WARNING !

Before starting up the saw, please remove protections of counterweight and flywheel. They can be simply recognized because of red marks on fixing protectors on slideways on both sides of counterweight. Turning on the wire saw with blocked counterbalance can cause damage of driving electrical motor! After unblocking of the saw flywheel can be easily drived by hand.

Lubricate slideways every time before starting the saw.

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PRECISION WIRE SAW
Model: WS22

Series No.: 474
Year of production: 2014

INSTRUCTION MANUAL

WS 22

Safety Precaution Sheet

To be read carefully before use

- The wire saw should be used appropriately specified in the instruction manual.
- The operator must be fully instructed in the use of the instrument according to this manual.
- Remove transport protection of driving wheel before starting up the machine (see point 2.4.2. in the instruction manual).
- Check the model plate and mains voltage prior to the power sully connection.
- Check that the saw is standing firmly on the support in order not to tip over.
- Do not put your fingers to the mechanism and keep top cover closed during operation and fill the mixer with slurry.

Dismantling of any part of the machine, in case of service or repair, should always be performed by a qualified technician (electromechanical, electronic, mechanical, etc.).

The apparatus is designed for use with consumables supplied by UNIPRESS. If subjected to misuse, improper installation, alteration, neglect, accident or improper repair, UNIPRESS will take no responsibility for damage(s) to the user or the equipment.

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CE COMPATIBILITY DECLARATION

We K.D.UNIPRESS ul. Łosicka 16c, 04-856 Warszawa, Poland hereby declare for our exclusive responsibility that our product Precision Wire Saw WS 22 to which this declaration concern meets the necessary requirements (according to the Machining Statement 89/392 EWG and its changes 91/368/EWG, 93/44/EWG and 93/68/EWG) the following standards:

EN 292-2: 1991/A1 Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifictions

EN 953: 1997 Safety of machinery. General requirements for the design and the construction of fixed and movable guards.

EN 894-2: 1997 Safety of machinery - Ergonomic requirements for the design of displays and control actuators - Part 2: Displays

EN 954-1: 1996 Safety of machinery - Safety - related parts of cotrol systems - Part 1: General principles for the design

EN 1050: 1996 Safety of machinery. Principles for risk assessment

EN 60204-1: 1997 Safety of machinery - Electrical equipment of machines - Part 1: General requirements

CONTENS:

1. PACKAGE, TRANSPORT

1.1. RANGE

Precision Wire Saw WS22 is dispatched as a completely mounted machine, ready for operation. Consumables and spare parts listed bellow are dispatched together with the wire saw:

1. Bottle of oil	1 pc.
2. Bottle of glicerine	1 pc.
3. Container of carborundum powder 800 mesh	1 pc.
4. Spool with wire	1 pc.
5. Wire guide bar (1 set = 2 pcs)	1 set
6. Sample attaching glue	1 pc.
7. Spanner stick	1 pc.
8. Felt cleaner	16 pcs.
9. Drip-pan	1 pc.
10. Oil-can	1 pc.
11. Sample support V-block	1 pc.
12. Sample holder yoke	1 pc.
13. Instruction manual	1 pc.

1.2. PACKED - DIMENSIONS

A WS22 wire saw pack is a wooden box of the following dimensions:

lenght: 0.85m

width: 0.35m

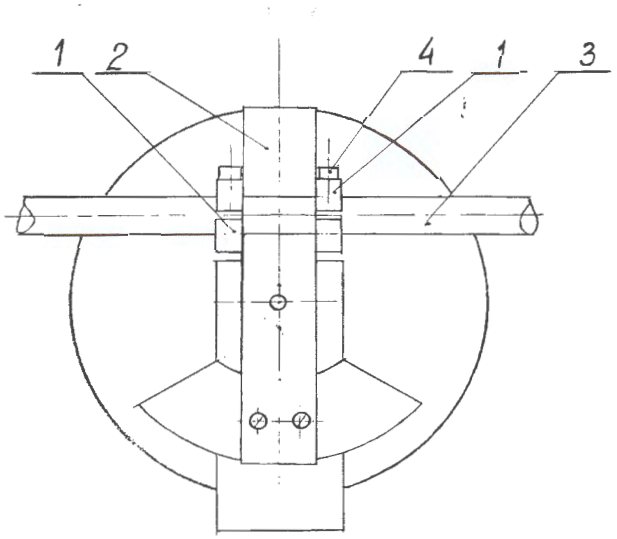
hight: 0.45m

The wire saw is fastened to the box bottom plate by the four screws and is placed in the bigest section of the box. The remaining part of the box is divided into three parts where consumables, spare parts and box with electronic unit are packed.

1.3. PROTECTION TRANSIT LOCKS

The wire saw is protected during transportation. These parts of wire saw are locked (locks are installed on the wire saw) during transport time (fig. 1):

- fly wheel (2) by the two special stoppers (1) marked by red paint which are instaled on the slideway (3).
- frame by fixing strip
-



1.Special stoper

2.Fly wheel

3.Slideway

4.Screw M5

fig 1

1.4. STORAGE TERMS

The wooden boxes with wire saws inside should be stored over -5°C in dry place. It is admissible to store them one on the other up to three at once.

1.5. MEANS OF TRANSPORT

- The box is equipped with two handles for easy carrying by two person.
- This box can be carried by a fork-lift truck. In this case qualified operating staff is required.

2. TECHNICAL CHARACTERISTIC

2.1. APPLICATION

The WS22 Wire Saw is a precision device for cutting or slicing hard and brittle materials, such as metals, ferrites, ceramics, stones etc. In particular it is useful for cutting semiconducting materials. The wire saw enables cutting of very thin slices (thicknes of 10μm) with smooth cut surfaces. This saw is recommended for cutting materials where losses of material should be minimized and cutting should not introduce crystal deformations or defects. The use of the special accessories (goniometers, orientation devices) extends the WS22 saw's application to precision cutting of crystallographically oriented crystals.

