



## ATS US-2000 WITH V5

Service Manual

Felins' US-based banding professionals provide full service and support for ATS banding systems.

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# SERVICE MANUAL



## US-2000 V5



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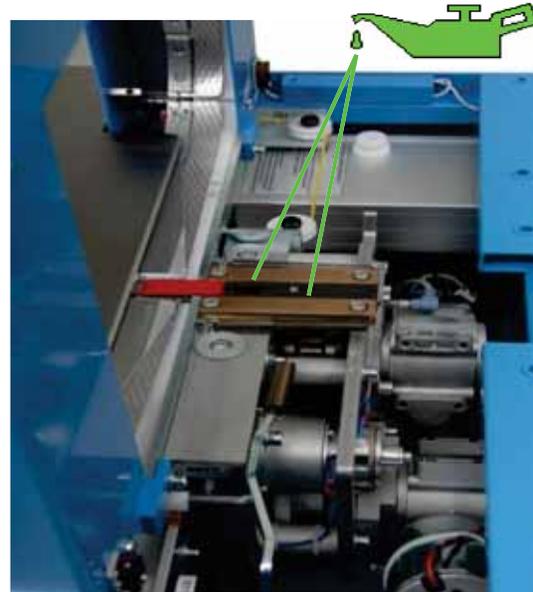
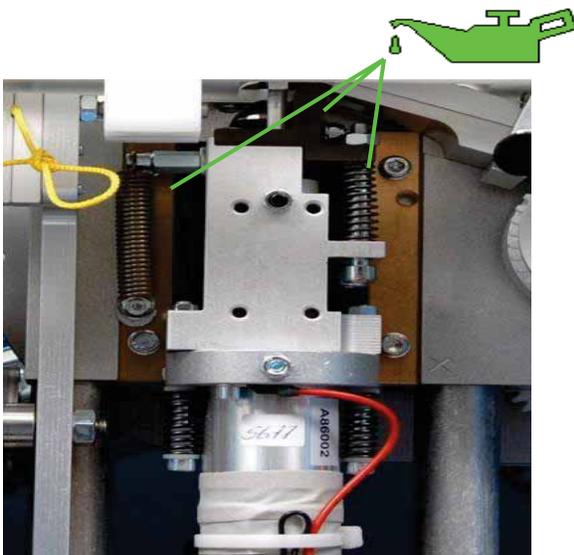
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## Maintenance

### 1. Maintenance

Maintenance work must be performed exclusively by authorised personnel. The machine must always be turned off and disconnected from the power grid prior to that!

The indicated maintenance interval refers to single shift operation in a normal environment.



#### 1.1. Monthly maintenance

**Procedure:**

1. Fold down the front panel.
2. Remove product guides
3. Remove rear table
4. Clean machine using compressed air or a vacuum cleaner.
5. Blow out the arch using compressed air.
6. One drop of oil each into the left and the right lead of the Anvil.
7. One drop of oil each into the left and the right lead of the sonotrode.
8. One drop of oil into the guide slot for the knife.

**Important:** Solvents or alcohol must never be used to clean the plastic arch

## Maintenance

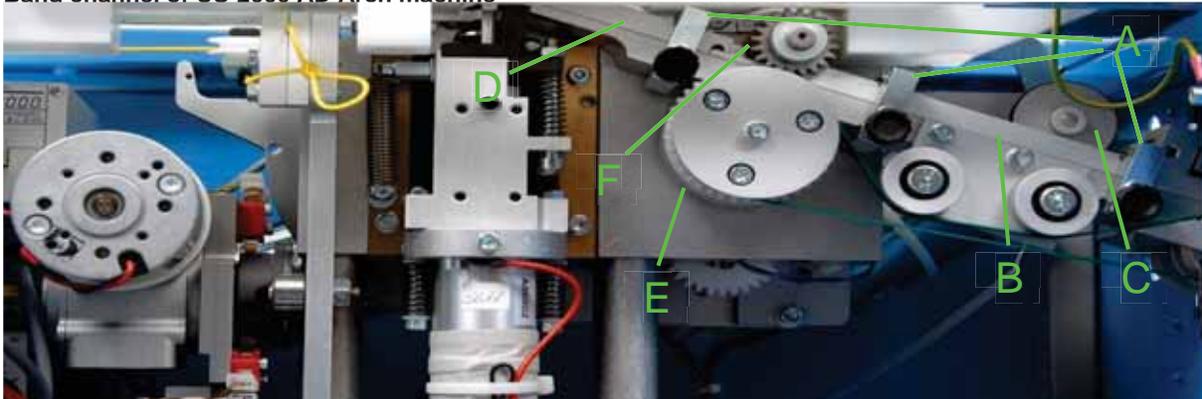
### 1.2. Cleaning of the band channel

**Procedure:**

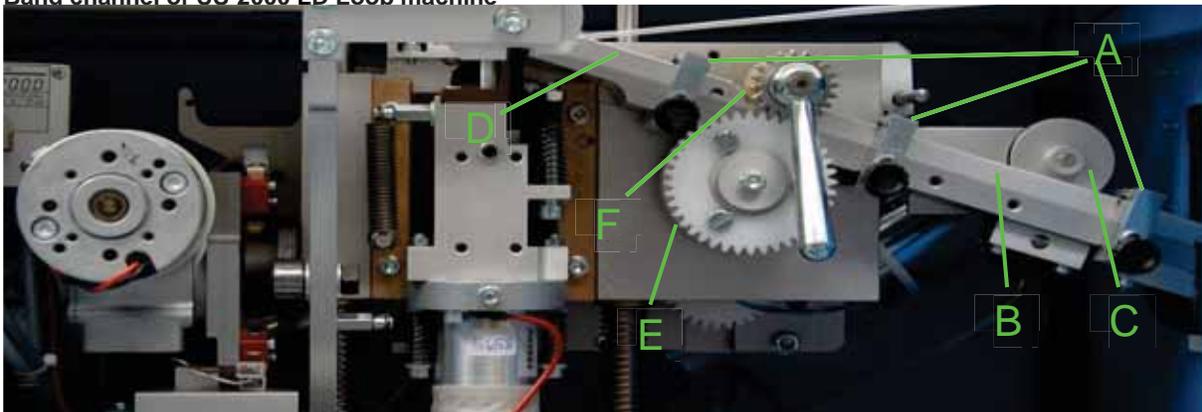
1. Remove the band from the arch by resetting the machine.
2. Operate the release lever and pull the start of the band out of the band channel.
3. Fold down the front panel.
4. Remove all three band channel quick release clamps (A).
5. Carefully move the right feed track cover (B) to the right while lifting the rotary encoder (C).
6. Carefully pull the left feed track cover (D) forward.
7. Carry out the cleaning: Band drive roll aluminum (E), rubber feed roller (F), feed track and feed track covers
8. Assemble in reverse order.
9. Thread the band according to instructions.

**Important:** Band channel incl. lid, rotary encoder, aluminum and rubber feed roller must in no case be cleaned using abrasive cleaning agents or other abrasive agents (e.g. file).

