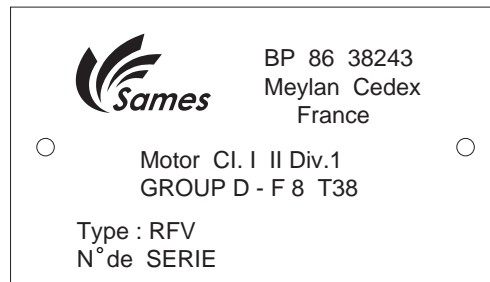
### 1.2. Marking RFV Reciprocator (Europe and USA)



**Europa : Powder**



**Europa : Liquid  
paints**



**USA**

DES04380

### 1.3. Precautions for Use

This document contains information that all operators should be aware of and understand before using this material. This information highlights situations that could result in serious damage and indicates the precautions that should be taken to avoid them. The equipment must only be used by personnel trained by SAMES Technologies

## 1.4. Warnings



**WARNING :** Safety may be jeopardized if this equipment is not operated, disassembled and reassembled in compliance with the instructions given in this manual and in any European Standard or national safety regulations in force.



**WARNING :** Equipment performance is only guaranteed if original spare parts distributed by SAMES Technologies are used.



**WARNING :**

This equipment has to be used only within areas designed for spraying with respect to EN 50176, EN 50177, EN 50223, or with similar ventilation conditions. The equipment has to be used only within ventilated in order to reduce risks for the health of the operators, fire or explosion. The efficiency of the extraction ventilation system has to be daily checked.

Within explosive atmospheres produced by the spraying process, only appropriate explosion-proof electrical or non-electrical equipment has to be used.

**Before carrying out any cleaning or general work in the spraying area, the high voltage generator must be switched off and the atomizer HV circuit discharged to the ground.**

The pressurised coating product or the pressurised air must not be directed towards people or animals

Appropriate measures have to be taken to avoid, during periods when the equipment is not used and/or when the equipment is broken, the presence of potential energy (liquid or air pressure or electric) inside the equipment.

The equipment must be serviced regularly in accordance with the information and instructions given by SAMES Technologies.

Cleaning operations must be carried out either in authorised areas equipped with a mechanical ventilation system, or using cleaning liquids with a flash point at least 5 °C higher than room temperature.

Only metal containers can be used for cleaning liquids and they must have a reliable ground connection

Inside the booth it is forbidden to use a naked flame, glowing object or a device likely to produce sparks.

It is also forbidden to store inflammable products, or vessels that have contained them, close to the booth.

The surrounding area must be kept clear and clean.

In addition, a careful check must be made to ensure that any conducting or semi-conducting part closer than 2.5 m to the atomizer is correctly grounded.

If it is not, electrical charges capable of causing sparks could build up on it. Operating personnel must wear anti-static shoes and gloves to avoid this risk.

Grounding is mandatory for all the conductive envelops of the electrical equipments and for all the conductive components within explosive atmospheres by conductive connection with the ground terminal.

Finally, for the same reasons, the spraying area must have an anti-static floor, such as concrete, metal duckboard, etc...

It is essential to provide sufficient ventilation in the spraying booths to avoid the build up of inflammable vapors.

Additional equipment has to be placed outside the dangerous area and its starting device has to be servo-controlled to the running mode of the booth aspiration fan. The correct working of the servo-control has to be checked once a week.

## 1.5. Important Recommendations



**WARNING :** The RFV reciprocator must be imperatively connected to the ground. (Connection is made on the plate of connection of the RFV).

### 1.5.1. Zones of use of RFV 2000 reciprocators

**Three cases are to be distinguished:**

- **The RFV equipped with a motor marked II3D:** it must be used only for the installations of non conductive flammable powder in zone 22 according to the European regulation.
- **The RFV equipped with a motor marked II2G:** it must be used only for the installations of flammable painting in zone 1 or 2 according to the European regulation.
- **The RFV equipped with a USA motor marked Motor I II Div.1; Groupe D. F8. T38:** it can be used for the installations of powder and liquid painting in explosive atmosphere (Zone Division 1) in the USA



**WARNING :** Any different use not complying with the rules stated above is prohibited.

### 1.5.2. Reciprocator installation

The RFV reciprocator must be installed on a flat ground and having a resistance of 40 daN/cm<sup>2</sup>.

It is preferable to balance the loads on both sides reciprocator; in the event of impossibility, carries it to acceptable overhang does not have to be higher than 35 cm since the axle of the robot.

If the load is overhanging forwards robot, the distance from the centre of gravity of the latter compared to the tube of fixing should not in no case to be higher than 10 cm.

The permissible loads are 25 Kg at a speed equal to 60 m/min for the robots dedicated to the installations of liquid paints and for the High speed robot for powder, and 50 kg at a speed of 25 m /min (for the robots dedicated to the installations of powder).



**WARNING :** When the RFV is under operation, the back cap of the RFV must be installed and imperatively fixed correctly.