2.2. TECHNICAL DATA

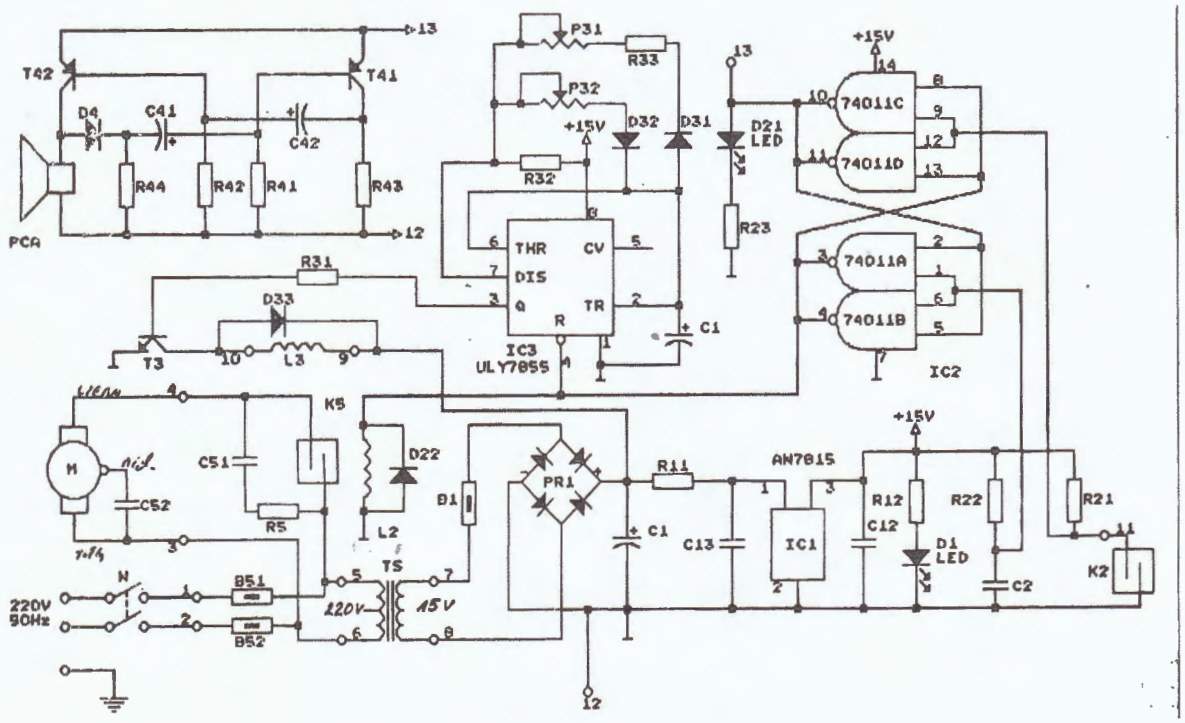
Power supply:	220 - 250V/50Hz
	or 110V/60Hz
Wire diameter:	20 - 60μm
Wire oscillation frequency:	300, 400/min.
Sample max. dimensions:	appr. 30 x 30mm
Weight:	48kg

Dimensions:	600 x 380 x 250mm
Mains fuses:	0.63A slow-blow for 220V
	1.25A slow-blow for 110V

2.3. DESIGN DESCRIPTION

2.3.1. The WS22 precision wire saws is equipped with:

- driving mechanism
- wire rewinding mechanism
- wire press setting mechanism
- sample positioning mechanism
- slurry mixing device
- automatic switch-off (AUTO-STOP)
- electronic control unit - see fig.2



N - main switch

M - motor

L3 - mixer coil

K2 - auto-stop switch

P31 - frequency setting

P32 - drop formation time setting

fig.2

2.3.2. The cutting operation is performed by tungsten wire covered with an oil or glicerin-suspended carborundum or boron carbide abrasive slurry. The wire moves back and forth in a swinging motion and cuts across the material in the vertical plane. To prevent excessive wire wear, new wire is continuously fed into the cutting area.

2.3.3. The motor is coupled by means of a rubber belt with a fly-wheel. Through a linkage drive it moves a frame on which the cutting wire is mounted. The frame slides in reciprocating motion along two parallel guide rods. To eliminate vibrations caused by large reaction forces, the device is mounted on heavy, rigid supporting plate.

2.3.4. The new wire is spooled off from a reel (1) (see fig.3) and the used one is spooled on the reel (2). Both reels are mounted on the same axis but there is a sliding joint between them. Reel (1) is turned through a small angle by each stroke of the wire frame. This rotation is transmitted from the smaller reel (1) to the bigger reel (2), by the special pad acting as a friction clutch (3). The difference of the reel diameters results in a permanent force tightening the wire. The clutch is used to compensate the difference in circumferential speeds of reels. The frictions is adjusted by the compressive force of the spring (4) which is blocked by thumb nut (5) and locknut (6). A greater friction causes greater tension of the cutting wire. The current wire tension is being shown by the indicator (7). It is recommended to record the position of the indicator before replacement of the wire with a new one. If the wire is replaced with a thicker one its tension should be increased and vice versa. Particular values of the tension are to be determined experimentally.

