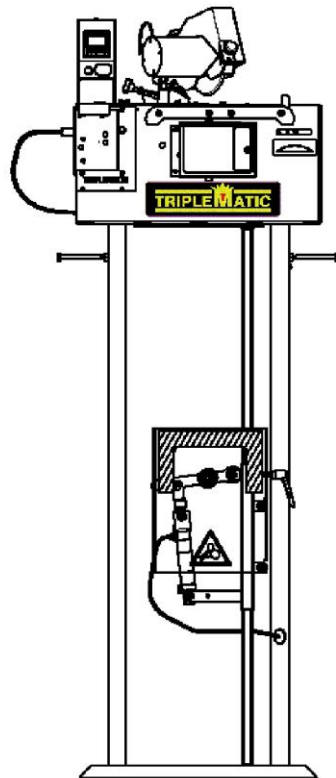


# TRIPLE M<sup>AT</sup>IC



## User guide

Before using the machine, read this guide thoroughly and make sure that You have understood it.



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There may be discrepancies in the pictures but the information is always correct.

## **GENERAL**

This user guide describes in detail how to use, maintain and inspect the chain sharpening machine. It also describes the steps to be taken to ensure maximum safety, how the safety components are designed, how they work and how to check and inspect them. It also explains how to carry out any repairs that might be needed.

### **NOTE:**

**Everyone who will install, use or repair the chain sharpening machine must read and understand this manual.**

The user guide covers installation, user and the various maintenance actions that can be done by the operator. More detailed servicing or troubleshooting must be done by the dealer's servicing team. The user guide describes all the necessary safety-related components. Anyone who intends to use the machine must read and understand it before the chain sharpening machine is installed. Symbols and warning signs shown on this page appear in this manual and on the chain sharpening machine.

If a warning decal on the machine has been damaged or is worn, a new one must be applied as soon as possible to ensure the greatest possible safety when using the chain sharpening machine.

## **DESCRIPTION OF FIELD OF APPLICATION**

The machine is designed to be used to sharpen cutting chains as used on power saws, forestry machines and harvesters.

The machine can sharpen the cutting teeth of chains and lugs. It works automatically.

The machine must be used indoors.

The machine is powered by a 12-Volt DC supply.

## **SYMBOLS**

Before using the chain sharpening machine, read this user guide thoroughly and make sure that you have understood it all.

Wear eye protection.



Wear safety gloves.



## **WARNING LABELS**



Observe



Risk of cutting injury.



Direction of rotation.



Pinch point!

## **SAFETY REGULATIONS**

Locate the machine where it is not exposed to rain or damp.

The site must be well lit.

The machine must not be located close to gas, liquids or other materials that might catch fire or explode.

Only a service technician is permitted to carry out work on the machine.

To avoid mistakes when sharpening chainsaw chains, it is extremely important to understand how the sharpening machine works.

Read the instruction manual carefully before doing any sharpening with the machine.

Always wear safety gloves and safety goggles.

Always check the condition of the grinding wheels.

Cracked, vibrating or wobbling grinding wheels must be discarded.

To avoid breakdowns, clean the machine to remove grinding dust.

## **MOTOR DATA TRIPLEMATIC**

Grinding motor

Voltage: 12 Volt DC

Rotation speed: 2800 r/min

Peripheral speed: 22 m/s

Power: 90 Watt

Current: 7,5 A

Grinding wheel: 150x4x16 mm

Overcurrent protection: Automatic fuse type ptc

Machine 15,9 kg (without stand)

Machine dimensions: L475mm x B140mm x H395mm (without stand)

Working voltage: Min 12 Volt DC, Max 15 Volt DC

## **COMPRESSED AIR DATA TRIPLEMATIC**

Min 5 Bar

Max 8 Bar

## POWER SUPPLY

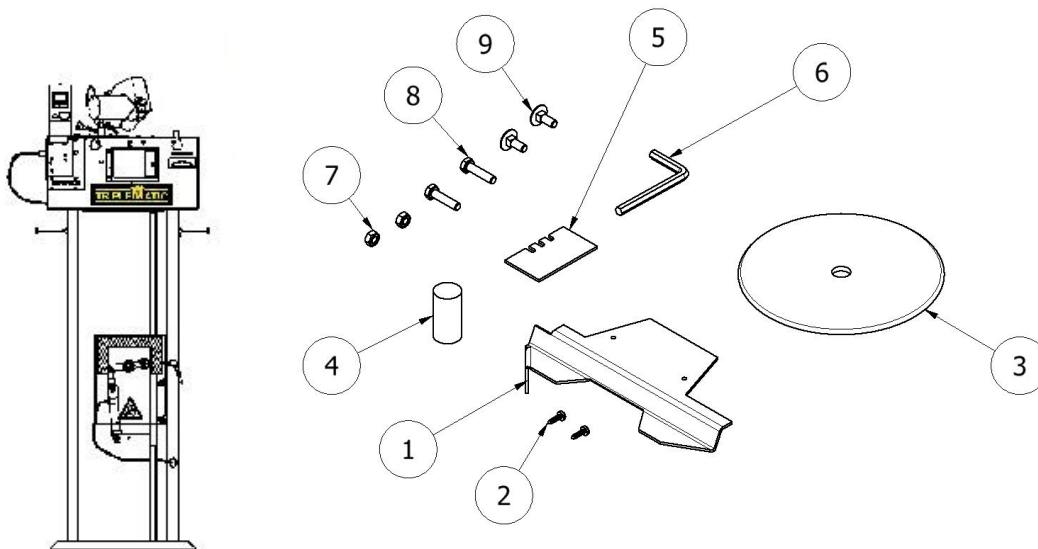
For best performance, the machine should be connected to the Markusson Converter. The machine can also be powered from a 12-volt car battery or from a battery charger with an output of 12 – 15 volts DC (min 10 ampere). When using a batter, connect the red cable to the positive terminal (+) and the black one to the negative (-).

**If the cables are connected to the wrong terminals, the grinding disc and the feeder motor will turn in wrong direction, causing the machine to break down. Compare the direction of rotation with the arrow on the cover.**

### NOTE:

**Position the battery, battery charger or power converter where there is as little dust as possible. Make sure that the battery terminals are connected to the correct poles of the battery. Position the battery so that sparks from the sharpening machine cannot reach it.**

## ACCESSORIES



**Besides the machine, there are a number of accessories in the kit:**

1. Grinding wheel guard
2. Sheet metal screw x2
3. Grinding wheel 150x4x16
4. Profile stone
5. Profile template
6. Allen key

**When machine is delivered with a stand, the following are also supplied:**

7. M6 nut x2 (stand)
8. M6 bolt x2
9. Carriagebolt M6 x2

## FUNCTIONS

1. Start, sharpening motor.
2. Start, automatic.
3. Speed control.
4. Counter.
5. Electric power (12-15 V DC in).
6. Depth gauges grinding, On/Off
7. Stop button.

(Zero-voltage cutout.