Band channel of US-2000 AD Arch machine



Band channel of US-2000 LD Loop machine



**Important:** When assembling the band channel quick release clamps (A) make sure that the knurled screws are at the bottom, as shown in the picture.

## 2. Mechanical settings

### 2.1. Rubber roller

When the tape is inserted and drawn back it is held between the rubber roller and the tape drive roller. The required clamping tension is adjusted with the set-screw, pushing on the excentric shaft. The rubber roller can be raised, by pushing down the release lever in order to ease off the tension when loosing up a tape jam (or inserting the tape on loop machines).

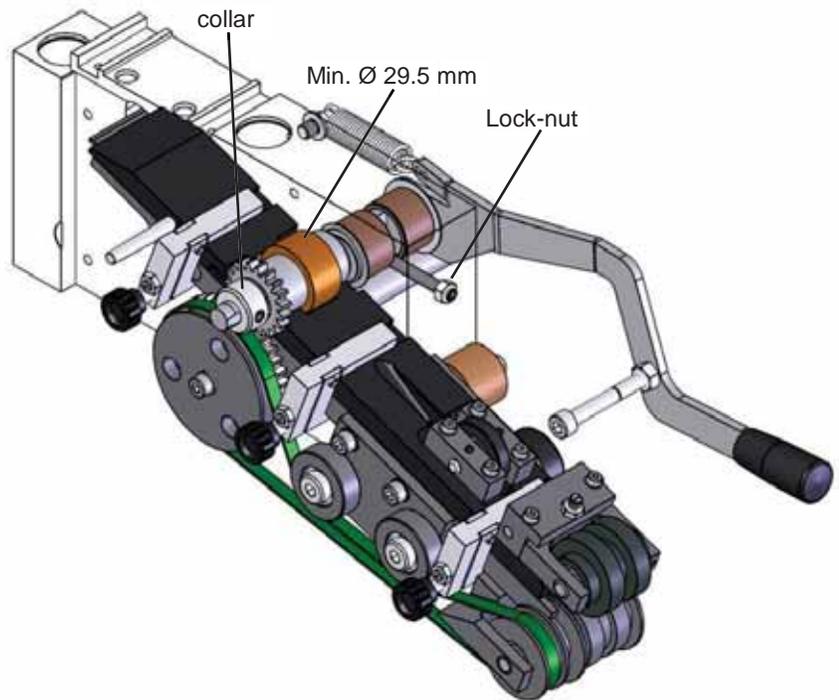
#### 2.1.1. Adjusting the rubber roller pressure

1. The rubber roller needs to be adjusted without any band between the rubber roller and feed roller > **remove all band from the track.**
2. Make sure the rubber roller and feed roller are clean
3. Loosen up the lock-nut on the set screw on the right side of the aggregate.
4. Turn the set-screw counter-clockwise until it does not touch the excentric shaft anymore.
5. Turn the set-screw clockwise until it touches the excentric shaft of the rubber roller.
6. Turn the set-screw clockwise by another ¼ turn.
7. Lock the lock-nut.

**Note:** The rubber roller should slightly touch the feed-roll. The rubber-roller needs to be replaced, as soon as it has reached a diameter of **Ø 29.5 mm**.

#### 2.1.2. Replacing the rubber roller

1. Remove collar and ring from the excentric shaft.
2. Remove the left and right track cover.
3. Remove the support bar (supporting the front table plate).
4. Remove the tension from the rubber roller, by pushing down the release lever.
5. Pull the rubber roller off the excentric shaft.
6. Mount the new roller in reverse order.
7. Adjust the pressure of the new rubber roller.
8. Note teh special washer between the collar and the rubber feed roller.



## 2.2. Encoder

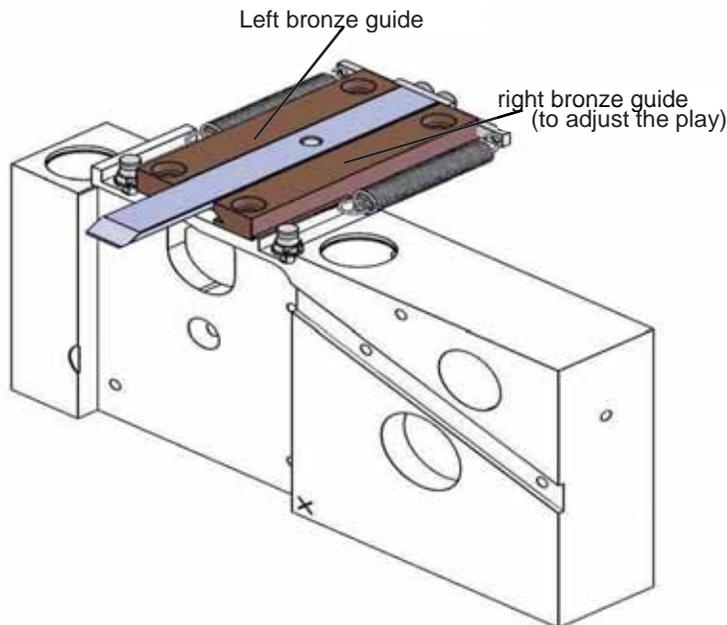
The encoder measures the band during the infeed and drawback of the band.

To ensure a constant over lap, the o-ring of the encoder should get replaced once a year.

The tension spring on the encoder applies pressure to the encoder wheel, so it does not jump on the band. The spring needs to be replaced if stretched.



## 2.3. Anvil



The anvil provides counter pressure for the clamp when the tape is pulled back and also for the Sonotrode during the welding process. The anvil moves horizontally to release the tape after welding.

### 2.3.1. Adjusting play of the Anvil

In order to have a good welding, the play of the anvil should be kept at a minimum when it is in the front position.

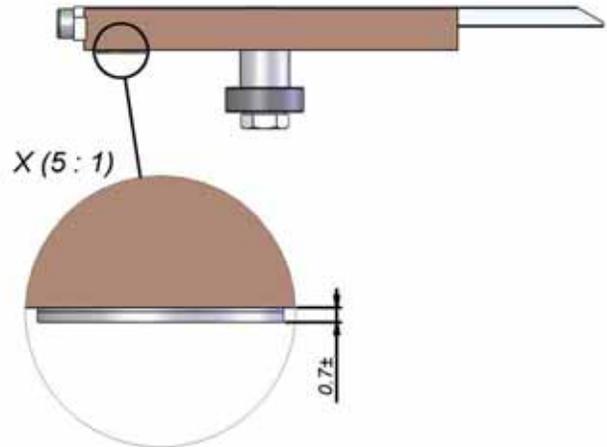
1. To check the play, the anvil must be in the front position and not clamped. > infeed position of the servicemode
2. The left guide is the reference and must be pushed all the way to the left (no gap between the aggregate and bronze guide) then tightened.
3. Adjust the play of the anvil with the right guide to a minimum but make sure that it does not get pinched as the anvil moves in the front position.
4. Check the play again after tightening all four screws. Even with only one spring it should pull the anvil back in the front position.
5. Reattach both springs. Make sure that the springs are rotated one-half turn to prevent them from getting stuck on the underside of the rear table.