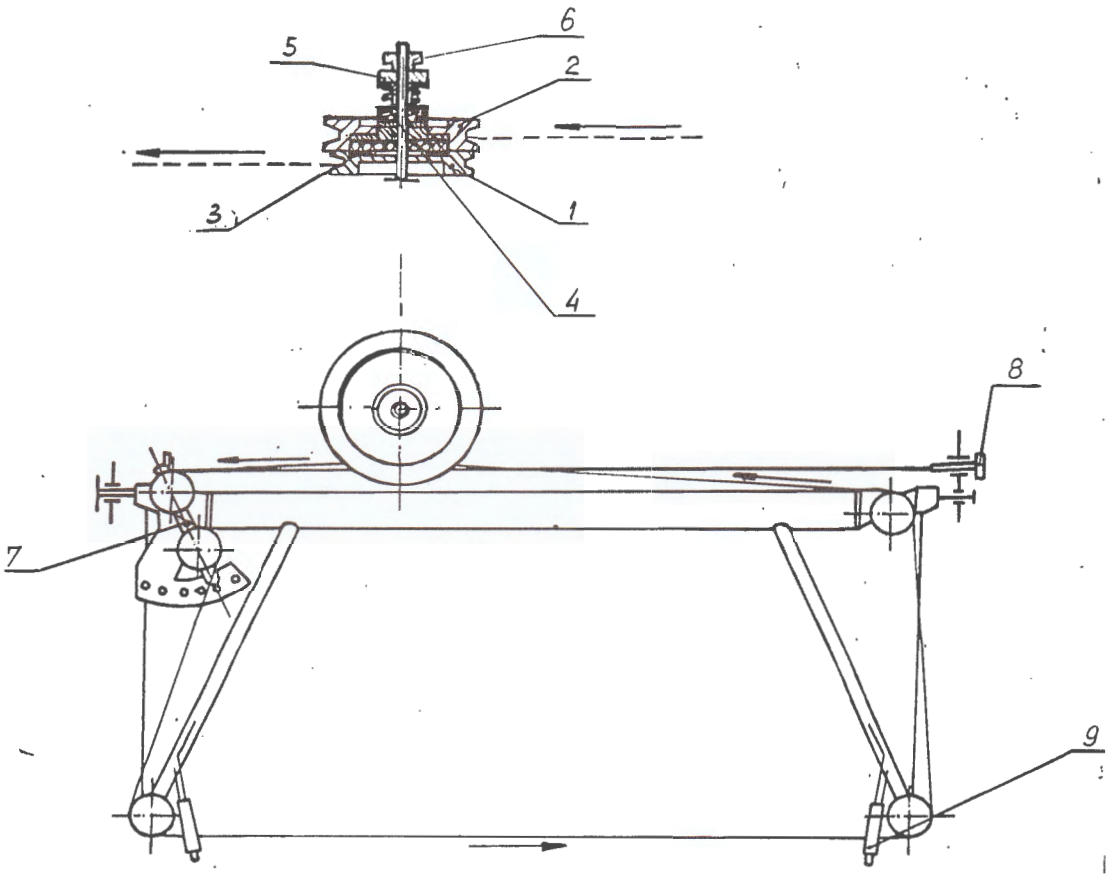


fig.3

The reel drive gear is powered by a ratched mechanism comprising small weight placed on a swinging lever. The inertia of this weight evokes the swinging motion of the lever as the wire frame oscillates. The spring pressing the pawl against the ratchet wheel should act only as strong as to obtain a correct mechanism operation. This can be checked by moving the swinging lever right and left by hand, and watching if the ratchet wheel moves. When the pawl withdraws, the wheel is stopped by the spring placed underneath. Strong pawl spring pressing causes the pawl and wheel teeth wearing. In that case, one can turn over the pawl: its every corner is machined in the same way and can work as a locking tooth. The swinging weight position can be adjusted: it ought to be placed as near the lever axis as necessary to operate the ratchet mechanism. Shorter acting arm develops smaller forces and ensures less wearing.

2.3.5. The wire press against the sample is adjusted by turning the graduated knob (8) located in the rear right hand corner of the wire frame (see fig.3). The knob controls the torsional strain of the spring wire, producing a holding wire down force.

2.3.6. The cutting stretch of the wire is extended between two pulleys placed in the right and left corner of the frame. The exact working portion is carried by two guide bars (2) (see fig.5 point 2.4.6.) mounted on the swinging sample support. This design perfectly fixes the wire position. In the case of the guide bars wear (although they are made of very hard material - sintered carbides), they can be turned over and work at another face surface.
Note: both guide bars have to be turned over at once. To protect the wire from incidental breakage, the frame is provided with a removable plexiglass rod. During operation, the plexiglass guard rod can be taken off depending on the size of a specimen.

 Quality of specimen surface after cutting strictly depends on the surface of the guide posts.

2.3.7. The sample being cut rotates up to approx. 15° left and right about the axis perpendicular to the cutting plane in the swinging motion allowing to get an even, vertical

cut. The sample is attached to the support which enables to arrange the desired position of the sample.

Amplitude of the swinging motion can be adjusted after unscrewing special cup in the front panel.

2.3.8. The abrasive slurry is being supplied from a container placed above the sample. The container is provided with an automatic, electromagnetic mixer which, apart from the mixing of slurry, batches it with an adjustable capacity. Mixing and batching is controlled by an electronic circuit providing the possibility of programming of dropping frequency and the drop forming time. Control knobs are placed on the front panel of the saw control unit. Both parameters are to be adjusted experimentally, regarding the viscosity of the slurry and cutting requirements.