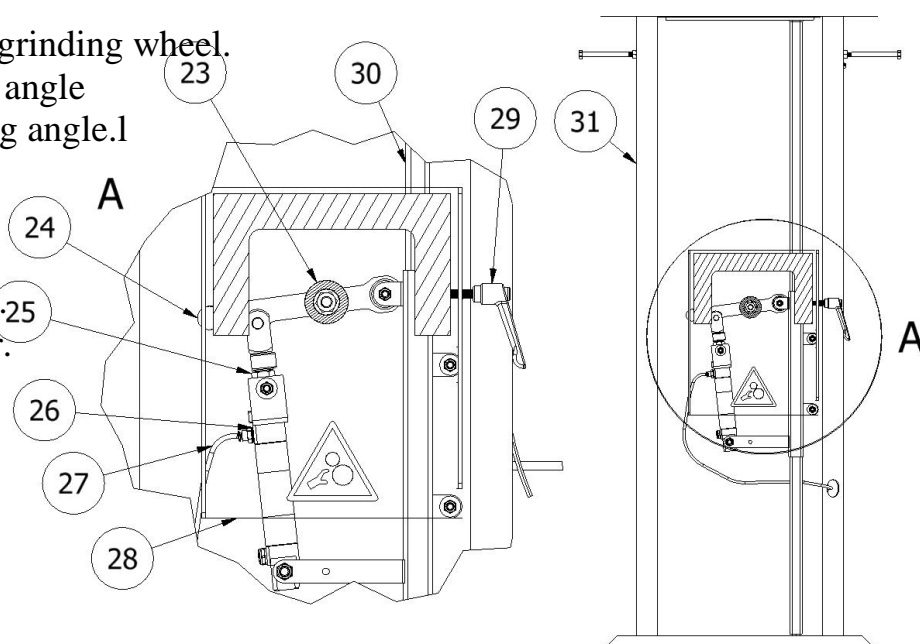
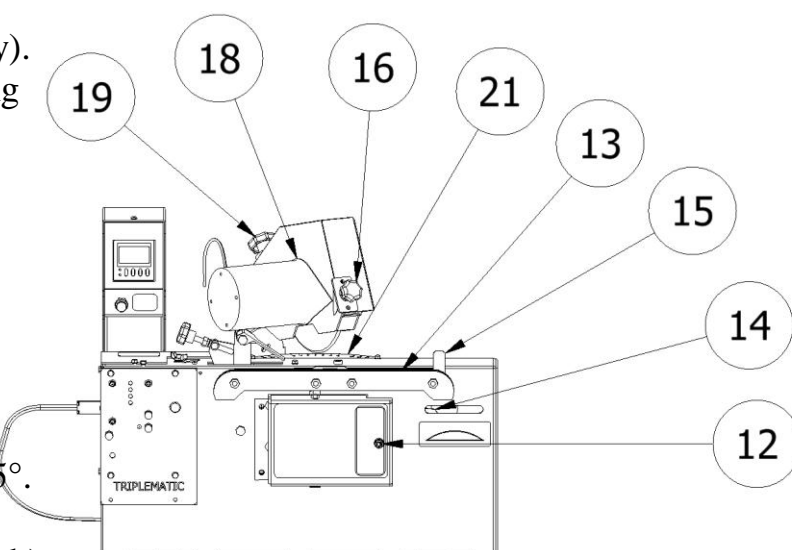
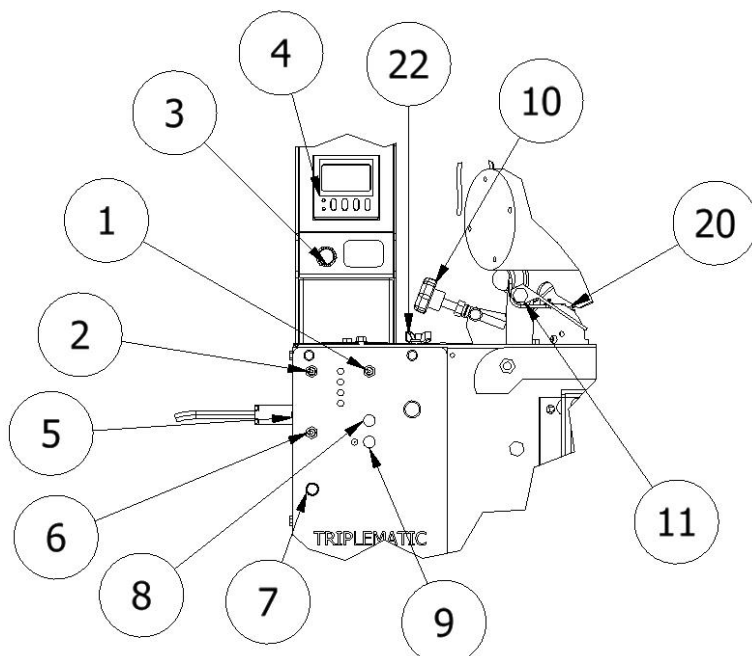
When the power is cut off, the machine must be restarted manually).

8. Changing the angle of the grinding head. (shift from left to right)
9. Power on.

10. Cutting tooth length setting adjustment.
11. Chain feeder mechanism.
12. Length adjustment between left and right tooth.
13. Chain rulers.

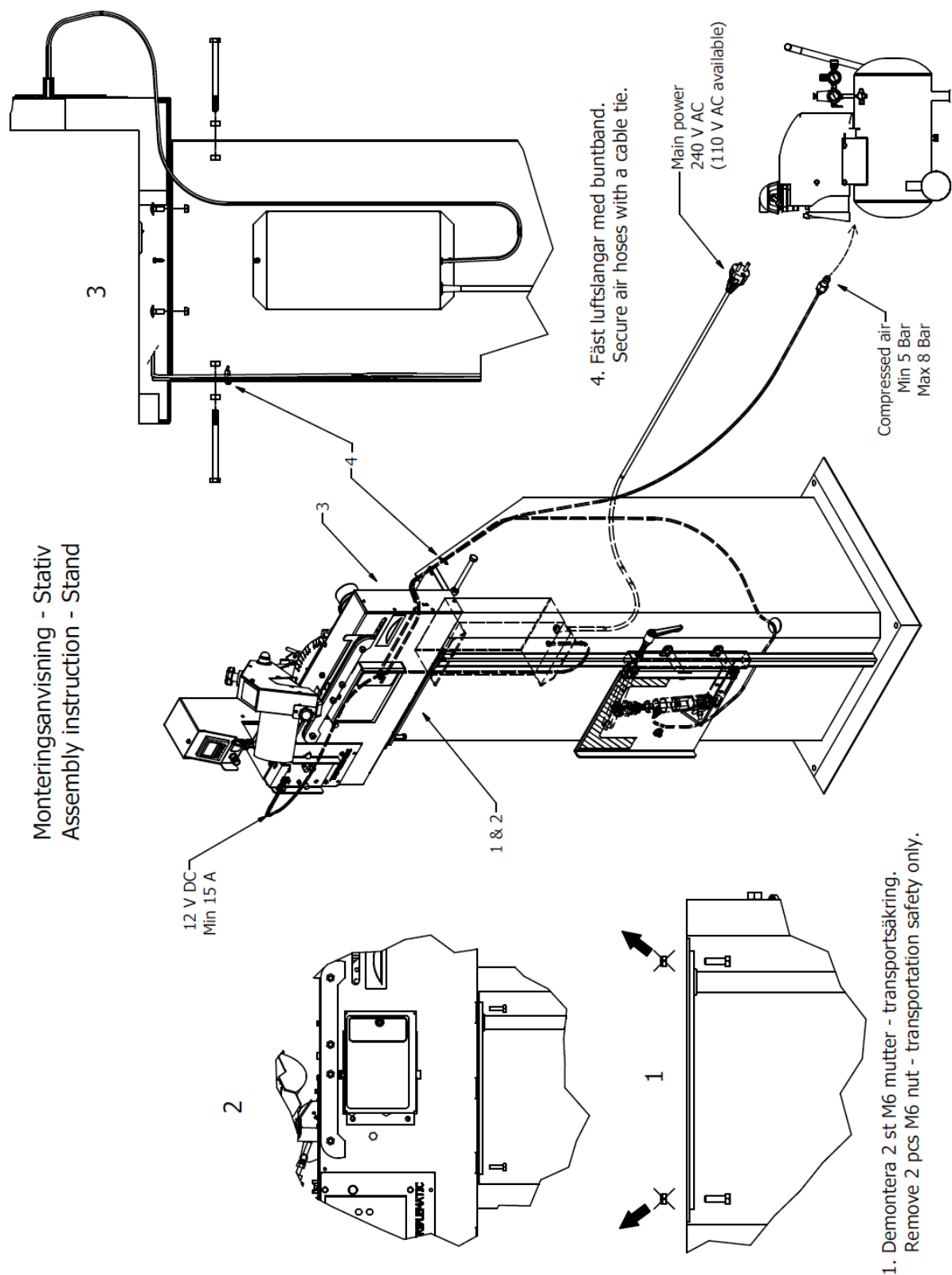
14. Grinding angle adjustment  $0^{\circ}$ - $35^{\circ}$ .
15. Chain lock adjustment
16. Grinding wheel adjustment (depth).
17. Grinding wheel.
18. Grinding motor.
19. Depth adjustment, grinding wheel.
20. Graduation cutting angle
21. Graduation grinding angle.1
22. Stroke adjustment.

23. Tensioner
24. Tensioner arm
25. Nut, pneumatic cyl.
26. Pneumatic cylinder.
27. Air hose
28. Protective plastic
29. Locking handle.
30. Tensioner bracket.
31. Stand.