**Note:** Always use the two shorter screws on the front side of the anvil.

### 2.3.2. Adjustment for a parallel weld

To achieve an optimum (even) seal, the angle of the anvil can be adjusted with shims underneath the back side of the anvil-guides.

1. Bring the machine with the service mode in the infeed position (anvil in the front but not clamped).
2. Remove all 4 screws from the bronze guides (Please note, that there are usually already shims underneath the guides).
3. Depending on what side you need to improve the sealing, remove or add shims on the back side of the guides (**Note:** only use precise grounded shims (**ATS-Order No: BN1976 6x12x0.5/ BN1976 6x12x0.2**).
4. Make sure you add or remove the same amount of shims on the left and the right guide.
5. Mount the guides with all 4 screws but do not tighten them yet.
6. Put the anvil all the way back between the guides.
7. Adjust the play of the anvil by following steps of section 2.3.1.
8. Check the sealing again for a parallel welding



*More shims in the back = more pressure  
Less Shims = less pressure*

**Note:** Only add shims on the back side of the anvil as shown in the picture. Shims in the front of the anvil could lead to an incomplete cutting of the band.

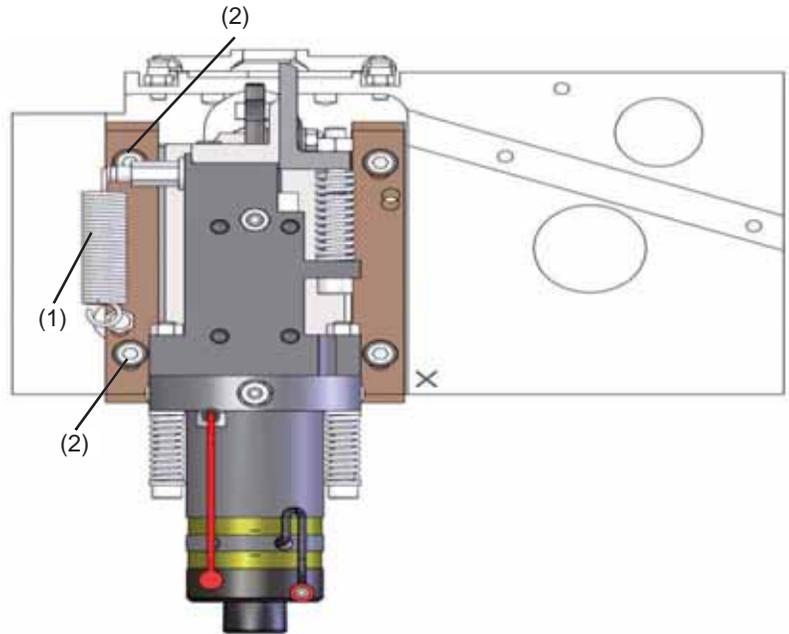
## 2.4. Sonotrode slide

The sonotrode slide moves the sonotrode, knife and clamp along the vertical axis and has following functions:

- Clamps the band durring draw back between the anvil and clamp.
- Presses the sonotrode against the anvil during the welding process.
- Cuts the band.

### 2.4.1. Removing the sonotrode slide

1. Press Reset to cut the tape. This opens the arch.
2. Shut down the machine.
3. Release the spring (1) on the Sonotrode slide.
4. Remove the plug connection of the red and black wire between the sonotrode and generator carefully.
5. Remove both screws (2) of the left sonotrode guide.
6. Push down the left guide and remove it out of the unit.
7. Rotate the Sonotrode slide slightly counter-clockwise and remove it carefully from the unit (you may have to lift the arch bottom slightly).



### 2.4.2. Mounting the sonotrode slide

1. Before mounting the sonotrode slide, lubricate both sides of the sonotrode slide, the cam follower and cutter.
2. Place the sonotrode slide back in the unit.
3. Slide in the left sonotrode guide back in the unit from below.
4. Push the left guide together with the sonotrode slide all the way to the left side of the unit and tighten both screws.
5. Insert the tension spring (1).
6. Reconnect the red and black sonotrode wire.

**Note:** To reduce the electromagnetic disturbance, the red and black wire from the sonotrode have to be twisted. Whenever possible, keep the sonotrode wires out of the cable channel (separated from other wires).

## 2.5. Sonotrode and generator

**Note:**

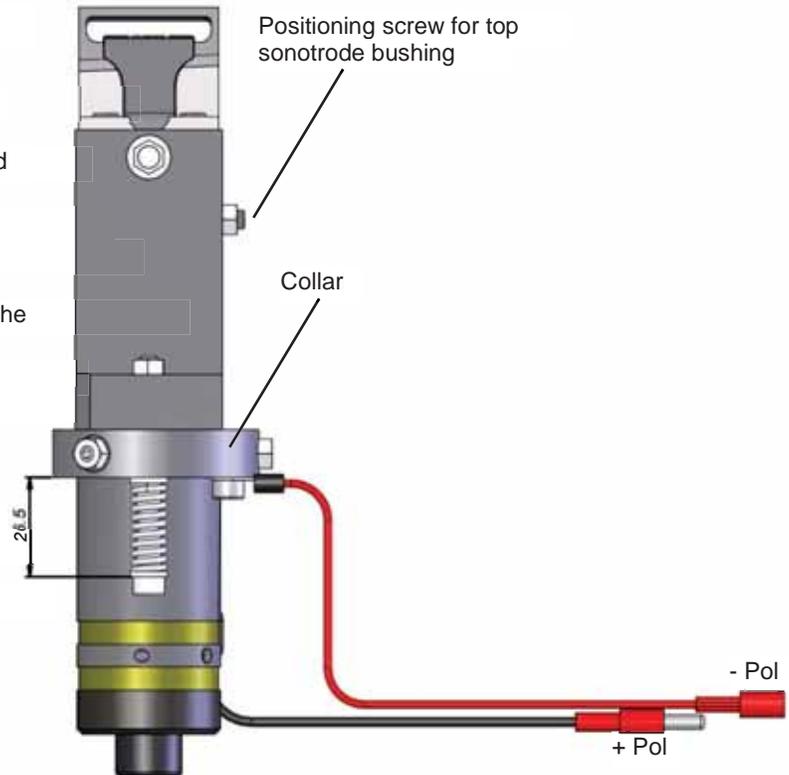
- Sonotrode and Generator always need to be replaced as a set and not separately (it is possible, that a damaged sonotrode would cause a new generator to fail again after only a few cycles).
- sonotrode wires should only get replaced with original ATS-parts (these wires are more resistant against mechanical wear and are built for the high frequency signals coming from the generator).

### 2.5.1. Removing the sonotrode

1. Remove the sonotrode slide from the unit (Chapter 2.4).
2. Loosen all three locknuts on the collar and remove the screws.
3. Cut the cable tie off the sonotrode.
4. Remove the black set screw from the top sonotrode bushing.
5. Carefully pull sonotrode down and out of the support.
6. Check the red sonotrode wire for any damages and replace it if necessary.