### 1.5.3. Maximum speed of the reciprocator

Reciprocators **RFV used for the powder** (except the High speed robot for powder) have a speed equal to 25 m/min with a frequency of 50Hz.

Reciprocators **RFV used for liquid paints, the RFV intended for the USA and the High speed RFV used with powder** have a speed equal to 60m/min with a frequency of 50Hz.



**WARNING :** The access of the working area when a high speed RFV for powder is used, will have to be regulated and/or limited with a grid enclosure of standardized protection.



**WARNING :** The guarantee does not cover the damage resulting from a higher reciprocating speed.

### 1.5.4. Vibrations of the reciprocator

If the robot vibrates in an unusual way, that generally means:

- Defective or badly rollers
- Slackened or used drive chains.
- Too important and/or too off-centered loads Charges trop importantes et/ou trop excentrées (overhang too important).



**WARNING :** The guarantee does not cover the damage generated by loads and/or with an overhang higher than those recommended.

### 1.5.5. Ventilation

Do not begin applying paint with the RFV reciprocator before starting up the ventilation system in the spraying booth. If the ventilation is cut, toxic substances such as organic solvents or ozone may remain in the spraying booth, resulting in a risk of fire, poisoning or irritation.

### 1.5.6. Safety devices

RFV reciprocators used for liquid paints (Europa and USA) must be placed in an enclosure surrounded by a wire fence or a booth whose accesses are controlled.

### 1.5.7. Mechanical Collision

The guarantee does not cover damage resulting from the operating environment (for example collision with the booth, or parts to be painted...).

### 1.5.8. Ambient Temperature

The sprayer is designed to work normally under room temperature between 0°C and + 40°C.

### 1.5.9. Sound level

The acoustic pressure level, continuous, equivalent, weighted, equals to 70 dBA.

#### **Conditions of measurement:**

Measures were taken on a reciprocator at the laboratory of powdering of SAMES Technologies on the site of Meylan in France.

#### **Method of measurement:**

The values measured under the maximum conditions of use, were taken to 1 meter of the robot and a 1,6 m height over some 30 seconds periods.



#### 1.5.10. Specific maintenance provisions

The access of the booth, near the reciprocator in operation, will have to be proscribed and controlled by safety devices which will have to stop the equipment in case of intrusion of people in the area. Nevertheless, for maintenance operation, these safety devices will have to be arranged in order to allow certain operations and checks (only for persons trained and entitled by Sames Technologies).

#### 1.6. Guarantee

Under the guarantee, which applies only to the buyer, **SAMES Technologies** agrees to repair operating faults resulting from a design fault, materials or manufacture, under the conditions set out below.

The guarantee claim must define, in writing, the exact nature of the fault concerned.

The **SAMES Technologies** guarantee only covers equipment that has been serviced and cleaned according to standard procedures and our own instructions, that has been fitted with parts approved by SAMES or that has not been modified by the customer.

More precisely, the guarantee does not cover damage resulting from:

- customer's negligence or inattentiveness,
- incorrect use,
- failure to follow the procedure
- nonrespect of recommended maintenance.
- use of a control system not designed by SAMES Technologies or a SAMES Technologies control system modified by a third party without written permission from an authorized SAMES Technologies technical agent,
- accidents such as: collision with external objects, or similar events,
- flooding, earthquake, fire or similar events,
- exceeding the maximum speed according to the type of reciprocator,

SAMES Technologies reciprocator type **RFV** is covered by a one-year guarantee for use in two 8-hour shifts under normal operating conditions.

The guarantee will take effect from the date of the first startup or of the provisional acceptance report. In the absence of document, the general conditions of sale apply.

Under no circumstances, either in the context of this guarantee or in other contexts, will **SAMES Technologies** be held responsible for physical injury or intangible damage, damage to brand image and loss of production resulting directly from its products.

## 2. Field of Use and Possibilities

Electronically controlled reciprocator **RFV** is designed for use with automatic powder spraying or electrostatic paint atomizing facilities. It is used to drive vertical reciprocal movement of powder spray guns or paint atomizers such as:

- ten **Auto Mach-Jet** powder spray guns,
- four **Inobell** powder projector (Powder robot version High speed)
- two **PPH 607** paint atomizers,
- four **PPH 308** paint atomizers,
- four **TRP 501, 502, PIV 660, PRT 101** paint spray guns.

To provide the required thickness of powder or paint deposit over the entire height of the object to be coated, the speed can be varied throughout the stroke with speed settings close to the ends of the stroke set separately from those of the central part. The position of the two speed change points can be set separately between the middle of the stroke and the reversal point. It is of course possible to set a constant speed for the entire stroke. (The speed can be set to match the type of control electronics).

In the case of a use with a booth, to avoid the crushing of members (fingers, hands...) between the projectors and the booth, it is imperatively necessary to install and regulate the limit stop to the parts high and low of the stroke.