# ASSEMBLY INSTRUCTIONS, STAND

Monteringsanvisning - Stativ  
Assembly instruction - Stand





## INSTALLING THE SHARPENING MACHINE



**The machine must not be located close to gas, liquids or other materials that might catch fire or explode.**

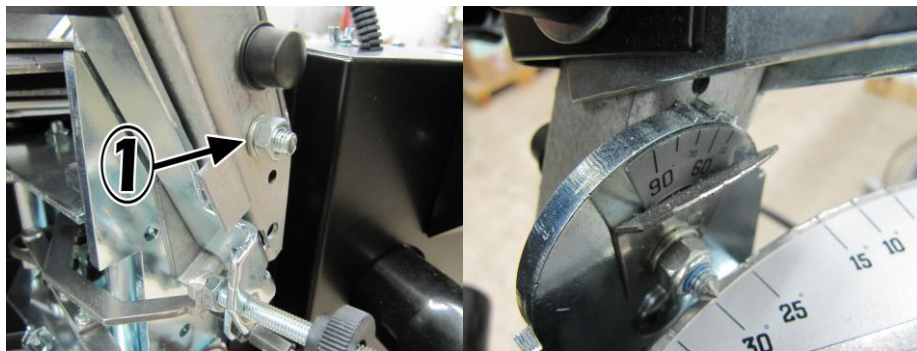
Install the machine on a working bench or a stand.

**NOTE:**

The machine must be securely fastened. The machine must be fixed in line with or 1-5mm outside of the edge of the working bench.

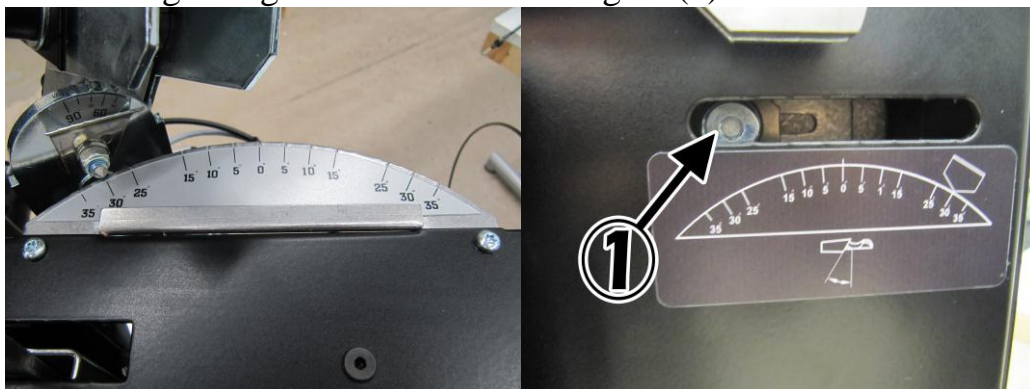
## CUTTING ANGLE

The cutting angle can be set between 90° and 50°. Loosen the nut on the back (1) and turn the grinding head to the correct degree marking and then tighten the nut.



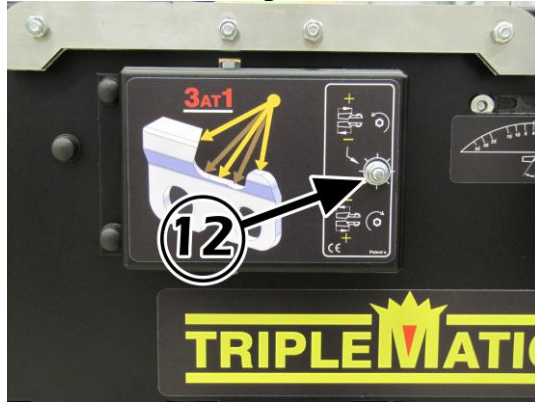
## GRINDING ANGLE

The grinding angle can be set between 0°-35°. If You want to change the angle, loosen the allen screw (1). **NOTE:** Max three (3) turns. Turn the grinding head to the desired angle. Tighten the allen screw again (1).

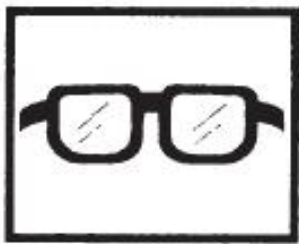


## CENTRING THE GRINDING WHEEL

If the lengths of the right and left cutting links turn out different on sharpening, this can be adjusted with adjusting screw 12. When the screw is adjusted, the length of the inner or outer cutting links increases.



**Be prepared to stop the machine if something goes wrong during trial sharpening.**



**Check the grinding disc for cracks and that it is securely fixed to the hub. Stop the grinding wheel immediately if abnormal vibrations occur.**

## COUNTER

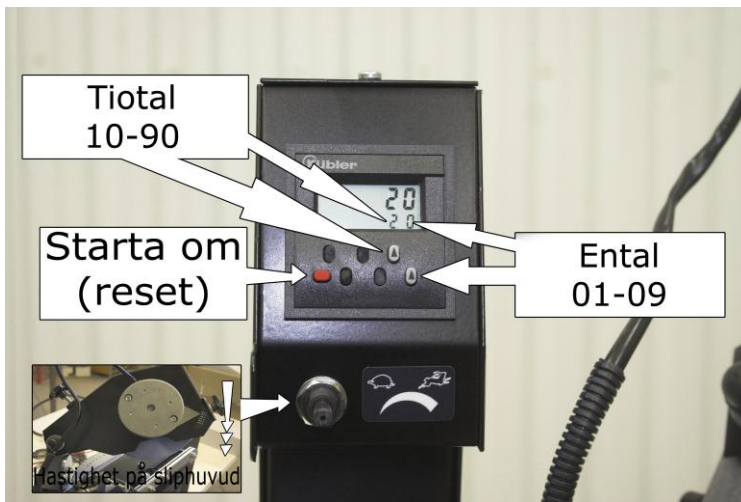
The counter is placed above the control panel, maximum count is 99 teeth. The counter is programmed using the two buttons to the right. To set the number of teeth, push the right button to set X0-X9 and the left on to set 1X-9X. The number of teeth will be stored in memory until the next time the value is set.

When the machine is running, the number of teeth grinded will be counted and the machine will stop when the preset number is reached.

To restart the machine (and to reset the counter), push the red button.

## SPEED CONTROL

The speed control is placed below the counter. This control the lowering speed of the grinding head (grinding wheel) as it grinds the tooth. High speed can be used when grinding 0-1mm of the tooth, low speed when grinding 1-4mm.



## CHAIN LOCK ADJUSTMENT BETWEEN DIFFERENT CHAIN TYPES

The lock adjustment is placed to the right. This is used to change the locking point on the chain ruler when grinding different types of chains.

To adjust the locking point, stop the machine in a position where the lock isn't engaged.

Loosen the M6 nut on the chain rulers right hand side and move the lever right or left.

Tighten the nut again.

Preset position is as shown in right hand picture below.

(Pictures, se following page).