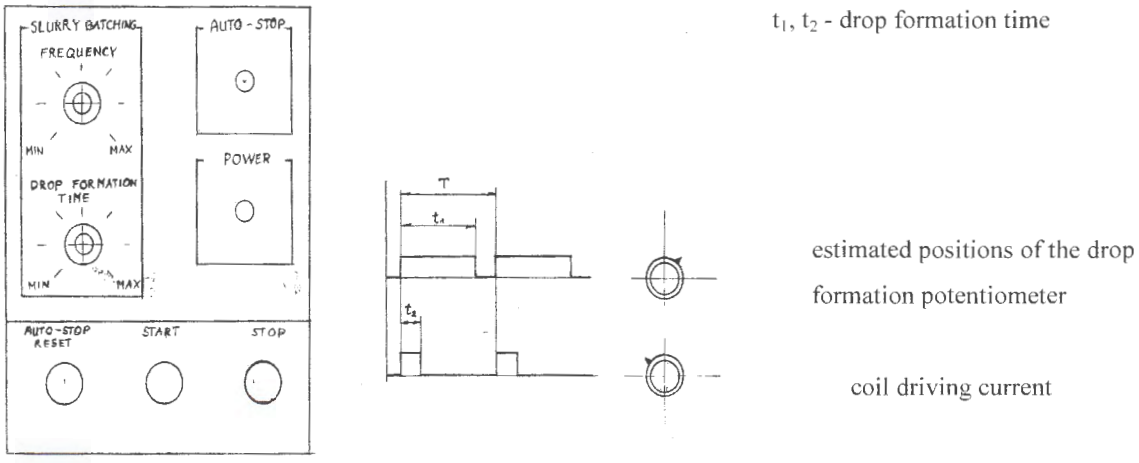


fig.4

2.3.9. The automatic switch off: the AUTO-STOP provides immediate drive stoppage when desired depth of cut has been attained or the cutting wire has been broken. Auto-stop element is a magnetic switch connected firmly with the frame of wire. **Switching OFF lever is settled by manufacturer and not adjustable.** In order to "memorize" desired depth, lean the wire of the sample and find (by means of an adjusting of the vertical support screw) its altitude corresponding to switch-over position of the auto-stop. Then raise the sample support by desired value. When the auto-stop operates red LED will be lit and buzzer will be heard. In order to restart the drive place the wire in higher position (putting on a new sector if necessary) and change over the AUTO-STOP RESET button switch to OFF and next to ON position.

2.4. OPERATING INSTRUCTION

2.4.1. Unpacking

- Remove foil anti dust cover
- Unscrew four fixing nuts in the corners of crank using wrench 13 metric size
- Take up the saw,

! the wire saw is heavy – two men are preferred for this operation

2.4.2. Installation instructions

- Before using the machine you must remove the transit protections (fig.1):
  - two special stoppers (1) marked by red paint which are installed on the slideway
  - fixing strip on the frame

  Keep the transit protections (special stoppers) for future use.
- Place the saw on a reasonably level surface - 80 ÷ 105cm high of a table is recommended. Check that the saw is standing firmly on the support in order, not to tip over.

 The table should be of strong and heavy construction (special Unipress tables are recommended - they can be delivered by request)

- Fix the wire guides in upper position (sliding them up in slots after releasing fixing screws).
- Clean and lubricate (suitable oil is attached) the guide rods. Do it every day before starting up cutting. Turning the fly wheel by hand make sure that the wire frame moves freely - the motion should be perfectly noiseless and smooth.

 Do not use oils of high viscosity (for example motor oils). It can cause serious damage of the driving mechanism).

- Check the tension of the driving belt. Adjust the tension if necessary.
- Connect box of electronic unit with the main frame of the saw . Electrical nine pin slot should be protect from disconnecting with two fixing screws.

 Before connecting electronic unit be sure that the saw is not connected to electrical power supply.

- Connect the saw to AC 220V/50Hz or to 110V/60Hz supply. Electrical connections must be made in accordance with local regulations and must be made only by means of a socket with earth connection, installed in accordance with established legislation. Voltage, power and consumption information is shown on the data plate placed on the side plate on the right side.
- Switch on main switch placed in the back of the saw power supplying socket.
- Start up the saw (pressing START button switch) without the sample and check if wire is displaced - make use of stroboscopic effect looking of one point on tooth wheel in the feeding mechanism.

2.4.3. Threading of the wire:

Wind out some 1m of the wire from the reel (1) (see fig.3 and point 2.3.4.). Fix the loose wire end to the reel (2) and wind some wire on it. Holding this reel with your fingers thread the wire through the pulleys and set up on his place. 50 μm wire diameter meets requirements for most purposes; a wire thicker than 60μm may cause the frame damage.

 Before this operation remove used wire from upper reel. Try to keep this reel empty.

2.4.4. The wire tension control:

The wire tension is controlled by the spring (4) (see fig.3 point 2.3.4.). In order to adjust the wire tension, loosen the upper nut (retaining nut) (6) and then turn the lower thumb nut (5) to obtain proper spring compression. The required tension depends on the wire thickness. The best results are obtained when the force tensing the wire is nearly equal to its tensile strength. Tightening up the nut increases the wire tension.

After every change of holding down force, or relative displacement of the reels, the steady-state conditions of the clutch must be achieved. This can be set by turning the ratchet wheel by hand anticlockwise until the wire tension indicator remains in one position. If the indicator moves constantly in one direction it means that the clutch does not operate in steady-state conditions. The wire tension should be set as high as possible, but not to high, as small changes of the tension might break the wire. If the consecutive tests fail, check the clutch facing. In case of impurity, clean it with alcohol. Average settings for 50μm wire is the third point, 60μm fourth point, 40μm between second and third point. Use these settings as a guidance only, they can vary a little on your saw.

2.4.5. Sample attaching:

Attach the sample to the sample support using a special low temperature glue delivered together with the saw as consumable (under special request K.D.Unipress can manufacture glue of different temperature characteristics). Stick the sample to the slide-in plate of the support (see fig.5 point 2.4.6.). To avoid the wire cutting into the edges of the support, it may be the necessery to mount the sample on a piece of soft material (turbax, wood, etc.). Very thin slices can be obtained if they are attached to a supporting substrate. A piece of glass should be glued to the cut surface of the sample: in the next cutting operation one obtains a slice attached to the glass. Most accurate cutting can be performed when the frame speed and the wire pressing on the sample are of very small values. Besides the above, a very important factor affecting the precision is the distance between the wire guide bars. They ought to be clamped with screwed plates as near the sample and each other as possible, even not being parallel. This condition has to be competed when cutting the thinnest slices i.e. 10μm thick.