**Do not remove the main screw at the bottom of the sonotrode. This would generate high voltage if not grounded properly.**



### 2.5.2. Mounting the new sonotrode

1. Slide the plastic bushing on the new sonotrode (Note: the hole for the positioning screw is not in the center of the bushing; the short side has to face the top of the sonotrode).
2. Slide the new sonotrode carefully back into the support until the hole of the sonotrode top bushing is aligned with the thread of the sonotrode support.
3. Tighten the positioning screw of the top bushing.
4. Hold the sonotrode slide vertical and slowly loosen the positioning screw until the sonotrode drops by its own weight.
5. Now tighten the lock nut of the positioning screw.
6. Slide the sonotrode all the way up and line up the holes of the sonotrode with the threads in the collar.
7. Tighten all three screws on the collar and make sure that there is an even gap between the sonotrode and the sonotrode-collar.
8. Tighten the three lock-nuts.
9. Add a new cable tie on both sonotrode wires around the bottom of the sonotrode.
10. Before mounting the sonotrode slide, check the pressure on both sonotrode springs (Setting between collar and the beginning of the screw should be set to **26.5 mm**).

### 2.5.3. Adjusting the generator

New and repaired sets from ATS are adjusted. Use this instruction in case of welding problems only, if the setting of a higher welding time does not increase the welding quality.

**You must not exchange sonotrode and generator separately! Exchange both when either fails. Warranty is void when only one part has been replaced.**

#### Preparation:

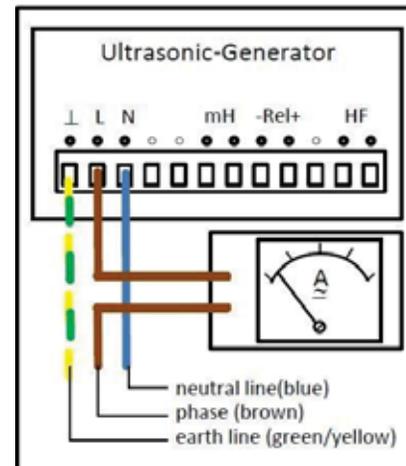
1. The lower ferrite core has to be flush with the end face of the white screw. You'll find it on the bottom of the ultrasonic generator.



#### Connecting the ampere meter:

1. **Disconnect the power** plug from the machine.
2. Unplug the ultrasonic generator plug and unscrew the phase line (brown) from the plug.
3. Connect the phase line to the analog ampere meter.\*
4. Connect the other terminal of the ampere meter to the phase terminal of the ultrasonic generator.
5. Make sure the wires are connected properly and switch on the machine.

\*Do not use other ampere meters than the ampere meter distributed by ATS (№ 120526). We can't guarantee that the values in this document are equal to the values displayed by other measuring equipment.



#### Adjusting the 25mm sonotrode & generator set:

1. Set the welding time to 300ms.
2. Turn the white screw clockwise or counterclockwise to adjust the current consumption of the generator during welding. **Adjust the current to 4.0 Amperes.**
3. Fix the white screw with the lock nut on it.
4. Reduce the welding time to have an accurate welding (ideal welding time depends on the material used). The sonotrode's noise should be a high tone and it should not "grumble". If it does, reduce the current consumption.

## 2.6. Cutter

The cutter cuts the band after the welding. The clamp holds the band tight after it has been fed around the arch.

**Hint:** Cutter, clamping brackets, springs etc. are only available as a set and cannot be ordered individually.

### 2.6.1. Replacing the cutter

1. Remove the lock-nuts off the setscrews on the clamp.
2. Slowly remove the two fixing screws from the clamp holder. Caution: Springs are tensioned.
3. Remove both springs from the cutter.
4. Always replace both springs, bolts and locknuts (delivered with the new cutter).

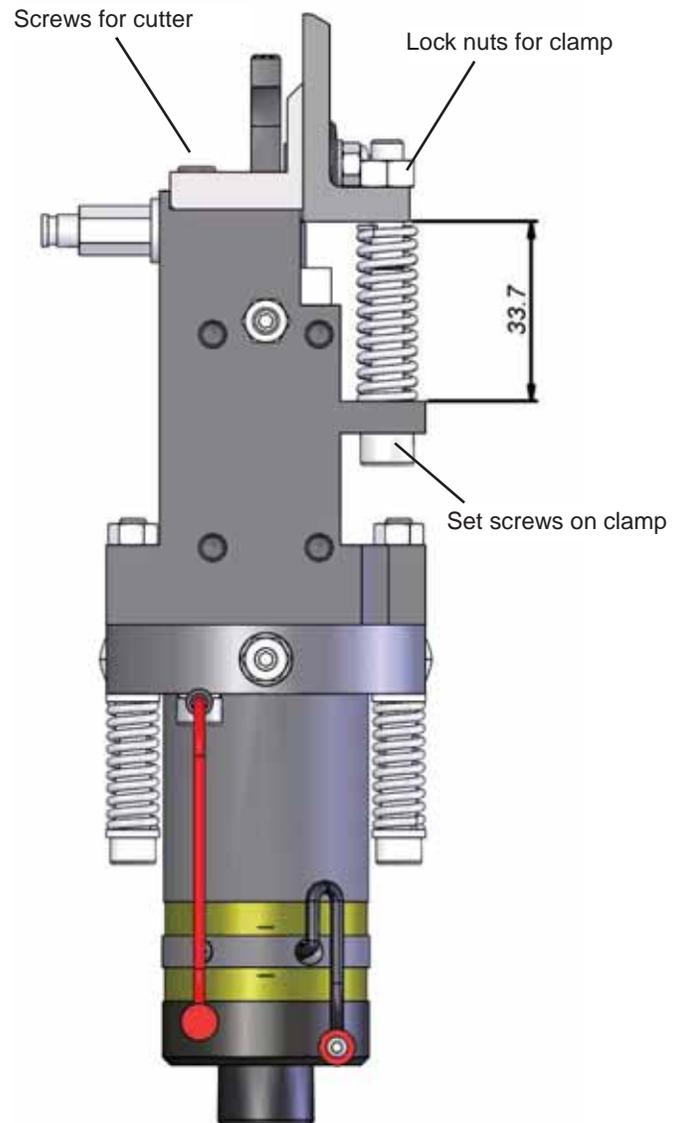
**To mount the new cutter, follow the same procedure but in reverse order:**

1. Adjust the measurement between the clamp and the Sonotrode holder to exactly **34.00 mm**. This enables the correct pressure against the anvil. It also adjusts the angle, of how the band enters the arch.

### 2.6.2. Maintenance of the cutter

The cutter should be lubricated frequently (see monthly maintenance). If the sonotrode slide is out of the unit, the cutter should be lubricated with new grease:

1. Remove both screws on the cutter.
2. Turn the cutter on the clamp, until you can see the groove in the clamps.
3. Check the edge of the cutter and replace it if necessary.
4. Clean all dirt off the grooves of the clamp.
5. Fill the grooves with new grease.
6. Tighten both screws on the cutter.
7. The spring washers should be adjusted so that the two blades slide against each other smoothly with some resistanc. The spring washers should be cupped rather than flat.