## WIRE ADJUSTMENT

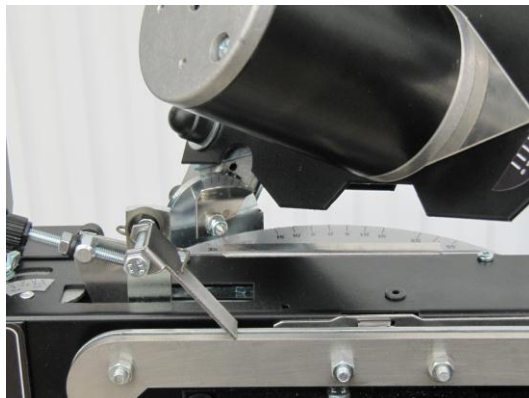
For the grinding machine to function properly, it is important that the wire is adjusted correct. It is set in factory but will be worn over time making adjustment or replacement necessary. To adjust the wire correct, follow these steps:

**NOTE! The machine is to be set at high speed (rabbit) when adjusting the wire.**

1. Start by turning the grinding head to the left.



2. Set the angle to 30°.  
NOTE: Head to the left.

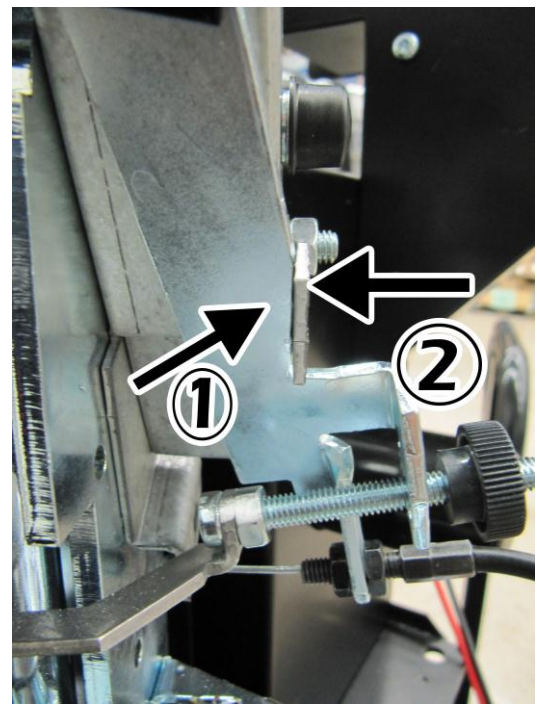
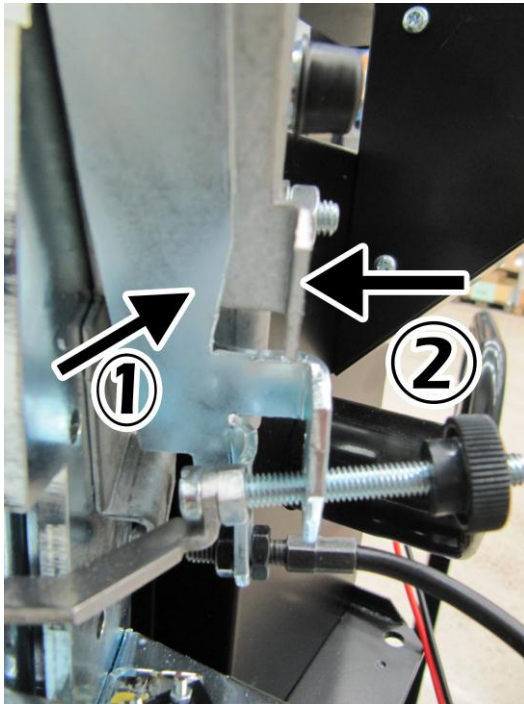


3. Turn the machine and have a look At the back. Start the machine and observe as the lifting arm (1) meets the flange (2).

4. The lifting arm (1) shall meet the flange (2) app. 1,5 sec before lifting again. Use a 0,05 mm feeler gauge between the arm and the flange to control that contact is made.

*Pictures (step 3 & 4), see next page.*

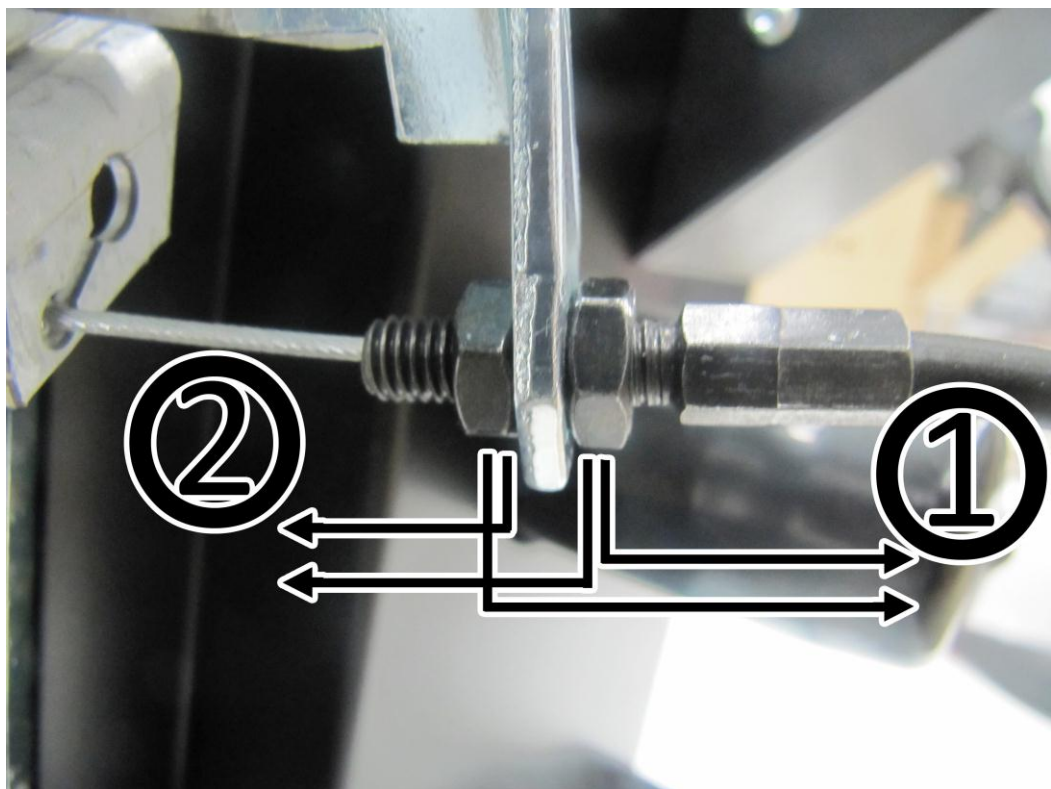




5. To adjust the wire, making the arm make contact with the flange longer, turn nuts as shown below (1). To adjust for a shorter time of contact, see below (2).

1. Longer time

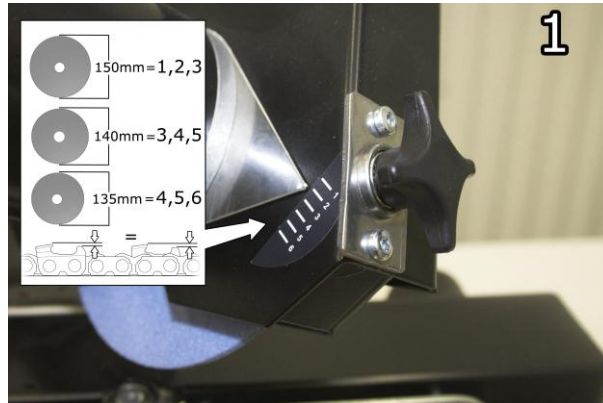
2. Shorter time



## GRINDING WHEEL ADJUSTMENT DEPTH

It is possible to adjust the position of the grinding motor turning the knob on the front of the grinding head. An arrow indicates a number on a scale. This adjustment is used as the diameter of the grinding wheel decreases when it is worn.

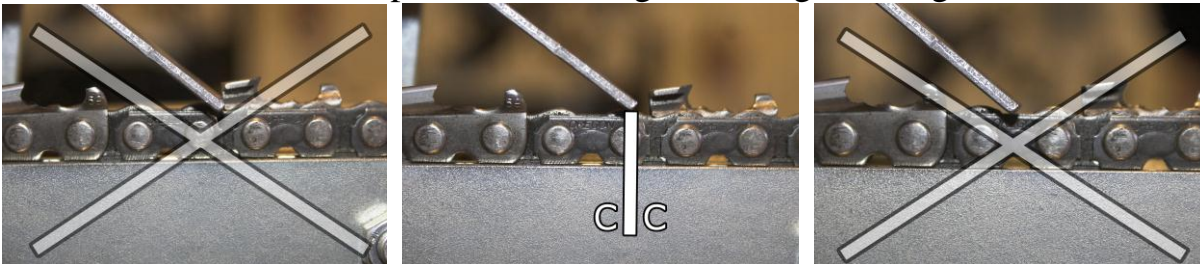
When fitting a new grinding wheel, the arrow should point at 1-3 on the scale. As the wheel is worn, it should be adjusted to a higher number making shure that each grind is equally deep.



## STROKE ADJUSTMENT

The stroke adjustment (distance between to teeth) is done with the wing-nut on top of the machine. Loosen the nut and position it according to the label. This must be changed if chains with different pitch are grinded, for example .325 to 404. It is important the the feeder arm stops right above the rivet behind the cutting link. Se pictures below.