The speed of the reciprocator specific to powder is limited to 25m /min does not generate shocks for the people, on the other hand this risk is high for the reciprocators used for the installations of liquid paints (60 m /min). Respect the precautions of installation imperatively.

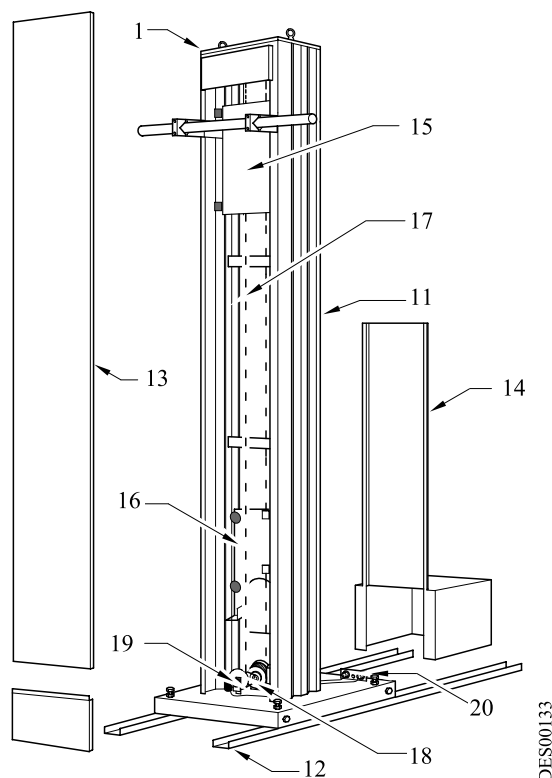
### 3. Components

The **RFV** is made of a mechanism remote controlled by a REV600 in a stand-alone unit or in an electrical cabinet. The system can also be controlled by PLC. The cables are delivered in a standard length of 15 m. A longer cable for a specific facility can be supplied on request.

The mechanism (1) is contained in a frame (11) comprising a vertical case and a horizontal base fitted on rollers that allow it to move along two guide rails (12) (in option) on the floor. The assembly is closed by a front panel (13) and rear cover (14).

The case forms a rolling track along which the carriage (15) moves. This carriage supports the spraying equipment and a counter-weight for balance (16). The carriage is driven by a transmission chain (17), an asynchronous three-phase electrical motor and a reduction gear assembly (18). A potentiometer (19) is used to control the reciprocating movement according to the control equipment settings.

**Mechanical stop units making it possible to limit the stroke can be installed either on the up and down carriage (limitation of the low stroke), or on the counterweight carriage (limitation of the high stroke), or on both.**



## 4. Characteristics and Dimensions

Stroke setting*	0.6 to 2 m
Reciprocating speed	continuously adjustable
Powder	25 m / min maxi.
Liquid paints (Europa, USA model) and Powder version High Speed (Europa)	60 m / min maxi.
<b>Permissible load</b>	
Powder reciprocator	50 kg
Reciprocators for Liquid paints and powder High speed	25 kg
Permissible overhang	0.30 m
Movement along floor	0.9 m
<b>Power according to the gear-motor used</b>	
Gear-motor Europa used with powder	0,375 kW
Gear-motor Europa used with liquid paints	0,75 kW
Gear-motor Europa used with powder paints version, High speed reciprocator	0,75 kW
Gear-motor USA	0,75 kW
Power supply: single-phase	220 V
Frequency	50 or 60 Hz
Support bar diameter	dia. 50 mm
Lifting ring	dia. 28 mm

\* Special versions for other values.

### 4.1. Overall Dimensions

Mechanism

	<b>2000-mm stroke</b>	<b>2900-mm stroke</b>
Overall height	3.03 m + lifting ring + (*).	3.93 m + lifting ring + (*)
Occupied floor area	0.55 x 0.70 m.	0.75 x 0.85 m
No-load weight	approx. 230 kg	
<b>Gear-motor weight</b>	to add to the no-load weight	
Powder Europa version	14 Kg	
High speed Powder Europa version	20 Kg	
Liquid Europa version	19 Kg	
USA version	47 Kg	

\* Add 0.14 m for the positioning carriage.

## 5. Unpacking

- Cut the bands securing the carriage in low position.
- Remove the inserts separating the front panel from the case.
- Screw on the bar support caps.

## 6. Installation

Once the location for the mechanism and control unit has been determined, the guide rails can be secured to the floor (option, 6 screws  $\varnothing$  8 to 10 mm and plugs) and the unit placed on a support. Whenever possible, restrict the length of the electrical connection between the mechanism and the unit to 15 meters.

The unit must be placed horizontally from more than one meter from the spraying zone (zone 21 for powder, zone 1 for paint and zones defined by the customer), eliminating as much dust as possible: do not cover the unit as some components give out heat.

Do not install close to spark-producing equipment (large circuit breaker, spot or arc welders, etc.).