2.4.6. Sample positioning:

The sample being cut swings up to approx. 15° left and right about the axis perpendicular to the cutting plane in the swinging motion allowing to get an even, vertical cut. The sample is attached to the support which enables to arrange the desired position of the sample. Two screws with scales are used for moving the sample along two perpendicular axes with the accuracy of ±5μm along the horizontal axis and ±100μm along the vertical one. The angular adjustement of the sample position can be accomplished in two planes, by loosing clamp screws (4), (7) (see fig.5) and tightening them again after the required sample rearrangement. Loosen screw (4) and place the slide-in plate in the support: then tighten it. Loosen screws (7) and (5) and orient the sample as desired. Using the micrometric screws move the sample to the desired position for cutting.

1. Sample
2. Wire guide bar
3. Cutting wire
4. Screw 4
5. Sample orientation screw 5
6. Sample support V-block
7. Sample orientation screw 7

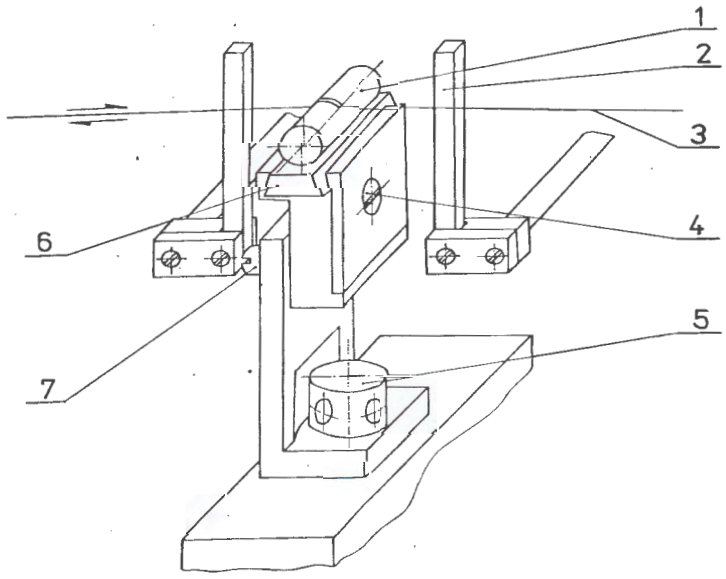


fig 5

You can place the sample in a little vice (fig.6) instead of attaching it to the support as well. Change the V-block (6) (fig.5) on the little vice. Place the sample on a special V-block (1) (fig.6) and hold down it with the press bolt (5). Remember that the end of the sample you will cut should protrude from the special V-block (1).

1. Special V-block
2. Jack pin
3. Rubber end
4. Body
5. Press bolt

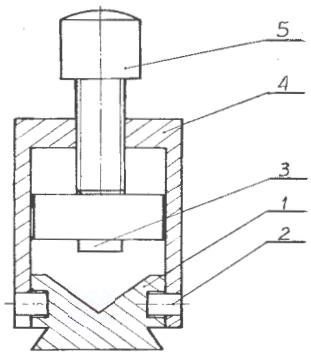


fig 6

2.4.7. Frame positioning:

- The criterion of the above is the wire operation position: the wire has to be pushed out by the wire guide bars not more than 1mm. If the wire slag (the deflection) is not equal at the both guide bars looking from the above, it means that the parallelism of the frame has to be adjusted.
- Turn slightly the eccentric plates retaining the axial position of the frame.
- Set the centers of the frame and the wire guides in the one line.
- Applay a rule to the wire guide
- If it is good then loose screws half turn ! do not unscrew them completely.
- Set the suitable position
- Fasten the screws