NOTE: Not to be mixed up with the cutting tooth length setting.



## GRINDING THE DEPTH GAUGE LUGS.



**WHEN TURNING ON THE DEPTH GAUGE GRINDING, ENSURE THAT THE MACHINE IS IN A MODE WHERE THE CHAIN IS NOT LOCKED. I.E WHEN FEEDING THE CHAIN FORWARD.**



**Check the grinding disc for cracks and that it is securely fixed to the hub. Stop the grinding wheel immediately if abnormal vibrations occur.**

To grind the depth gauge lugs, turn the 3AT1 switch On.

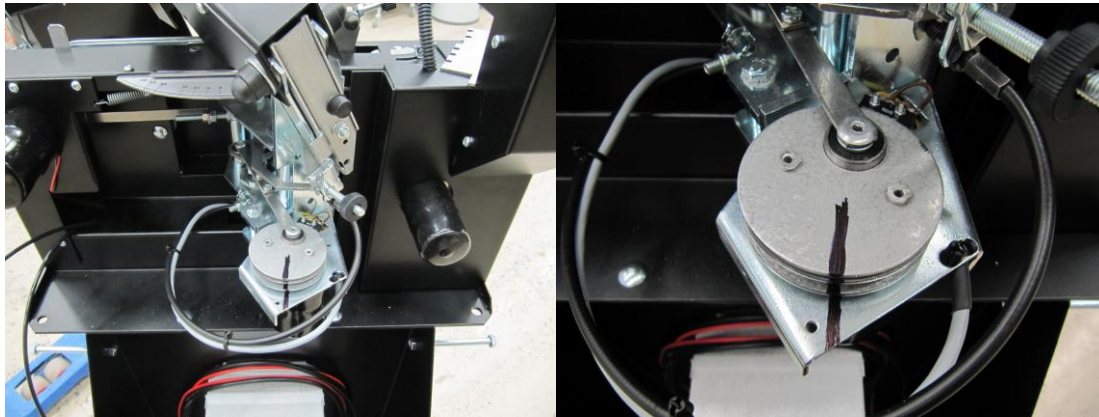
### NOTE;

- When changing from regular grinding to the 3AT1 mode this must be done as the chain is feed forward.
- Do not turn the 3AT1 mode Off during grinding, this can only be done as the chain is feed forward.

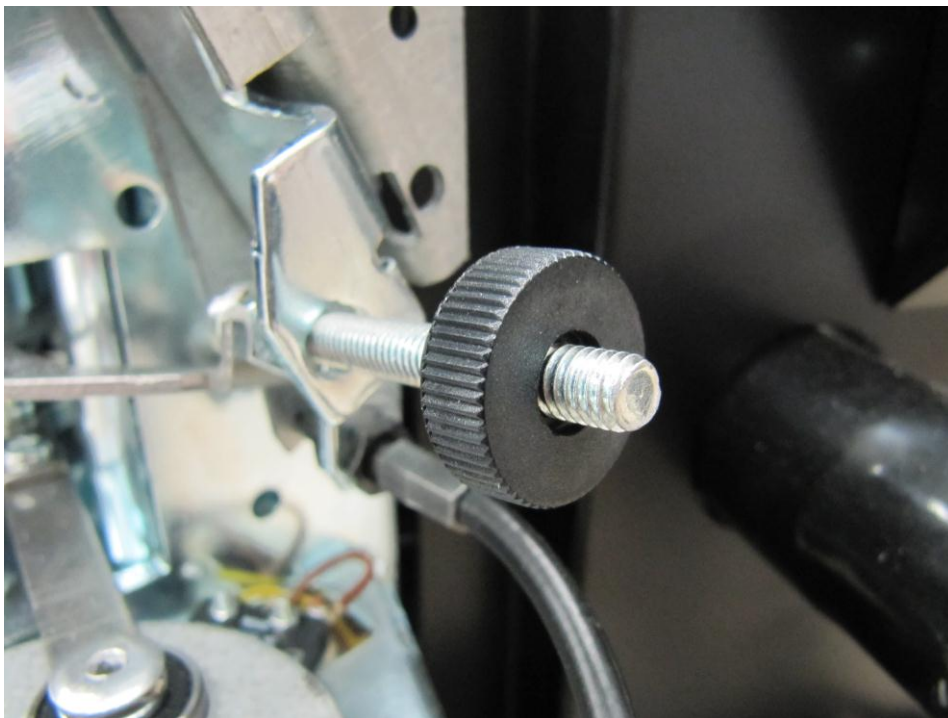




If the mode is turned On or Off at the wrong time the feeder motor might shut down, this will cause the machine to appear as "dead". If so, turn the power off. Look at the back of the machine and turn the control curve until the lines are in-line as shown below.



To control the depth gauge grinding, turn the plastic nut shown below.  
Turn clockwise for less grinding (higher lugs)  
Turn counter clockwise for more grinding (lower lugs)





## TRIAL SHARPENING

Test the various functions of the machine and study the motions. Always stop the machine when the grinding head reaches its uppermost position. The chain rulers are then “unlocked” and the chain is free. When you have done a trial run with the machine and feel familiar with it, you can put in a chain. Now test-sharpen a chain, following the instructions in under Sharpening cutting links. In the interest of safety, use an old chain.

## SHARPENING CUTTING LINKS

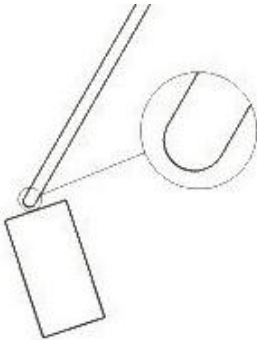


**Always use safety gloves when handling saw chains.  
Risk of cutting injury.**

To sharpen a chain in the Triplematic machine, proceed with these steps:

(Numbers correspond to parts shown on page 17))

1. Activate power (Power in) – 9.
2. Start grinding motor – 1.
3. Profile the disc – see picture below.



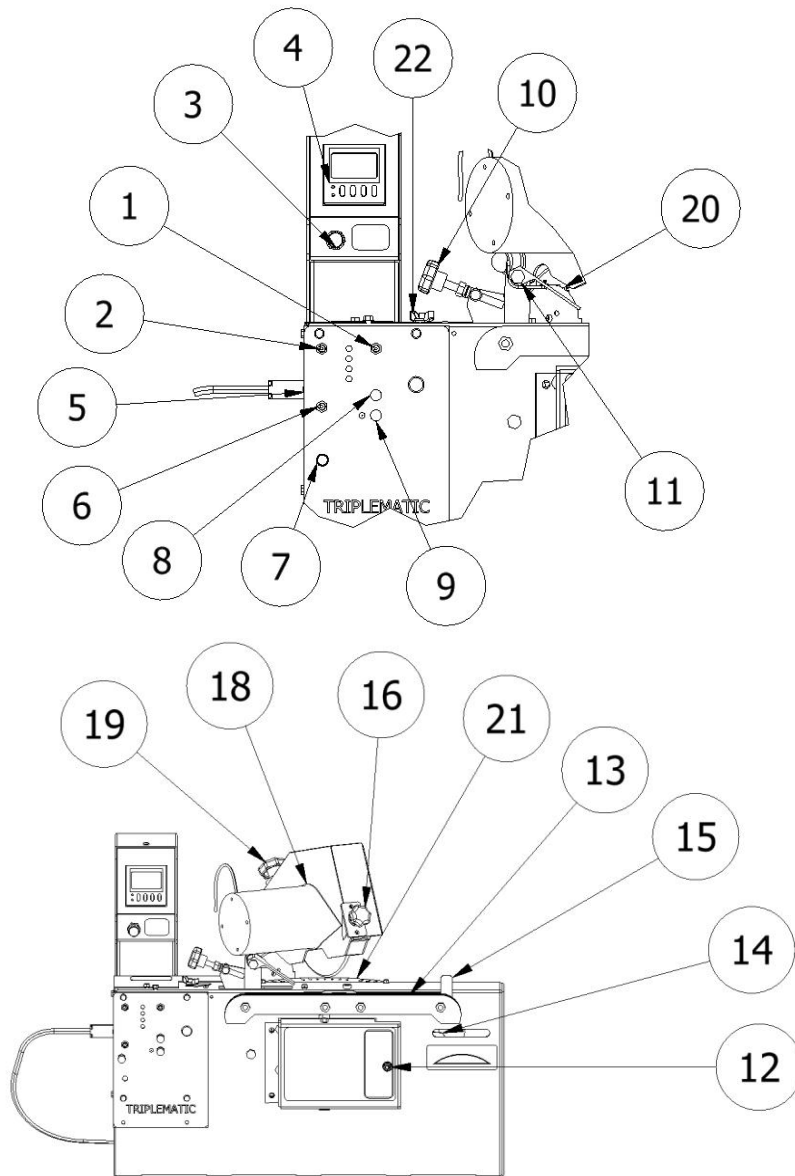
4. Turn grinding motor Off. – 1.