The mechanism can be locked on its guide rails using the four M12 screws at the front and rear of the base (20).

### 6.1. Electrical connections between reciprocator mechanism and control module

Electrical connections are made as follows:

- With a plug for the potentiometer.
- Through 2 cable glands for the motor (supply and thermic sonde).
- With a brass screw for ground.

#### 6.1.1. Motor connection

The motor is connected with a 4G 1,5 mm<sup>2</sup> flexible shielded cable minimum voltage 750V. Connections find themselves in the motor box through the cable gland on U, V, W and ground terminals (standard configuration).

The connection of the thermic sonde is made with a 1 mm<sup>2</sup> flexible cable not shielded. Connections are made in the motor box through the cable gland on terminals.

#### 6.1.2. Potentiometer connection

The potentiometer is connected with a 0,75 mm<sup>2</sup> flexible shielded cable and connections are made through the plugs installed for that.

#### 6.1.3. Ground connection

Through green/yellow protective conductor of motor cable connected to ground of motor. Ground is connected to ground bar of the control cabinet or to the ground screw of the control module.



**WARNING : the cabinet or the module must be connected to a good quality ground.**

#### 6.1.4. Equipotential connection

The ground terminal of the reciprocator mechanism (M6 brass screw located on the reciprocator near terminal glands) must be connected to ground terminal of control cabinet or to ground screw of the control module through a mini 4 mm<sup>2</sup> green/yellow conductor.



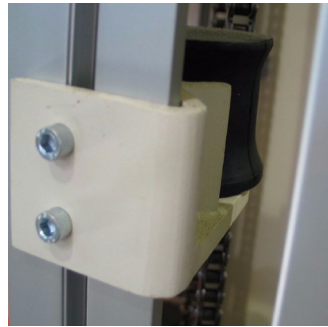
**WARNING : it is absolutely essential to respect the equipotential cabling between control module and reciprocator with the recommended size. Failure to do so may result in equipment damage.**

## 6.2. Adjustment of thrusts

The high thrusts limit the stroke of the up and down carriage.

Procedure of adjustment of the two high thrusts which limit the low stroke of the robot:

- **Step 1:** remove both lower side panels.
- **Step 2:** using a 5 mm allen wrench, loosen the two screws of the first thrust .
- **Step 3:** place the thrust at the desired height, tighten the two screws.  
Proceed in the same way for the second thrust.
- **Step 4:** Put back in place the side covers.



The low thrusts limit the stroke of the counterweight carriage.

Procedure of adjustment of the two low thrusts which limit the high stroke of the robot.

- **Step 1:** Remove the cover motor side.
- **Step 2:** using a 14 mm flat wrench, loosen the two nuts of the first thrust.
- **Step 3:** place the thrust at the desired height, tighten the two nuts.  
Proceed in the same way for the second thrust.
- **Step 4:** Put back in place the cover motor side.



**WARNING :** The two low thrusts must be placed at the same height, idem for the two high thrusts.

## 7. Loading the Reciprocator

Powder spraying and paint atomizing equipment must be secured using suitable fastening systems to the bar which is also secured to the reciprocator carriage. This bar can be set in two positions on the carriage with a height difference of 250 mm. To change the position, remove the front panel (pull upwards after removing the four M8 screws) and move the two bar supports (two M12 bolts). Make sure these bolts are tightened when reassembling. For efficient operation of the mechanism:

- the distribution and the overhang of the permissible loads are respected ([see § 1.5.2 page 7](#)).
- the weight of the carriage, with the spraying equipment fitted and with cables and hoses connected, should be carefully balanced by adjusting the counterweight ballasts. Ballasts can be added or removed by taking off the front panel. Each ballast weighs approximately 3 kg. After adjustment, tighten the two securing nuts (M12) firmly. During transport, the ballasts are bolted to the side of the mechanism. Store unused ballasts in the same way.

## 8. Frequent Maintenance Operations

### 8.1. Mechanism

Remove the rear cover 14 and the front panel 13.

After the first 100 and 200 hours, then every 1000 hours (or twice a year):