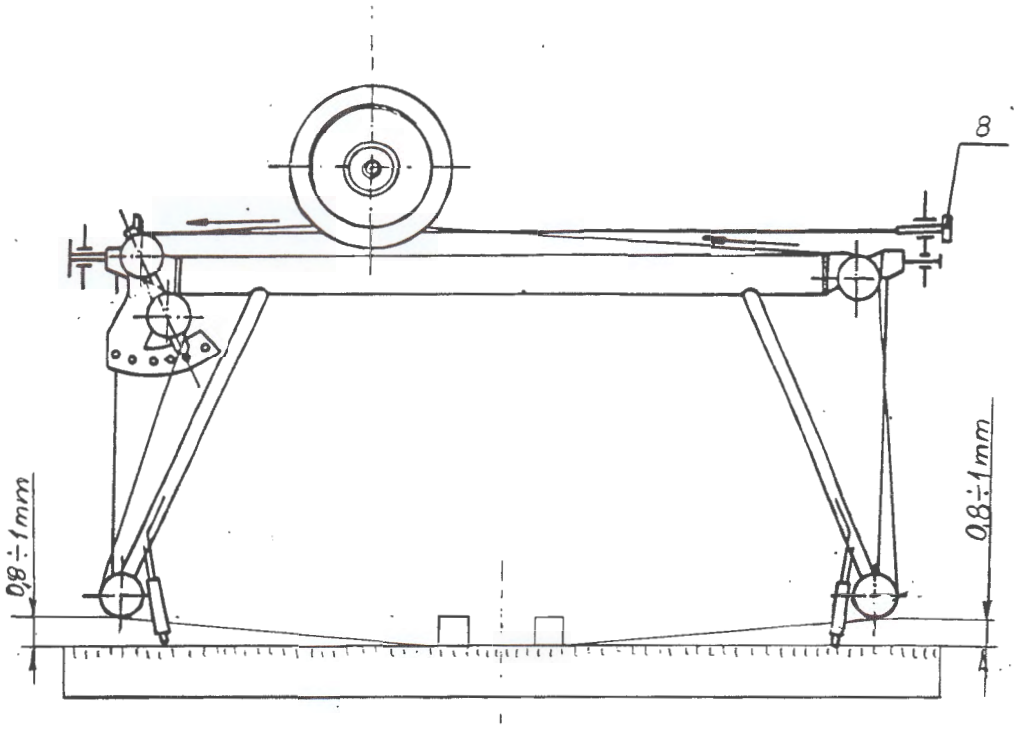
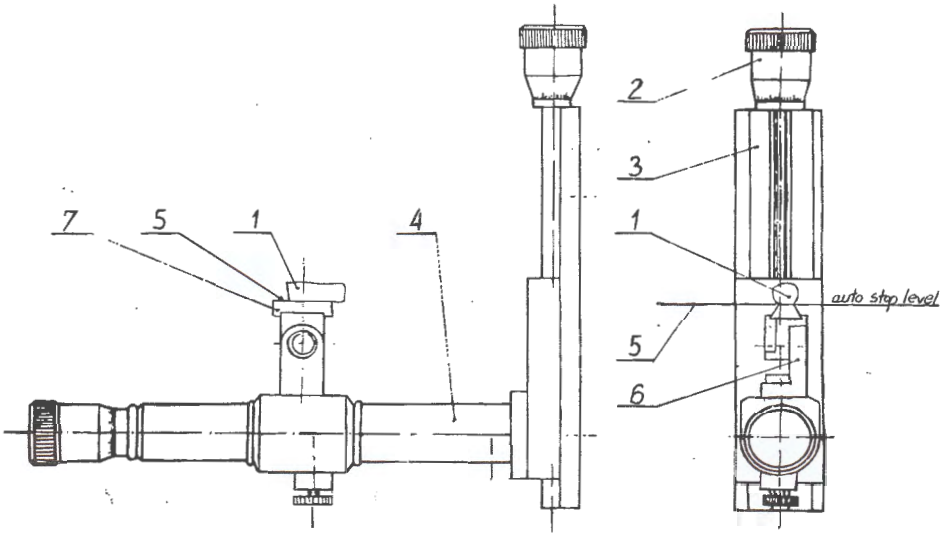


fig.7

2.4.8. Auto-stop adjustment:

Auto-stop level is set up in the workshop and it is not supposed to be adjusted by the user.

Adjust the cutting depth of the sample (1) by adjusting the vertical position by the handwheel(2) which is on the top of the vertical slideway (3). The spacemen should be positioned above the fixed auto-stop level. The sample should be on the right highest to switch on automatic stop (auto-stop) after cutting off and stop the saw. This mechanism should also work after breakage of the wire. To check auto-stop level switch on the saw do not start the saw or press STOP push button. Move carriage with frame to the right corner Auto-stop lever should be about three cm away from the frame of the saw. Lower the frame with wire until buzzer and flashing diode starts to operate. In this moment position of the wire assign „auto-stop line".



1.Sample

2.Handwheel

3.Vertical slideway

4.Horizontal slideway

5.Cutting wire

6.Sample support V-block

7.V-block

fig.8

2.4.9. Adjustment of a force the wire presses on the sample:

Place the wire in contact with the sample. By turning knob (8) (see fig.7 point 2.4.7.) adjust the pressure:

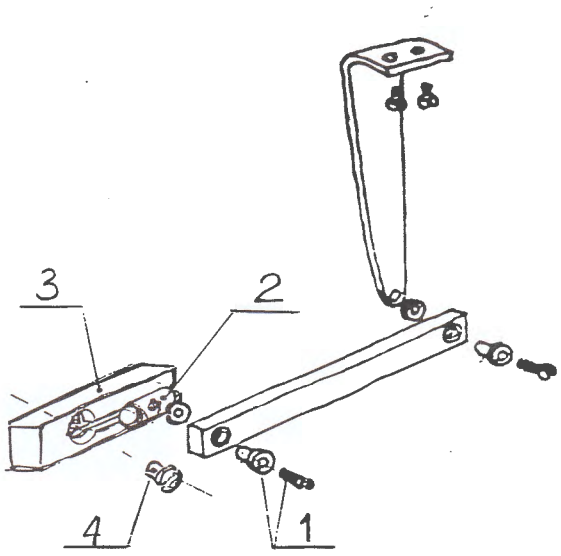
- increase press by turning knob (8) counter clockwise direction
- decrease press by turning knob (8) clockwise direction

The cutting speed increases with pressure but cutting section becomes less even: the selected pressure is determined by the user according to the experience.

Too big wire press to the sample can cause unparallel to the guide posts and not flat cut surface.

2.4.10. Adjusting of the amplitude of the swinging motion:

- Unscrew the special cup in the front panel.
- Loose the rod axle (1) fig.9 in the eccentric adjusting slider (2).
- Displace the adjusting slider (2) in the eccentric (3) adjusting the length of the eccentric arm
- Screw the rod axle (1) in the suitable position



1.Rod axle
2.Adjusting slider
3.Eccentric
4.Screw

fig.9

Do not unscrew the screw (4)

2.4.11. Preparation the abrasive slurry:

Mix light machine oil or glycerin with carborundum powder of 3:1 up to 10:1 volume proportions. The bigger sample the more liquid is necessary to get the abrasive slurry into cutting area. You can add less liquid to the boron carbide abrasive slurry because of its slower sedimentation.