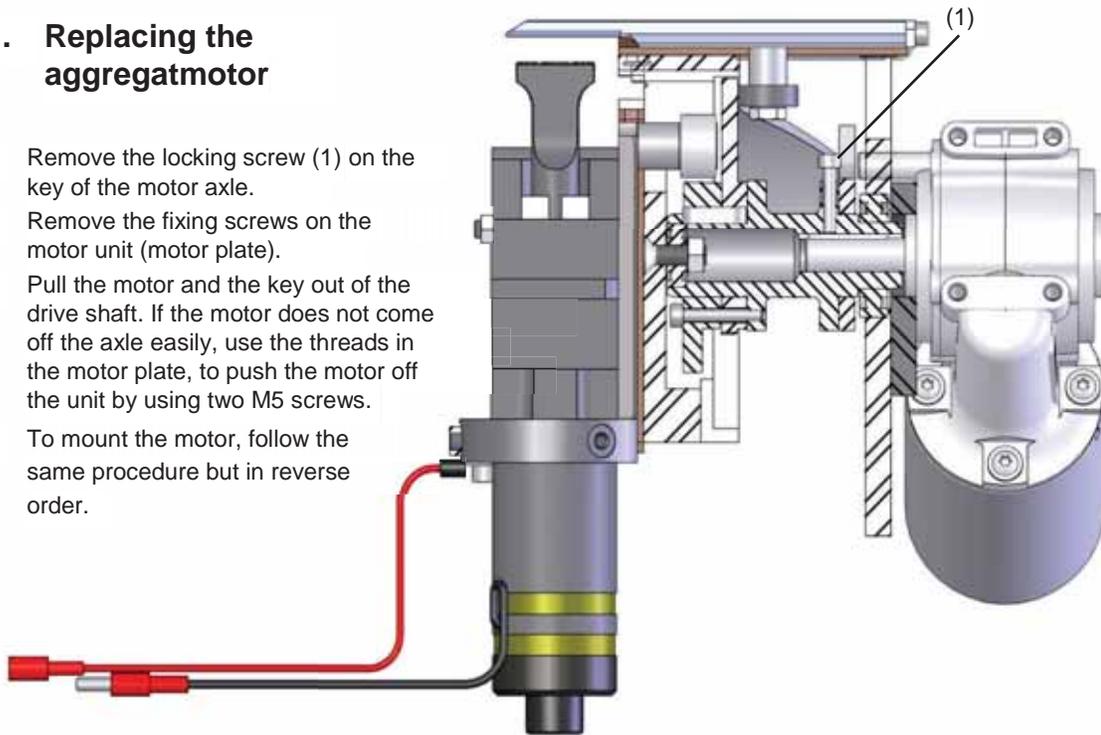


## 2.7. Aggregatmotor M1

The motor M1 unit drives a shaft which activates the the cam discs and plates to bring the aggregate into the different positions.

### 2.7.1. Replacing the aggregatmotor

1. Remove the locking screw (1) on the key of the motor axle.
2. Remove the fixing screws on the motor unit (motor plate).
3. Pull the motor and the key out of the drive shaft. If the motor does not come off the axle easily, use the threads in the motor plate, to push the motor off the unit by using two M5 screws.
4. To mount the motor, follow the same procedure but in reverse order.



### 2.7.2. M1 gear ratio

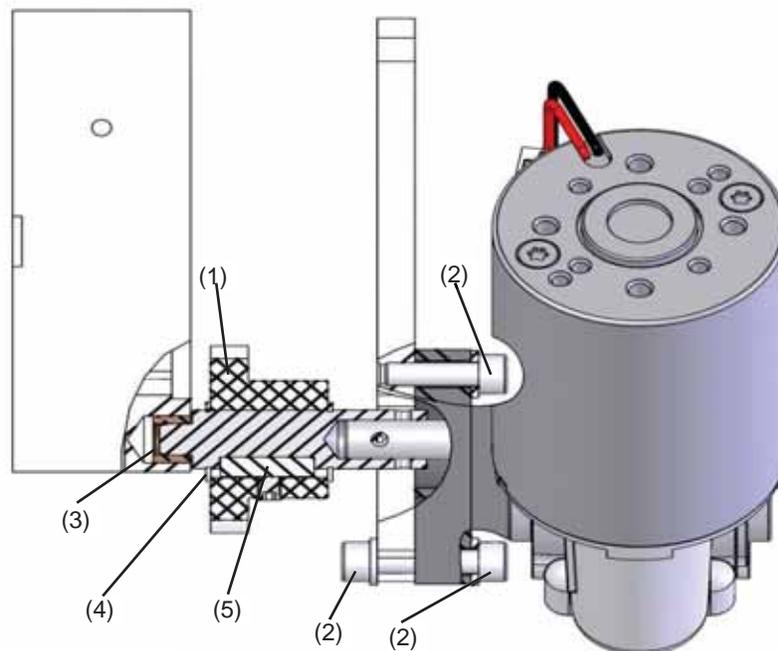
Machine	Band width	Gear ratio	Replacment part Number
US-2000 AD	15	i = 38:1	ATS-244064
US-2000 AD	20	i = 38:1	ATS-244064
US-2000 AD	30	i = 38:1	ATS-244064
US-2000 AD	50	i = 38:1	ATS-244064
US-2000 AD	60	i = 50:1	ATS-244164
US-2000 LD	20	i = 50:1	ATS-244164
US-2000 LD	30	i = 50:1	ATS-244164
US-2000 LD	50	i = 50:1	ATS-244164

## 2.8. Bandmotor M2

The tape motor and clutch shaft transport the tape during infeed and draw down. The clutch shaft is driven by a spur gear wheel (1) attached to the motor shaft.

### 2.8.1. Replacing the bandmotor

1. Remove the fixing screws (3) on the tape motor and pull it back out of the friction bearing.
2. If necessary, replace the spur gear wheel (1). To do this, first remove the retaining ring (4).
3. Pay attention to the key (5) when taking off the spur gear wheel.
4. To mount the new tape motor, follow the same procedure but in reverse order.