- Check the chain tension and correct it if necessary:
  - main chain: the damping springs must be compressed by about 4 mm from their free length. Adjust the tension by turning the M12 chain tensioner nuts on the upper part of the carriage and/or adjusting the counterweight (dimension 42 mm to be respected [see § 12.7 page 24](#)). Adjust each tensioner by roughly the same amount.
  - potentiometer drive chain: If the arrow between the two pinions is higher than 5mm, tighten the potentiometer unit fixed on the support of the reciprocator. The tension can be altered by moving this support on the mechanism base (two M8 screws).
- Check that the rollers turn freely:
  - Carriage rollers: the lower set of rollers at the front and the upper set at the back support a load due to the overhang of the spraying equipment: they should not turn freely. However, the lower set at the back and the upper set at the front should turn freely without excessive play. Check this at different points of the carriage stroke because the track could be slightly deformed as a resulting of welding.
  - If necessary, modify the roller position as follows: slightly loosen the M12 screw on the roller axle, securing the eccentric nut using a flat 27 mm wrench turn until the setting is correct. If necessary, rectify after checking.
  - Counterweight rollers: these rollers should turn freely without excessive play all along the stroke. The adjustment procedure is the same as that for the carriage rollers.
- Motor-gearbox maintenance:
  - See manufacturer manual.
- clean the chains with a rag for example, possibly soaked in oil if the deposits are dry; oil them thoroughly with a liquid oil (SAE 10 to 30). Also oil the two chain fasteners passing through the damping springs and their bronze guides as well as the bronze bushes supporting the shaft of the potentiometer drive sprocket (item 26 [see § 12 page 19](#)). Run the mechanism for a few hours so that cleaning is improved by the excess oil. Wipe the chains again, and also the parts of the mechanism soiled by dirty oil (especially the rolling tracks of the carriage and counterweight rollers). Oil the chains again lightly with the same oil.
- Clean the motor blades and the fan cover, using, for example, a cloth lightly soaked in solvent and a screwdriver. If necessary, remove the cover to clean the chamber and turbine.
- The roller and upper sprocket bearings are greased for more than 10,000 hours of operation and do not require any maintenance other than cleaning the outside.



**WARNING : The counterweight must always be firmly secured before dismantling the chain.**

Proceed as follows, having first taken spraying equipment off the reciprocator and out of the booth:

- set the spray gun carriage in its centered position,
- secure the counterweight by introducing a screwdriver or an object of diameter 4 to 5 mm and length: 100 mm and place a cleat (100 X 100 and height approximately 700 mm) between the counterweight carriage and the support of the reciprocator.

The drive chain can now be slackened and removed.

- For reassembly, carry out the procedure in reverse order.

## 9. Troubleshooting

Symptom	Cause	Corrective Action
The reciprocator operates but there is a rattle when the movement changes direction.	The main chain is slack and the chain fastener strikes the counterweight ballast.	Tighten the chain.
	The locking nuts of the counterweight ballasts or bar supports are loose.	Tighten the nuts.
	The damping springs are broken.	Change them.

## 10. Replacing the potentiometer

After 3000 to 5000 hours of operation, or following accidental damage, it may be necessary to replace the control potentiometer (Item 1 [see § 12.8 page 25](#)). Caution: the potentiometer is very fragile, especially its connection terminals.

### 10.1. Description

The potentiometer is supported by its shaft which fit into the bored shaft of the take-up sprocket where it is locked by a two radial screws. A stop pin on the support prevents the potentiometer case from turning, so that the cursor moves in relation to the track.

Three CHc screws are used to secure the case to its support.

The three terminals of the potentiometer are marked 11, 12 and 13 on the case. Number 12 is connected to the cursor.



## 10.2. Replacing the Potentiometer

- Unplug the potentiometer connector.
- Loosen the 2 radial screws closest to the potentiometer, which lock its shaft. Remove the shaft.
- Caution: the 2 BTR screws closest to the drive sprocket must not be loosened.
- Remove the potentiometer from its support by loosening the 3 CHc securing screws.
- Fit the new potentiometer on the support. Check the positioning pin.
- Set the new potentiometer on the mechanism, making sure that the positioning pin enters the groove on the support. Lock the shaft by tightening the 2 radial screws.
- Connect the new plug.

### 10.2.1. Setting the Potentiometer Angle

Angular calibration of the potentiometer is carried out in the factory.

The purpose of this is to set the angular stroke of the cursor in relation to the end positions of the circular track of the potentiometer. If it is accidentally offset, it should be re-adjusted as follows:

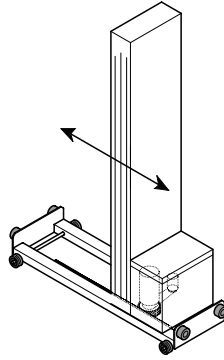
- Place the up and down carriage in high position.
- Place a pin or a screwdriver (diameter 4 to 5 mm) in one of the two holes located on the sides of the RFV.
- Position the up and down carriage against the screwdriver.
- Loosen the two BTR screws closest to the drive sprocket.
- Direct downwards the pin off-centred from the potentiometer axis.
- With the help of a spirit level, adjust the coupling as follows:
  - Place the spirit level on the flat face of the coupling opposite to the potentiometer pin.
  - Pay attention that it is correctly horizontal.
- Tighten the 2 BTR screws.
- Refit the connector.



**WARNING** : The potentiometer may be damaged by overcurrent (max. 10 mA). Check that the type of ohmmeter used does not exceed this value during resistance measurements.