2.4.12. Fill up the slurry container:

Unscrew the upper cup of the container and fill the container with the prepared slurry.Screw the container cup into the electromagnet casing. Adjust container position to let the slurry drop on the sample cutting area. Set the frequency and drop forming time having the saw drive started.

 Do not open the slideways cover during filling up the container. Do it very carefully to avoid accidental dropping of the slurry to the slideways.

 Do not leave the slurry in the mixer. Sedimentation of the powder can cause jam in the mixer dropping pipe. If you cut the same material the slurry can be reused many times.

2.4.13. A test turn of the saw frame before start:

After long time of not using of the machine turn the fly-wheel by hand at least one complete cycle to check whether all the mechanisms work properly and that the wire is carried by the guide bars at the extreme positions of the swinging sample support.

 Switch off power system during this operation.

2.4.14. Wire saw start-up:

- Switch on the saw than press START.
- If the saw does not start moving at once (it will happened when the saw was not used by long time), switch off the saw, lift the plexiglass cover, clean the slideway from dust and old lubricant, drop some light oil from the attached drip-pan on the guide rods, turn the fly-wheel by hand to assist the initial stroke, close the cover and switch on the saw.

 All covers must be closed all the time except while checking or adjusting the saw.

2.4.15. Check the wire feeding during the operation:

This can be done observing the gear wheel at the left or right dead centre of frame movement. Looking through the holes made in the gear wheel, the human eye inertia enables to notice slow rotation of gears driving the reels. That quasi-stroboscopic effect can be most easily watched from the point strictly above one of dead centers.

 Do not stop the saw during cutting unless it is necessary.

 Each stoping of the saw during cutting makes the surface a poorer.

3. MAINTENANCE

After use the saw should always be cleaned.

- Cleaning of the mixer container. After cutting remove mixer from the electromagnetic casing unscrewing it and clean using warm but not hot water.
- Absolutely no abrasive slurry should remain on the slideways. The slideways should be cleaned and lubricated with light machine oil every 20 hours of operation.
- The micrometric screws have to be protected from the slurry by a rubber cover. They should be periodically washed with trichloroethylene or petrol.
- The same applies to the wire pulleys and the wire reel gear drive.
- Once a day after cutting dismantle the slurry container and clean it with a dissolvent (not acetone).
- Replace soiled felt cleaners (9) (see fig.3 point 2.3.4.) with a new one (every 100 hours of operation).
- The motor bearings are all life-type and require no lubrication.
- In order to adjust the tension of the driving belt loose the fixing screw, adjust the tension and tighten the screw.

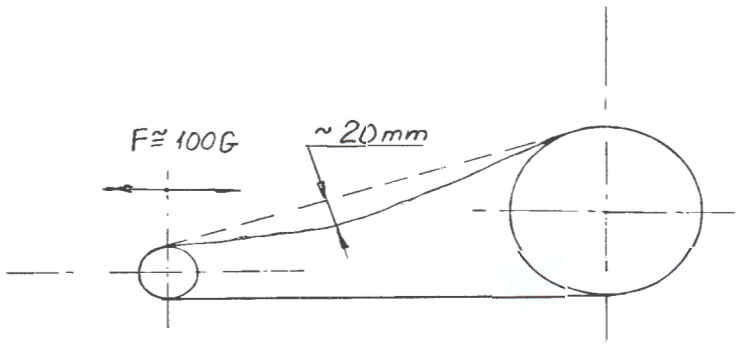


fig.10

When, during the use, the wire tension calls for permanent increase of the spring thrust it means, that the clutch friction pad got oil and it has to be cleaned with petrol for excessive grease removal.

4. FAULTS AND REMEDIES

During the wire operation some inconveniences may be rarely encountered. Most common ones and relative remedies are listed bellow.

4.1. The motor is switched on but the saw not start moving. If the motor works it means that:

- the driving belt is slack; switch the motor off, adjust the tension roll
- the moving frame "sticks" to the guide rods; turn the fly-wheel by hand to indicate the operation. If the saw still not start, switch the motor off, make sure the guide rods are clean and lubricated with light machine oil. We recommend using of our oil.

 Using of another oil results in more extensive wear of the connecting-rod bearing.

4.2. The wire is not fed (this will result in immediate wire break).

- switch the motor off, check the operation of the ratchet mechanism (fig.11) when the wire drive is stopped (see point 2.3.4.), clean the pawl (1), its spindle and the gear wheel to make sure that no scuffing or gripping occur. Try to increase slightly the working arm of the swinging weight (2). Turn over the pawl if necessary. Set the stroke and the weight arm (3) with the feeding adjusting screws (4).

1.Pawl

2.Swinging weight

3.Weight arm

4.Feeding adjusting screw

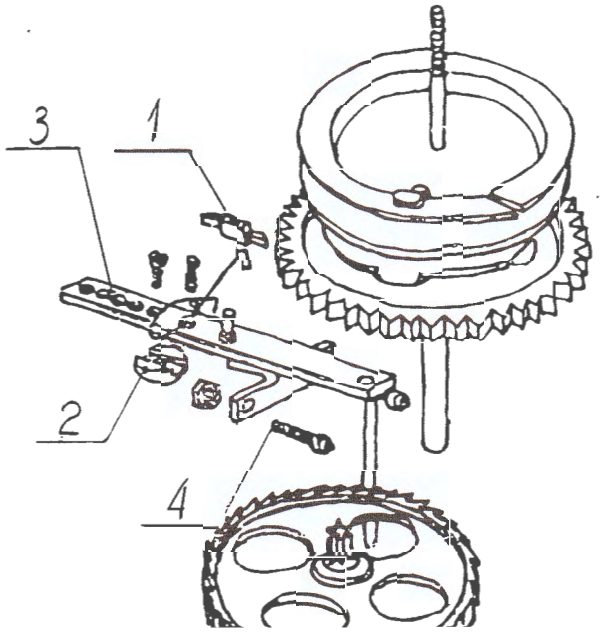


fig.11

4.3. The wire gets weaved in the gears and reels.

- switch the motor off, the probable cause is dirt, contaminations and wire clogging of the wire driving mechanism. Loosen the upper and lower retaining nut, remove both reels and driving gears; wash the clutch pad and the driving mechanism pieces in petrol. Lubricate and reassemble the reels and driving mechanism. Thread the wire.