### 2.8.2. M2 gear ratio

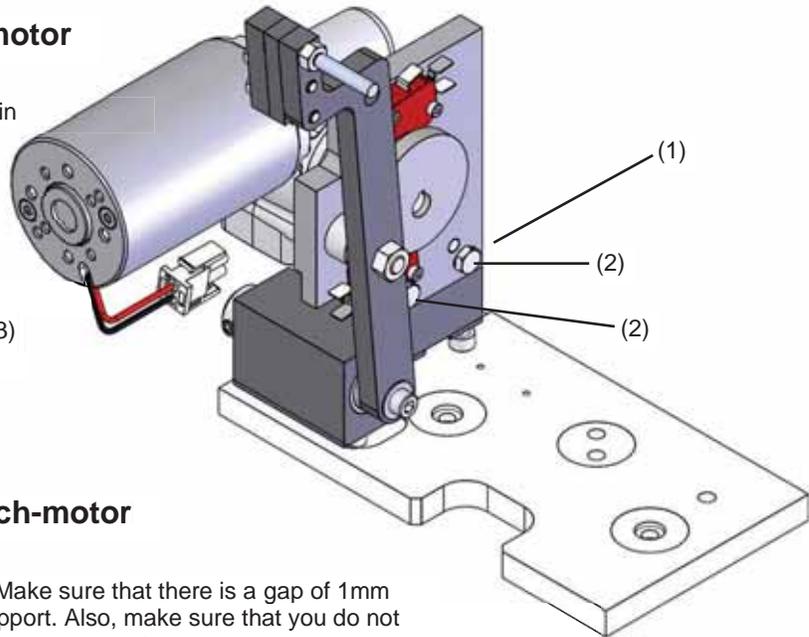
Machine	Band width	Gear ratio	Replacement Part Number
US-2000 AD	15	$i = 5:1$	ATS-244065
US-2000 AD	20	$i = 5:1$	ATS-244065
US-2000 AD	30	$i = 5:1$	ATS-244065
US-2000 AD	50	$i = 5:1$	ATS-244158
US-2000 AD	60	$i = 5:1$	ATS-244265
US-2000 LD	20	$i = 10:1$	ATS-244166
US-2000 LD	30	$i = 10:1$	ATS-244166
US-2000 LD	50	$i = 10:1$	ATS-244165

## 2.9. Archmotor M3

The arch motor is mounted to the unit base plate and opens and closes the arch. A lever moves by a cam disc which is mounted onto the motor shaft. This lever is connected on the bottom of the arch and opens and closes the arch. A string is connected on the top of the arch in order to help it open and close parallel.

### 2.9.1. Removing the arch-motor

1. Make sure the arch is closed (cam in the minimum position).
2. Loosen the lock nut on the set screw (1).
3. Remove both fixing screws (2) from the motor plate.
4. Remove the motor out of the unit.
5. Loosen the set screw on the cam (3) and pull it off the motor shaft.



### 2.9.2. Mounting the new arch-motor

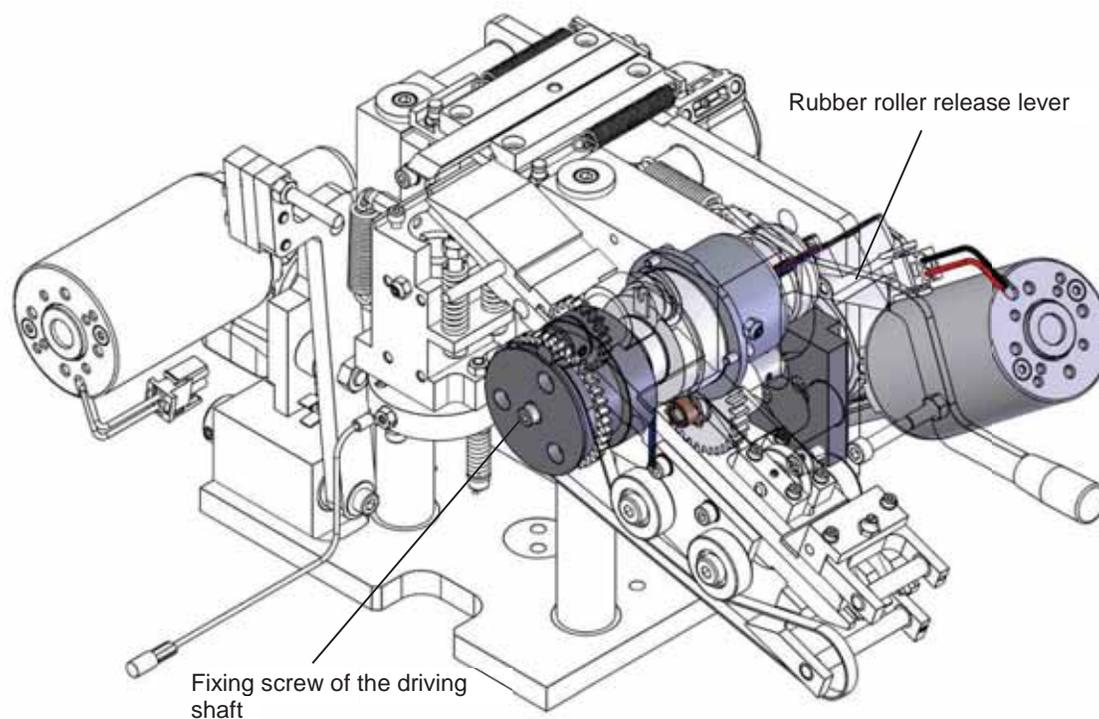
1. Mount the cam on the arch motor. Make sure that there is a gap of 1mm between the cam and the motor support. Also, make sure that you do not damage the switches (S7/ S8) when you mount the cam.
2. Mount the motor support and insert the two fixing screws (2) but do not tighten them yet.
3. If the cam disc does not make contact with the arch opening lever bearing (arch must be closed), use the adjusting screw (1) to bring the whole unit to a proper position, where the bearing slightly touches the cam but does not hold the arch open.
4. Tighten both fixing screws(2).

### 2.9.3. M3 gear ratio

Machine	Band width	Gear ratio	Replacement Part Number
US-2000 AD	15	i = 24:1	ATS-244066
US-2000 AD	20	i = 24:1	ATS-244066
US-2000 AD	30	i = 24:1	ATS-244066
US-2000 AD	50	i = 24:1	ATS-244066
US-2000 AD	60	i = 24:1	ATS-244066
US-2000 LD	20	i = 15:1	ATS-244157
US-2000 LD	30	i = 15:1	ATS-244157
US-2000 LD	50	i = 15:1	ATS-244157

## 2.10. Driving shaft

The clutch shaft is driven by a spur gear wheel attached to the motor shaft. The required tape tension is controlled by an electro magnetic clutch. An electro magnetic brake mechanism holds the drive shaft in position during the welding process in order to ensure that the band is tensioned as required.



### 2.10.1. Removing the driving shaft

1. Remove the bandmotor.
2. Remove the rubber roller release lever.
3. Disconnect the brake and clutch wires from their terminal connections.
4. Remove the fixing screw of the feed roller.
5. Remove the 3 fixing screws on the bearing housing.
6. Pull the whole driving shaft out of the unit, while you hold the feed roller.
7. Put the key back in to the driving shaft.
8. Out of the unit, you can put the driving shaft back into the feed roller.

## 2.10.2. Adjusting the driving shaft (clutch/ brake)

To achieve a good range in the tension setting (Soft tension and Band tension) the gap between the rotor and stator of the clutch and brake has to be set to desired value. To adjust the gap, only use precise (grounded) shims.

### Disassembling the driving shaft:

1. Remove the fixing screw on the brake disc and take off the disc.
2. Remove all four fixing screws of the brake housing and remove the brake.
3. Take off the spacer bushing and any other spacers/ shims if necessary.
4. Remove the bearing housing.
5. Take off the spacer bushing and the clutch gear wheel.
6. Remove the spacer bushing and any other spacers/ shims if necessary.
7. Pull the clutch plate off the shaft and remove the key.
8. If necessary replace brake and/ or the clutch.
9. To mount the driving shaft, follow the same procedure but in reverse order. Pay attention to the gap setting of the clutch and brake.