## 11. 2nd Axis Option

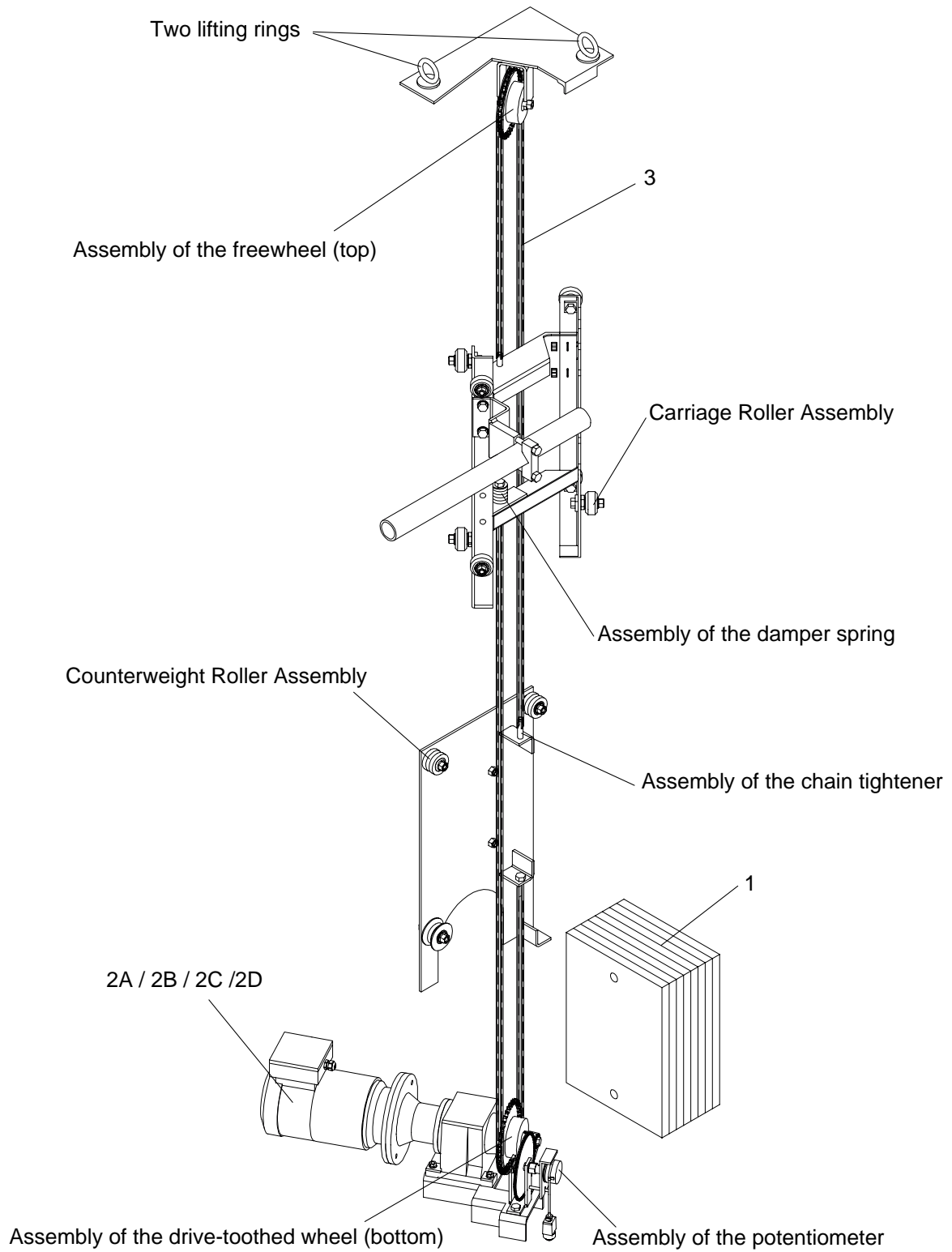
This option is used for movement perpendicular to the conveyor axis using a PLC.  
[see RT Nr 7025](#) user manual of the positioner.



DES00123

## 12. Spare Parts

### 12.1. RFV mechanism



DES02732

Item	Part number	Description	Qty	Unit of sale	Maintenance level for spare parts (*)
	910006928-XXX **	RFV 2000 European version liquid paints	1	1	-
	910006929-XXX	RFV 2000 European version powder paints	1	1	-
	910007410-XXX	RFV 2000 USA version	1	1	-
	910009354-XXX	High Speed RFV 2000 RFV 2000 European version powder paints	1	1	-
1	E013243	3 kg ballast	8	1	-
	900006166	4.4 kg lead ballast	option (8 maxi)	1	-
2A	900005141AT	Gear motor European version (powder)	1	1	2
2B	900008642AT	Gear motor European version (liquid paints)	1	1	2
2C	900001158	Gear motor USA version	1	1	2
2D	900006752AT	Gear motor European version powder, High speed robot	1	1	2
3*	K4CSRP737	Main chain: pitch: 12.7 length: 5.20m.	1	1	1