Place the chain to be sharpened between chain rulers 8.

Pull the chain around by hand and check that it runs freely in the chain rulers. Check also whether the chain has “double links”, that it does not have any burrs on the drive links and that it is not damaged.

**NOTE: If there are double links, see the instructions for double links.**

## OPERATION GRINDING MACHINE



- Before grinding: Also read the chapter "Operation Stand and tensioner".
  - If the grinding head is pointing in wrong direction, push switch to change = switch 8.
  - Start automatic mode (feeding) = switch 2.
  - Set the stroke for the chain = wingnut 22.
  - Program the number of teeth to be grinded= counter 4.
  - Set the approx. sharpening depth = knob 19.
  - Set the approx. sharpening length = knob 10.
  - Start grinding motor = switch 1.
  - Finetune the sharpening depth. = knob 19.
  - Finetune the shapening length. = knob 10.
  - Stop the automatic mode. = switch 2.
  - Stop the grinding motor. = switch 1.
  - Adjust grinding speed. = Knob 3 (Grinding a lot of material = turtle)
- Pull the chain back to the first tooth grinded (If double link, start with the link to the left).  
Reset counter (red button) and start sharpening.

## OPERATION STAND & TENSIONER



**Always turn power off!**



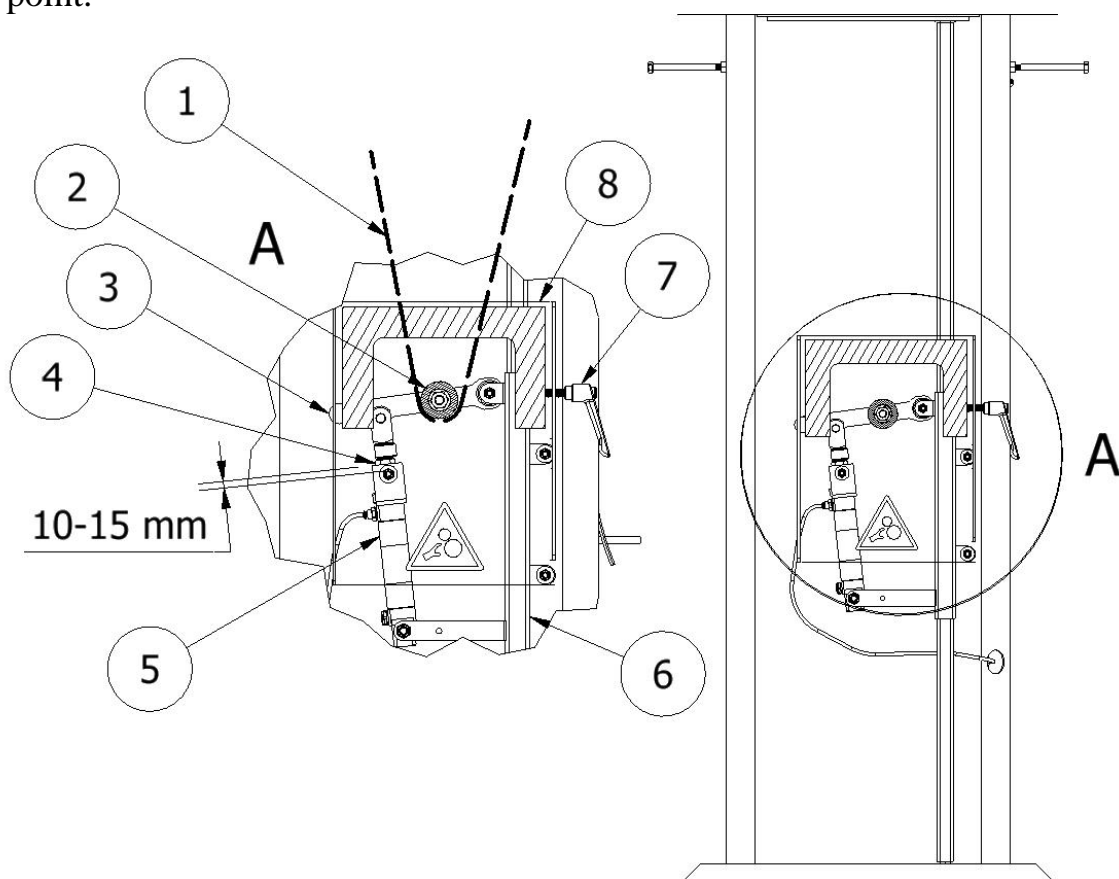
**Pinch point!**

NOTE! Keep hand, fingers and other body parts away from area behind the protective plastic sheet – Pinch Point!

Positions chain (1) placing it below the tensioner roll (2) by lifting the tensioner arm (3). If necessary, loosen handle (7) and move the tensioner upwards. There should be a gap of about 10-15mm between the nut (4) and cylinder (5) (10-15mm of the piston should be visible). Tighten locking handle (7) again.

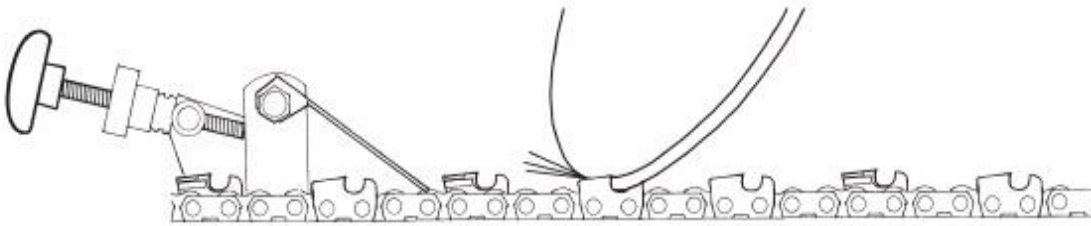
If the next chain to be sharpened has the same length, You will only need to lift the arm (3) when replacing chain.

NOTE! In case of emergency – loosen locking handle (7) to release tension and eliminate pinch point.



## SHARPENING DOUBLE LINKED CHAINS

If the chain has a double link, sharpening should start there. Begin with the left one as shown in picture below.



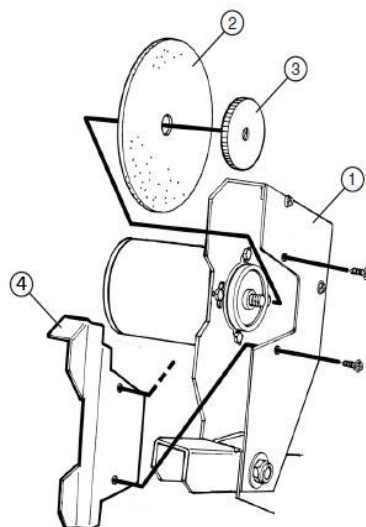
## MAINTENANCE

### Replacing the grinding wheel (disc)



**Always turn power off!**

1. Lift the grinding head (1) and remove the guard (4).
2. Hold the grinding wheel (2) and loosen the nut (3) manually or with a pair of pliers.
3. Remove the old wheel and fit a new one. Tighten the nut by hand (3).



## SETTINGS AND SERVICE

If one cutting link gets too deep or too shallow in comparison to the next one, this can be adjusted by turning the knob in front of the grinding head ( see chapter "*Grinding wheel adjustment depth*"). The machine is almost maintenance-free, but it should be kept clean by removing any grinding dust.

The wires in the machine must be inspected after 40 hours of operation. Tension and condition should be checked (see chapter "*Wireadjustment*").