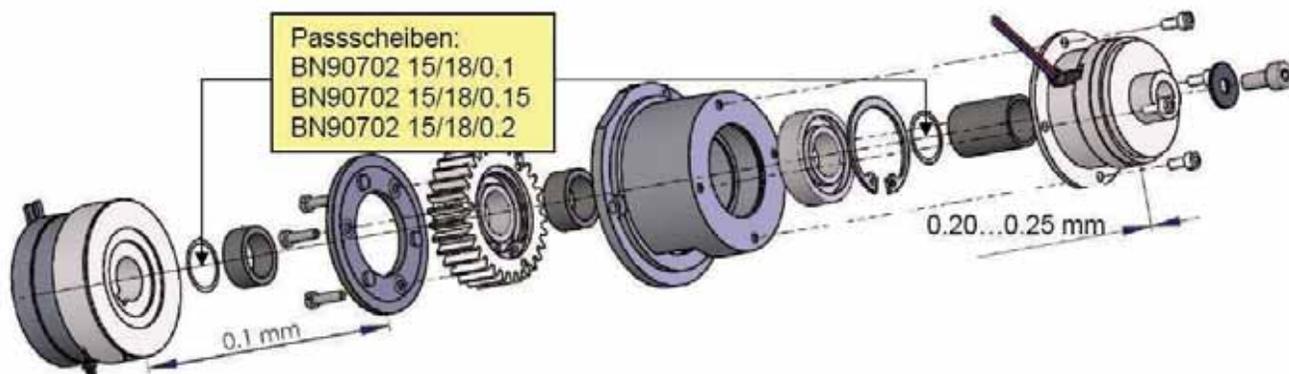
### Brake:

The brake needs a minimum gap of **0.20 mm**. The feeler gauge of **0.20 mm** should not be clamped by stator and rotor but should slightly touch it on each side.

If the gap is too small, it can happen that the brake does not disengage anymore. This causes inconsistent overlapping and will wear the brake quicker.

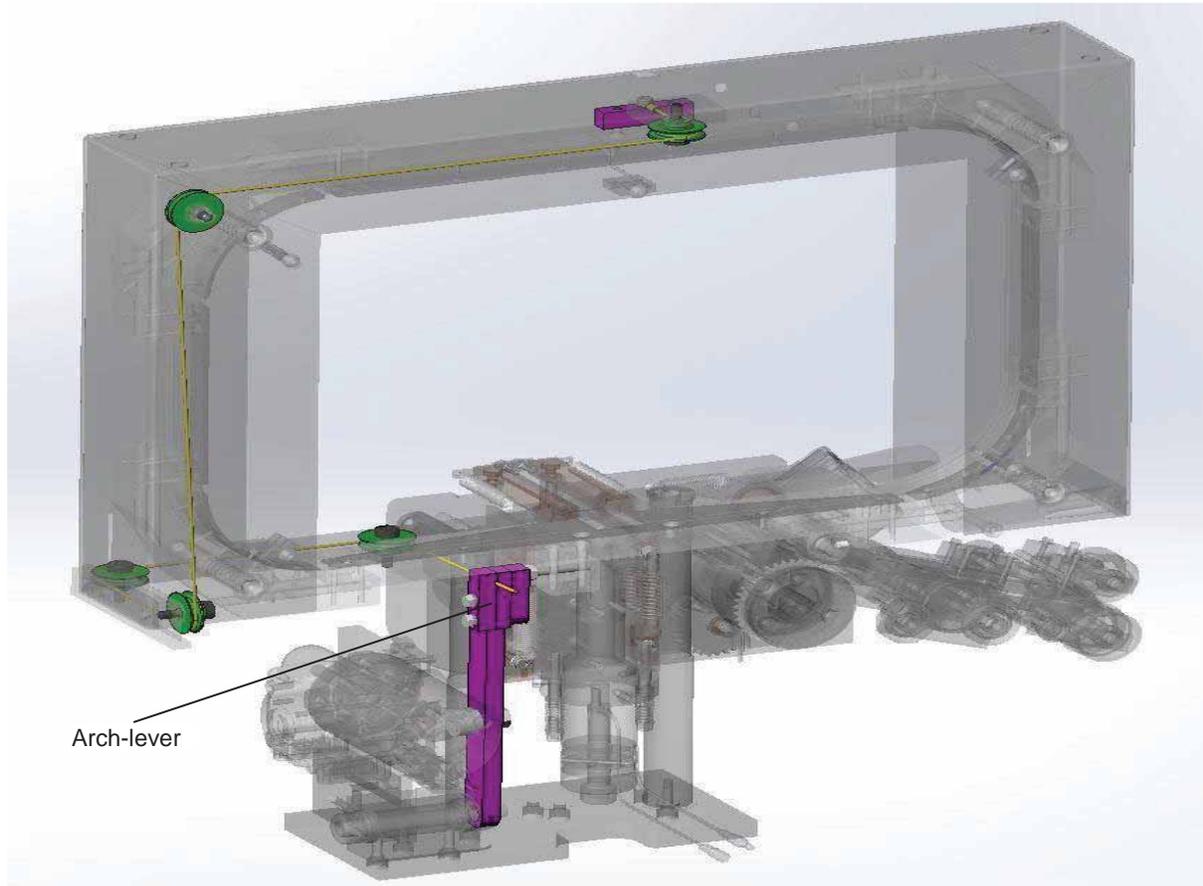
### Clutch:

The clutch needs a gap of **0.10mm** (stator and rotor should not touch). Only with a precise gap setting of the clutch, will make it possible to have low soft tension.



## 2.11. Arch-string (yellow cord)

The arch string (yellow string) is responsible to open the arch on the top side at the same time as it opens at the bottom.



### 2.11.1. Adjusting the arch-string

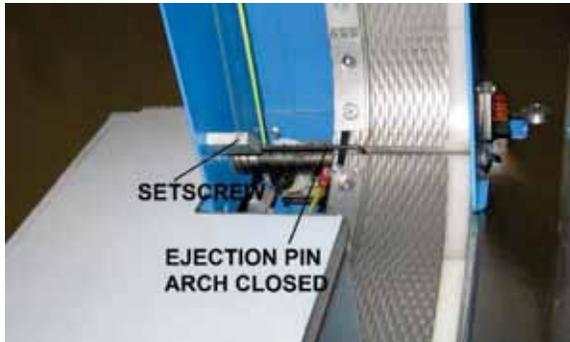
1. Make sure, the arch is in the closed position.
2. Loosen both screws on the arch-lever.
3. Tighten the arch string but make sure, that the top side of the arch remains closed.
4. Tighten both screws on the arch-lever.

### 2.11.2. Loop Cup Adjustment

Reset the machine to cut the tape. Reset again. As soon as the tape starts to enter the cup, turn off the machine with the main power switch. You will have to be quick. Advance the banding in by hand by turning the feed roller. As you feed the banding, listen and feel for smooth feeding of the banding. Adjust the cup up and down and side to side until the cup fills freely.