(\*) Level 1: Standard preventive maintenance

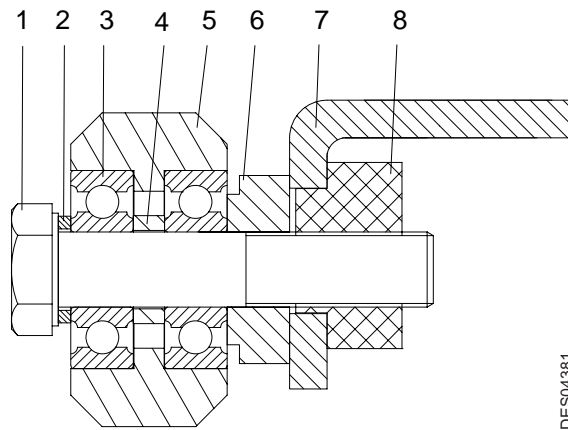
Level 2: Corrective maintenance

Level 3: Exceptional maintenance

\*\* XXX : stroke of robot

\* Quantity: 2 if the stroke is superior to 2000 mm.

## 12.2. Carriage Roller Assembly

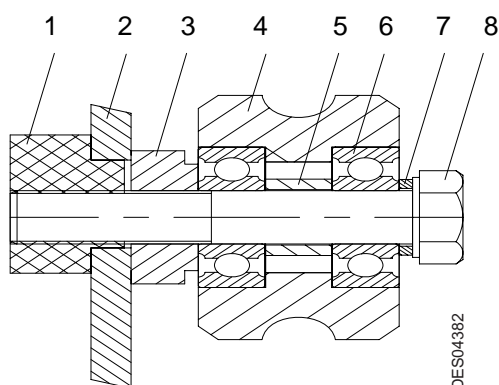


DES04381

Item	Part number	Description	Qty	Unit of sale	Maintenance level for spare parts (*)
1	250000002	Screw H M 12 x 60 steel 8/8	1	1	3
2	250000010	Flat washer 13x17x2	1	1	3
3	K6RKBR103	Roller bearing 6201-2Z	2	1	2
4	446513	Cylindrical spacer	1	1	3
5	C446511	Carriage roller	1	1	1
6	900000505	Spacer for roller	1	1	3
7	E013182	Front plate	1	1	3
8	900000540	Eccentric nut, carriage wheel	1	1	3

**Note :** Quantities mentioned above are given for 1 set of carriage roller. The RFV 2000 reciprocator is equipped with 8 sets of carriage rollers.

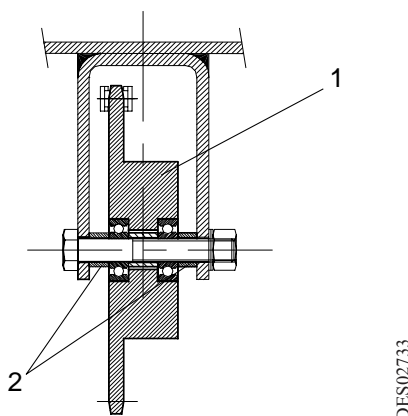
### 12.3. Counterweight Roller Assembly



Item	Part number	Description	Qty	Unit of sale	Maintenance level for spare parts (*)
1	900000540	Bushing	1	1	3
2	E013183	Back balance plate	1	1	3
3	900000505	Eccentric nut	1	1	3
4	C446512	Wheel	1	1	2
5	446508	Upper chain bushing	1	1	3
6	K6RKBR103	Ball bearing 6201-2Z	2	1	1
7	250000010	Flat washer	1	1	3
8	250000002	Screw, H M12 x 60	1	1	3

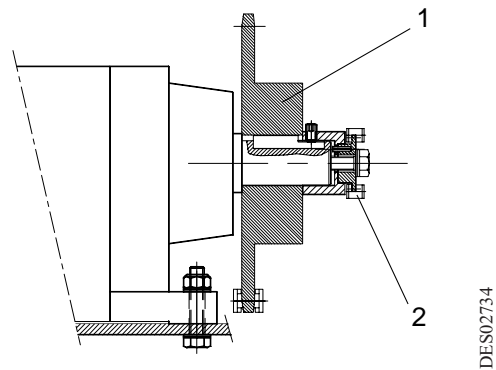
**Note:** the quantities mentioned above are given for a set of counter-weight rollers. The RFV 2000 reciprocator is equipped with 4 sets of counter-weight rollers.