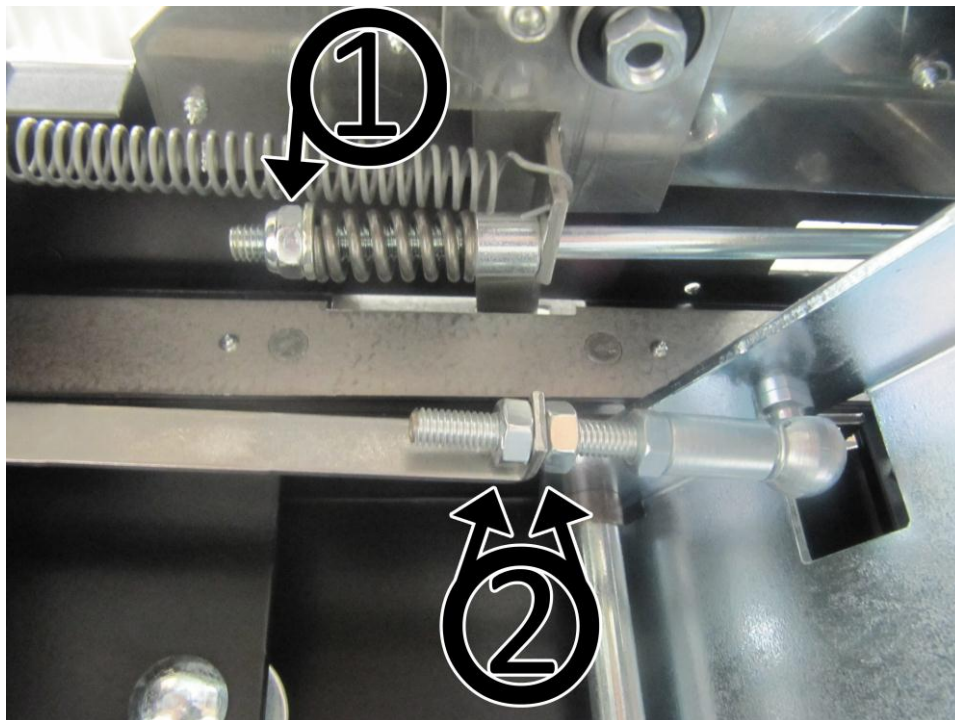
**If the wire is in poor condition. replace immediately!**

## TROUBLESHOOTING



**Always turn power off!**

- Chain is not fixed during sharpening = Chain locking device must be tightened. Tighten the M6 nut (1) on the back of the machine. Start with 1 turn clockwise, a bit more if needed. (See picture on next page)
- Grinding angle shows for example 35° in one direction and 25° in the other when turning the grinding head. This is adjusted with a pair of M6 nuts (2). Adjust in steps of ½-turn. Turn the head left to right and control the grinding angle. Adjust until angle is the same in both directions. (See picture on next page.)

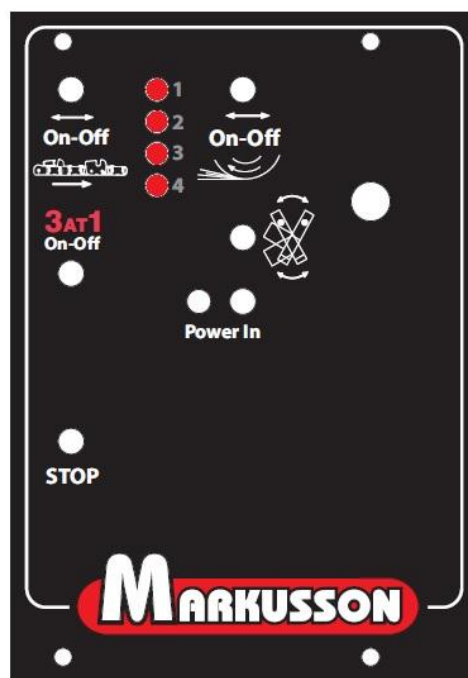


**More thorough servicing or troubleshooting must be done by the dealer's servicing team.**

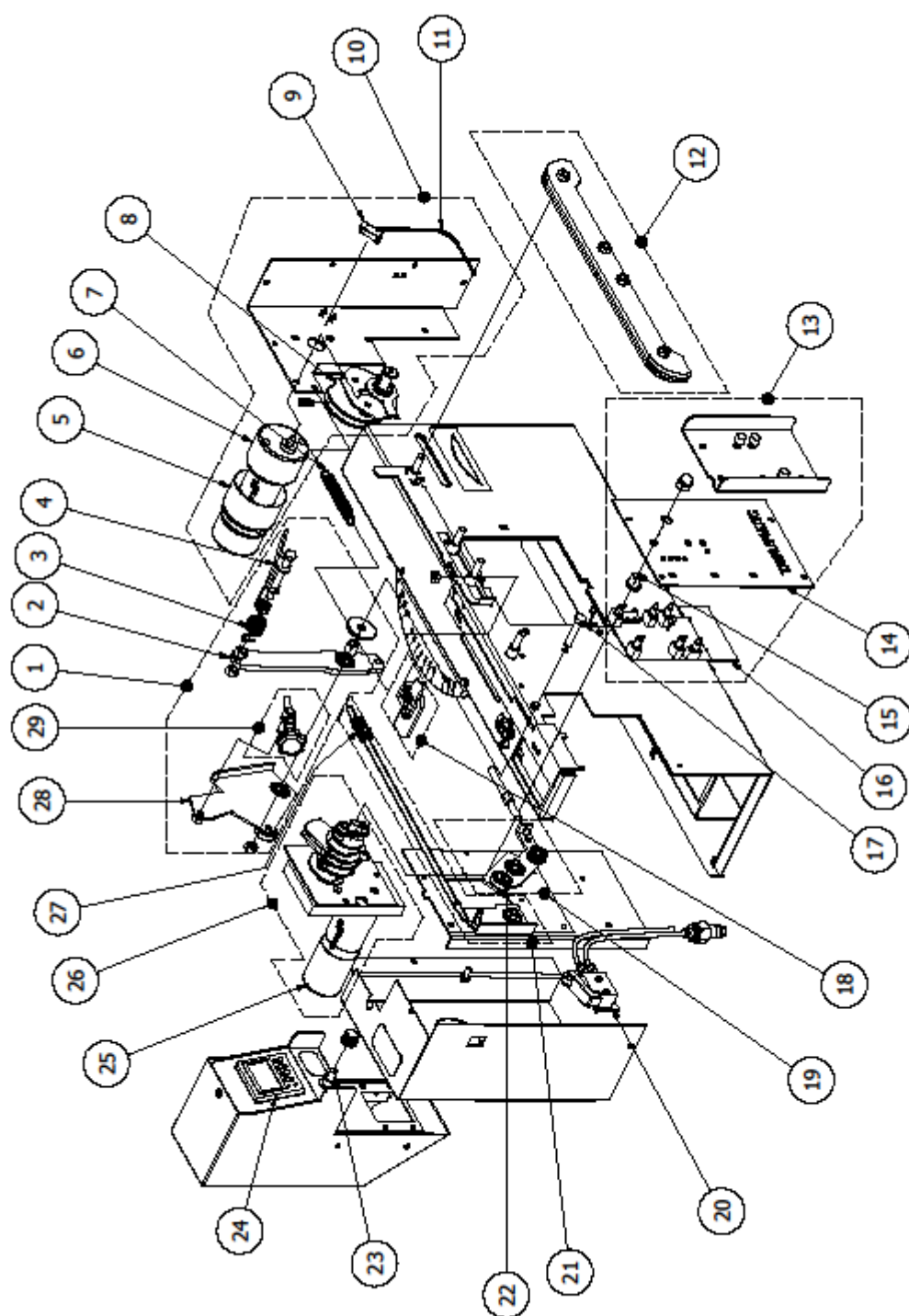
### Indication LED

The LED's 1- 4 can indicate problems with the motors:

1. Turning motor pulse
2. Error turning-motor
3. Error chain motor
4. Error 3AT1 motor



## EXPLODED VIEW

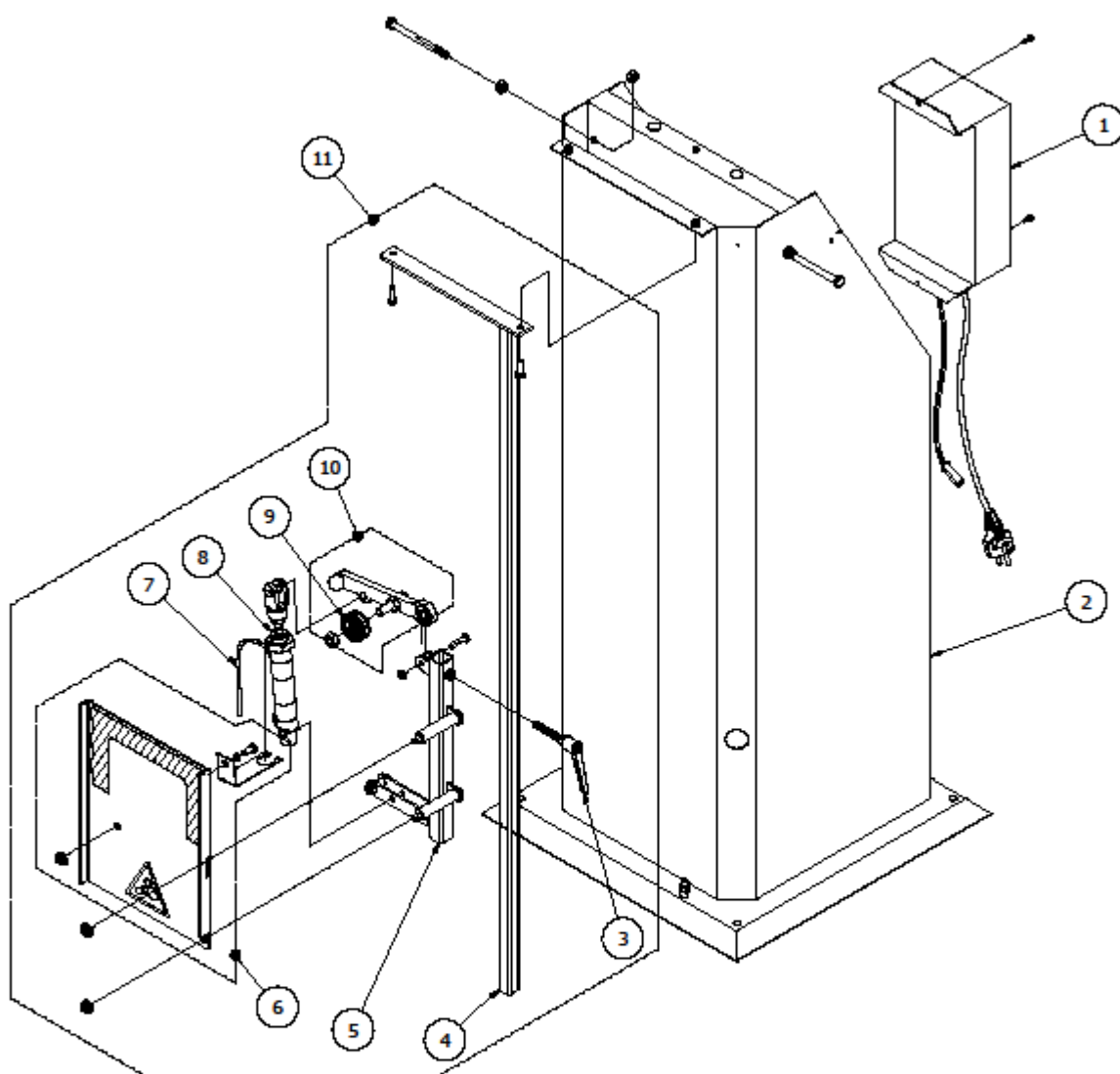






Pos/skiss	Art.nr / Part	Benämning / Sv.	Description / Eng.
1	13-046	Frammatning kmpl	Mover unit assembly
2	13-114	Frammatararm	Holder
3	13-045	Fjäder	Spring
4	13-044	Frammatarplåt	Mover
5	13-025	Motorskydd	Motorcover
6	13-026	Vändmotor	Motor
7	13-043	Fjäder	Spring
8	13-129	Brytarkurva kmpl	Cam curve assembly
9	13-029	Microbrytare	Microswitch
10	13-101	Motor komplett	Motor assembly
11	13-102	Kabelstam	Wiring harness
12	13-103	Kedjelinjal	Chain rails
13	13-104	Styrkort komplett	Control unit assembly
14	13-105	Panelplåt	Control plate
15	13-032	POE Lager	PDE Bearing
16	13-106	Styrkort kmpl	Control unit (PCB) assembly
16	13-106B	Styrkort	Control unit
17	13-034	Bult M6X40	Bolt M6X40
18	13-107	Kedjelåsning	Chain locking
19	13-108	Wirelyftare kmpl	Wire lifter assembly
20	13-605	Tryckluftsväventil kmpl	Pneumatic valve assembly
21	13-037	Låsdragstång	Lock axle
22	13-038	Kullager 626ZZ	Bearing 626ZZ
23	13-109	Vridpotentiometer	Potentiometer
24	13-110	Räkneverk	Counter
24	13-110B	Batteri/räkneverk	Battery/counter
25	13-131	Motorskydd	Motorcover
26	13-111	Motor kmpl	Motor assembly
27	13-112	Tryckfjäder	Spring
28	13-113	Matararm	Pusher plate
29	13-047	Justerskruv kmpl	Adjuster assembly
40	13-115	Sliphuvud kmpl	Grinder head assembly
41	13-116	Slipkapa plåtsats	Grinding cover metal kit
42	13-058	Skyddsplåt	Metal Protection
43	13-117	Justerskruv kmpl	Adjuster assembly
44	13-118	Mutter for slipskiva	Nut for grinding wheel
46	13-062	POE Lager	POE Bearing
47	13-119	Vevstång	Turn arm
48	13-120	Axel	Axle
49	13-061	Fjäder	Spring
50	13-121	Vridbalk	Turner beam
51	13-112	Tryckfjäder	Spring
52	13-122	Motor kmpl	Motor assembly
53	13-123	Motor	Motor
54	13-124	Microbrytare	Microswitch waterproof
55	13-125	Länkarm komplett	Link arm assembly
56	13-126	Gradbalk	Degree Beam

57	13-066	Wire	Wire
58	13-127	Plastmutter	Plastic nut
59	13-065	Kullager 6000ZZ	Ball Bearing 6000ZZ
60	13-057	Slipmotor	Sharping Motor
61	13-128	Justermutter	Adjusting nut
62	13-056	Justerskruv kmpl	Adjuster assembly
63	13-130	Kablage	Wiring harness



Parts List			
POS.	BENÄMNING	DESCRIPTION	ARTIKELNR./PART NO.
1	Converter	Converter	802
2	Stativ	Stand	14-500
3	Låshandtag	Locking handle	14-601
4	Spännstång	Tensioner pipe	14-602
5	Kolvhållare	Piston holder	14-603
6	Skyddsplast kompl.	Protective plastic compl.	14-604
7	Luftslang	Air hose	14-605
8	Kolv	Piston	14-606
9	Spännrulle	Tensioner	14-607
10	Spännarm kompl.	Tensioner bracket compl.	14-600
11	Luftdriven kedjesträckare kompl.	Air operated chain tensioner	14-600

## EC DECLARATION OF CONFORMITY

Manufacturer:

Markusson Development Systems AB  
Tegelbruksvägen  
762 31 Rimbo, Sweden

Hereby declare that:

**Triplematic**

Has been manufactured in compliance with the following EC directives:

98/37 EC, The Machine Directive  
73/23 EEC as amended, The Low-Voltage Directive  
89-336/EEC as amended, The EMC Directive

The following standards were used as a basis for this declaration.

EN ISO 12100-1, 2  
EN 61000-6-3, EN 55014-1, -2

Signed:

CEO: Pär Markusson

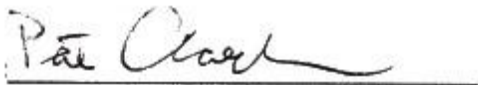
Company:

Markusson Development Systems AB  
Tegelbruksvägen  
762 31 Rimbo

Date: 2011-08-01

Place: Rimbo

Sign:

A handwritten signature in black ink, appearing to read 'Pär Markusson', is written over a horizontal line.