4.4. The wire breaks.

- the wire is not fed (see point 4.2.)
- the wire tension is too big. Switch the motor off, decrease the reel spring compression.
- the frame (and the wire between pulleys) is not parallel to the guide rods (see point 2.4.7.).
- the force pressing the wire against the sample is too large. Switch the motor off, readjust the knob (8) (see fig.7 p.2.4.7. and point 2.4.9.).
- wire guide bars wearing. Switch the motor off, turn over both guide bars.

4.5. The wire tension decreases.

Switch the motor off, slightly increase the reel spring compression. If the same effect occurs permanently, dismantle the reels and the clutch pad, then wash the pad with petrol to remove exessive lubricants.

5. CUSTOMER SERVICE

Please direct any questions concerning the operation of the wire saw to:

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04-856 Warszawa

phone:+48 604457125, fax::+48 022 6155950

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6. WORK SAFETY

1. HAZARD IDENTIFICATION

In design and manufacturing of the precision wire saw (type WS22 and WS22B) the following possible hazards were taken into account:

1.1. Mechanical hazards

1.1.1.Hazard by cutting or abrasion in the cutting zone coming from the cyclic swinging motion of the cutting wire.

1.1.2.Hazard by the stroke of a palm by the frame extension arms for cutting wire and being in the swinging motion.

1.1.3.Hazard by drawing in or catching of the fingers as result of the incidental contact in the driving zone.

1.2. Electrical hazards

Hazard by the electric shock as result of the direct or indirect contact witch the electrically conducting parts.

2. Safety measures

The following safety measures were applied in the precision wire saw (WS22 and WS22B)

	DANGEROUS PLACES, HAZARDS	SAFETY MEASURES
1.	Cutting zone	fixed safety guard
2.	Driving zone	a) driving of the saw is placed inside its body b) fixed safety guard makes impossible direct access to the inside of the body.
3.	Electric shock protection a) by indirect touch	- electric insulation of all parts being under voltage, - protection by casing IP65
	b) by direct touch	- control voltage is 16V - continuity of the protective circuit

7. ADDITIONAL EQUIPMENT

7.1. WSXC-10 Laue Camera

The WSXC-10 camera is designed for the orientation of single crystal samples where cutting is required along strictly determined crystallographic planes. It is used to hold crystals in the process of determining crystallographic orientation using Laue back reflection. The diffracted beams are registered by the wet film photographic method.

A crystal can be rotated 360^{o} in one axis with 0.1^{o} vernier and 120^{o} insecond axis with 0.1^{o} vernier.

WSXC10 X Ray Laue Camera - this is the set consisting of:

- WSG-01 Goniometer
- optical track with screen
- a wire saw adapter that holds the system on the wire

After the crystal is properly oriented, the whole WSG-01 goniometer is transferred to WS 22 or WS 22B Wire Saw for cutting the oriented surfaces or slices.

7.2. WSG-01 Goniometer

The WSG-01 goniometer can be fixed to the WS 22 or WS 22B Wire Saw. It is constructed of hard stainless material. The scales are deeply engraved and filled with a black paint. The crystal is cemented to a mounting table which is the central element of the goniometer. There are precision rises available to increase the height of the goniometer when working with crystals that are too small to reach the beam. If the face of the crystal is rotated to a position that is not in the path of the x-ray or optical beam, the table can be moved up to 10 mm on either side of the center in order to realign the crystal with the x-ray or optical beam.

After the required orientation of the sample in the WSXC-10 Laue Camera is obtained , the goniometer WSG-01 assembly completed with the support and the sample has to be transferred to the wire saw (fig.4). It can be slid over the swinging support at the saw and set in correct position by turning the micrometric screws.

7.3. Vacuum sample holder

The Vacuum Sample Holder is designed to use a vacuum to hold a 4cm * 6cm glass plate, on to which samples are fixed with wax. The glass plate is held against a stainless support plate with vacuum and is placed firmly against 3 locating pins to maintain its position.

7.4. MST 131 Microscope holder

The mikroscope holder is designed to fix and move streomicroscope head on wire saws frame. Usage of stereomicroscope with measurment eyepieces enables the most precise positioning of the sample and cutting of extremely thin slices.

7.5. MST 131 Microscope head

The MST 131 stereoscope head
is one of the assemblies of the MST 131 stereomicroscope.
This device is equipped with a light which has a power supply separate from the saw.
The MST 131 is equipped with several eyepieces to allow changing of magnification.

Technical data:

- magnification
  - with 10x eyepiece 6.3x-40x
  - with 20x eyepiece 12.6x-80x
  - with 25x eyepiece and N 1.6x lens 25.2x-160x
- visible field
  max 40mm (magn. 6.3x)
  min 1.5mm (magn. 160x)
- lens magnification 0.63x, 1.0x, 1.6x, 2.5x, 4.0x
- light: two lamps 6V/15W
- measuring eyepiece : 12STS
  magn. 12x
  10mm scale divided to 100 parts.
- standard accessories
  10x eyepieces
  25x eyepieces
  N1.6x lens
  12x measuring eyepiece
  12x eyepiece

- special accessories
  NSP straight microscope head
  20x eyepiece
  NFSB1 photographic mount
  NFSM1 photographic mount
  vertical light prism
  X-Y table
  swivel and displacement table