### 12.4. Assembly of the freewheel (top).



Item	Part number	Description	Qty	Unit of sale	Maintenance level for spare parts (*)
1	446507	Chain wheel 2	1	1	2
2	446508	Cylindrical spacer	1	1	3

## 12.5. Assembly of the drive-toothed wheel (bottom)



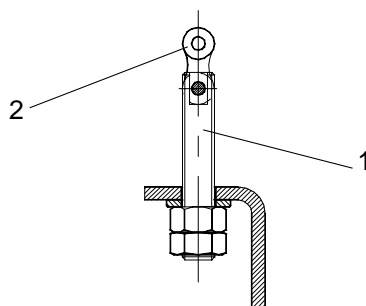
Item	Part number	Description	Qty	Unit of sale	Maintenance level for spare parts (*)
1	444185	Chain wheel 1	1	1	2
2*	900006725	Chain wheel 3	1	1	2

\* Adapter sets for special strokes:

Stroke	Drive sprocket	No. of teeth	Intermediate hub	Shaft adapter	Screws, HM 10	Nylstop nut
800	900006734	32	447270	-	X2BVHA332	-
900						
1000						
1100	900006733	26				
1200						
1300	900006732	22				
1400	900006731	21				
1500	900006730	20				
1600	900006729	19				
1700	900006728	18				
1800	900006727	17				
1900	900006726	16				
2000	900006725	15				
2100	900006724	13	447798	447799	-	X2BEHS008
2200						
2300						
2400						
2500	900006723	12				
2600						
2700	900006722	11				
2800						
2900	900006721	10				
3000						
3100						
3200						
3300						
3400						

For other strokes, contact Sames Technologies.

## 12.6. Assembly of the chain tightener



DES02735

Item	Part number	Description	Qty	Unit of sale	Maintenance level for spare parts (*)
1	446517	Chain tensioner	2	1	2
2	K4CATR738	Union link for 12,7-pitch chain	2	2	2

**Note:** the quantities mentioned above are given for 1 set of chain tightener. The RFV 2000 reciprocator is equipped with 2 sets of chain tighteners.

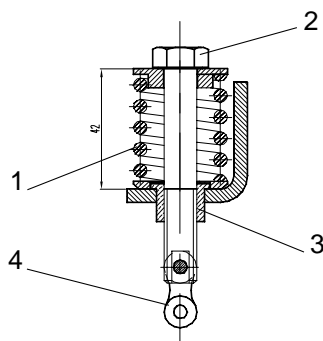
(\*)

Level 1: Standard preventive maintenance

Level 2: Corrective maintenance

Level 3: Exceptional maintenance

## 12.7. Assembly of the damper spring



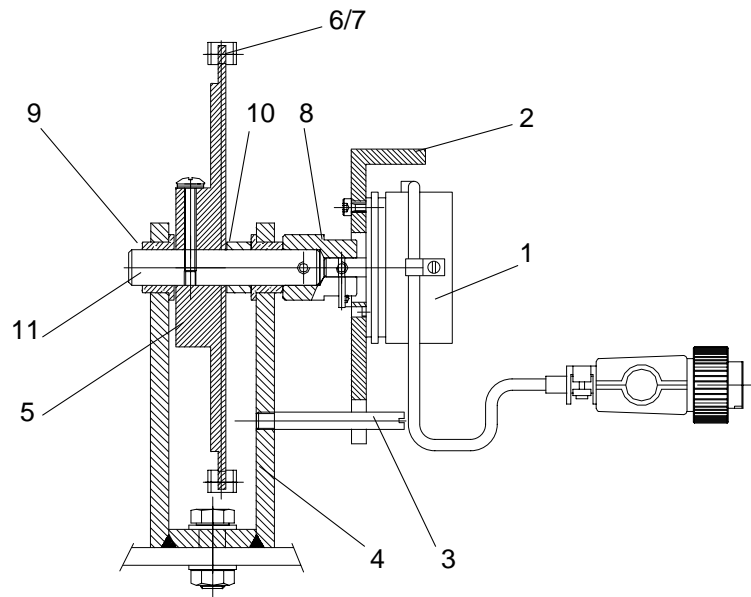
DES02736

Item	Part number	Description	Qty	Unit of sale	Maintenance level for spare parts (*)
1	446780	Damping spring	2	1	3
2	446557	Chain fastener	2	1	3
3	K6CABC033	Bronze bush	1 + 1	8	2
4	K4CATR738	Union link for 12,7-pitch chain	2	2	2

**Note:** the quantities mentioned above are given for 1 set of damper springs. The RFV 2000 reciprocator is equipped with 2 sets of damper springs.



## 12.8. Assembly of the potentiometer



DES02737

Item	Part number	Description	Qty	Unit of sale	Maintenance level for spare parts (*)
1	743678	Potentiometer + connector	1	1	1
2	446510	Potentiometer support	1	1	3
3	446561	Potentiometer stop	1	1	3
4	446527	Cover	1	1	3
5	900006720	Potentiometer take-up sprocket	1	1	2
6	K4CSRP810	Standard chain 6.35 mm	1	1	2
7	K4CATR217	Connecting link for chain 6.35	1	2	2
8	743855	Adjusting ring	1	1	3
9	K6CABC033	Bronze bush	1 + 1	8	2
10	446751	Cylindrical spacer	1	1	3
11	446504	Axle	1	1	3

(\*)

**Level 1: Standard preventive maintenance**

**Level 2: Corrective maintenance**

**Level 3: Exceptional maintenance**