### 2.11.3 Ejection Pin Adjustment

The ejection pins push the banding out from under the metal guides when the arch opens to draw down. The pin should be adjusted such that during tape infed the tape does not hit any of the pins as the banding is fed around the arch. Each pin has a setscrew for adjustment



## 3. Machine Sensors

### 3.1.1 Photo Sensors

These are the eyes on the backside of the arch that will see the product and initiate tensioning. Usually when these are bad, the machine will not cycle at all. Older models of the US-2000 bander have sensors on them that can be adjusted for sensitivity. Newer models do not have this feature. This sensor is used in *Automatic & Manual* modes. The height of the sensor is adjustable.



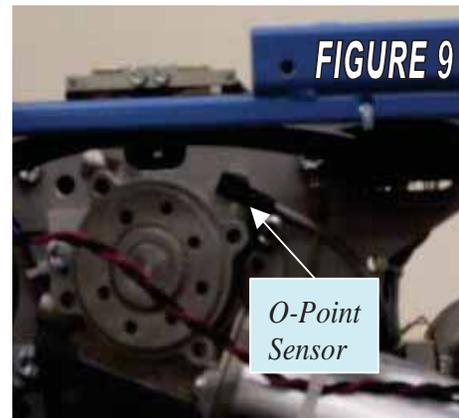
### 3.1.2 Tape End Sensor

This sensor is located inside the lower machine cabinet on the right side. A roller rides on top of the banding on an upper dancer roller. If the banding would run out, the sensor wheel lowers into a groove cut into the roller and reports the tape end. Tape End is a fault 3 condition. The error message will be displayed on the screen. A mis-threaded machine may also result in a Tape End fault.



### 3.1.3 0 Point Sensor

Finds the "0" point or home position of the machine. The machine's 0 point is the starting point when you first turn the machine on. The sensor is located above and just to the right of the M1 motor. If this sensor is bad, the red LED on the sensor will not illuminate in the home position. The machine will run twice in the forward direction, then once in reverse, looking for the home position. The fault will be displayed on the display screen.



**3.1.4 S7/S8 Sensors** These switches work opposite of each other to indicate arch position. The top switch will indicate an open arch, while the lower switch will indicate a closed arch.



## Print mark (option)

### 4. Print mark (option)

The print mark is used to position a printed band onto a product so that the print is always on the same position.

#### Turning on the print mark option:

1. Turn on the print mark: **Menu > Print mark.**
2. Choose the print mark position: **Menu > Submenu > Process settings > Print mark position.**

**Print mark on the side:** Set the print mark position to "0".

**Print mark underneath the welding:** Set the print mark position to "105".

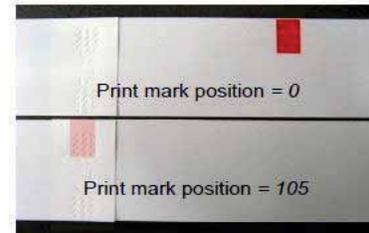


Fig. 1

#### Setting the print mark underneath the sensor:

1. Press **<RESET>** to cut the band and remove it out of the machine.
2. Pushing the release lever will release the band in the channel; remove the band.
3. Press **<RESET>** again,
4. The message **<Sensor S11>** appears on the display (the brake of the driving shaft is now disengaged).
5. Feed the band back into the track by following the feeding diagram.
6. Open the front door and turn the feed roller counterclockwise until the band becomes visible at the clamp (cutter).
7. Pull on the band (Fig. 3) until at least one print mark becomes visible for marking.
8. Mark the band from the middle of the print mark **55 mm** in infeed direction (Fig. 2). Copy the mark onto the back side of the band.
9. Turn the feed roller clockwise until the mark is located on the cutting edge of the clamp (Fig. 3). The print mark is now exactly above the reading head.

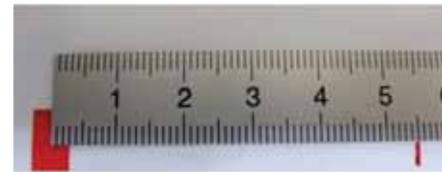


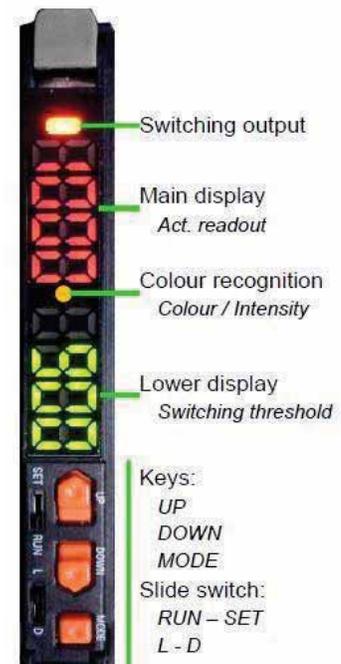
Fig. 2



Fig. 3

## Teaching the print mark reader:

1. Set the slide switch "SET – RUN" to "SET" and "L – D" to "L".
2. Press the "UP" or "DOWN" keys for 1 second until the display starts blinking. If there is no similar color to the print mark on the band, follow with step 4.
3. By turning the band drive roll, bring the band to the position under the reader where the critical color is expected. Press the "UP" or "DOWN" key for 1 second until the display starts blinking.
4. Set the slide switch "SET – RUN" to "RUN".
5. Turn the band forward and backwards by turning the feed roller to check the proper reading of the print mark. If the print mark is located under the reader, the switching output display should turn on and the main display should indicate about "1000"(red). The switching output is activated as soon as the main display value exceeds the value of the lower display (green). 6. The switching threshold can be adjusted with the "UP" and "DOWN" keys.



(Omron E3X-DAC41-S)

## 5. X50 Connection

### 5.1. Signals up - / downstream (X50 connection)

#### Standard signals

- **Ready permanent signal** Potential free, normally–open contact (US-2000) Closed when machine is ready for operation, opens as soon as there is an error (band end, bandjam,...)
- **Error** Potential free normally–open contact (US-2000) Errors will be signaled by closing the contact Exceptions to differentiated detection: At band end it will clock with 1Hz, at security loop with 2.5Hz.
- **Footpedal/external activation** Potential free normally–open contact (external equipment) A banding procedure is being activated by closing the contact during the activated ready signal (clocked). The start signal is not allowed to be reset before the ready signal is deleted (Handshake).

#### Optional signals

- **Ready clocked signal** (option) Potential free normally–open contact (US-2000) Closed at ready of the machine. Opens as soon as the banding procedure starts and closes as soon as the spacer/anvil releases the banded product.
- **Welding signal** (option) Potential free normally–open contact (US-2000) Closes during the welding procedure. May be used on automated systems to increase the output (speed), for example to release the externally controlled press during the welding procedure.
- **Band end prewarning/Reserve Relays** (option) Potential free normally–open contact (US-2000) By closing the contact the approaching end of the roll is signaled.

**Austauschbefehle**  
signal to up-/downstream

\* Option

