PORTABLE BORING AND WELDING COMPLEXES

“AVANTECHNO”

MODELS 411 / 611

OPERATING MANUAL

Sliven, Bulgaria tel: +359 882 49 88 38 www.avantodin.com

Contents

Standard configuration AVANTECHNO

Equipment	411	611
Drive unit in assembly	1	1
Control panel in assembly	1	1
Cable 220V	1	1
Transport stand holder	1	1
Centering set	2	2
Main boring bar Ø 40 mm	2200+ 1800 / 3x1500	-
Main boring bar Ø 60 mm	-	2x2000+ 1000 / 3x1500
Conical bar joint	1 / 2	1 / 2
Main support in assembly	2	2
Subsidiary support in assembly	2	2
Support fixtures	4x12	3x12
Reinforsing flange for supports (star) Ø 350 – Ø 600 mm	-	2
Measuring gauge 0,01 mm	1	1
Measuring gauge holder up to Ø 400 mm	set	-
Measuring gauge holder up to Ø 600 mm	-	set
Callipers up to Ø 400 mm	set	-
Callipers up to Ø 600 mm	-	set
Cutting bits (rhomb 6 mm)	10	10
Cutting bit holder Ø 10 mm (for bits rhomb 6 mm)	1	-
Cutting bit holder Ø 12 mm (for bits rhomb 6 mm)	-	1
Anti-vibration tool holder reinforcement Ø 105 up to Ø 230 mm	1	-
Anti-vibration tool holder reinforcement Ø 130 up to Ø 250 mm	-	1
Anti-vibration tool holder reinforcement Ø 200 up to Ø 400 mm	1	-
Anti-vibration tool holder reinforcement Ø 200 up to Ø 600 mm	-	1

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Equipment	411	611
Welding bar telescopic up to 1800 mm	1	1
Transitive nut for rotation	-	1
Mounting device for the transitive nut	-	1
Transitive nut for rotation	-	1
Electric contact ending	5	5
Welding gas nozzle	5	5
Welding torch	set of 5 pcs.	set of 5 pcs.
Welding machine connecting cable - 3 m	1	1
Tool holder fastening screw M8 x 10	5	-
Tool holder fastening screw M10 x 20	-	5
Bolt M14 x 40	12	12
Bolt M14 x 55	-	6
Bolt M14 x 60	12	6
Bolt M14	-	12
Washer	-	6
Lock nut M14	12	12
Special wrenches	set	set

Documentation		
Operating manual	1	1
Technical passport	1	1
Warranty coupon	1	1

Auxiliary equipment and materials AVANTECHNO

Equipment	411	611
Boring Set 4020 – from Ø 25 mm up to Ø 50 mm	set	-
Boring Set 6030 – from Ø 35 mm up to Ø 70 mm	-	set
Boring Set 6040 – from Ø 45 mm up to Ø 100 mm	-	set
Facing Head Ø 40 mm	set	-
Facing Head Ø 60 mm	-	set

Auxiliary equipment and materials for operating with “AVANTECHNO” Boring and Welding Machines

Equipment
Semi-automatic welding machine Telwin Mastermig 270/2 (or analogous to it)
Semi-automatic welding machine inverter type “Avantechno-250” 3x380V; 250A
Welding wire EN 440 0.8 G3Si1 cassete 15 kg
Cutting bits
Cutting bit holders
Gas (Ar+CO_2) mixturing device BM-2M (Germany)

Manufactrurer reserves his right to modify the designing and the standard configuration of the manufactured equipment, while not decreasing the range of its technical capabilities.

1. Preparations

1.1. Fasten the repair detail, ensuring its immobility and stability.
1.2. Clean the repair surface from dirt, oil, rust, etc.
1.3. In case of hidden cavities or cracks make the oil burn (image 1). This procedure is necessary in case of welding while reconditioning.


Image 1


Image 2

1.4. Buff the detail surface where the support will be mounted to (image 2).
1.5. Buffing is made in position «two o`clock», «six o`clock» and «ten o`clock» (red lines, see image 3).

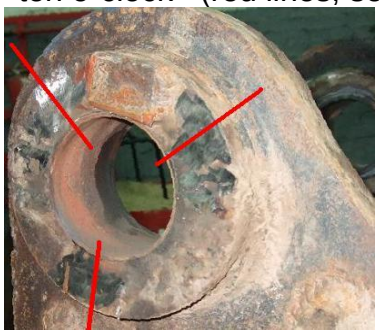
Image 3

1.6. Prepare the welding equipment for work:

- connect the gas mixturing device to the gas bottles (or gas pressure reducer to the bottle) (image 4),
- check if the feed rollers are adequate to welding wire diameter (0,8 mm),
- set up the welding machine according to its user`s manual (image 5),


Image 4


Image 5

WARNING!
Welding semi-automatic machine connection should be carried out in conformity with its instructions and in observation of safety rules by work with powerful electric devices!

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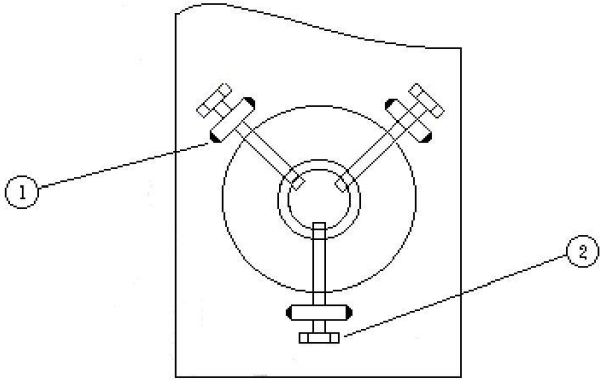
2. Centering set

Centering set is designed for centering of the boring shaft along the hole to be restored and consists of two identical half-sets, each of them includes a cylindrical profiled nut (see scheme 1) and three bolts (2), screwed into rectangular chasers (1).

Scheme 1



2.1. Half-set chasers with the screwed bolts and cylindrical nuts become affixed to the facing surface of detail from different sides through welding (images 6 and 7).

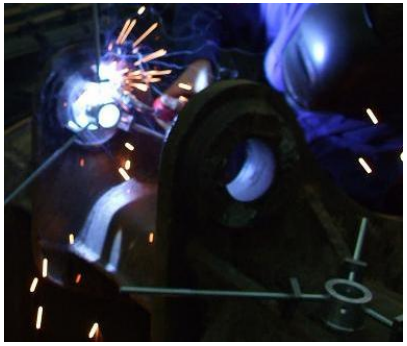


Image 6

Image 7

2.2. Depending of the shape of restoring detail one of the centering bolts has to be welded in position “six o`clock” or “twelve o`clock” (image 8).

2.3. After the welding of the centering bolts they have be unscrewed from the cylindrical nuts. With the help of the centering bolts the cylindrical nuts are being fixed (image 9).

2.4. Spray liquid grease on the boring shaft and carry it through both cylindrical nuts.

Image 8

Image 9

2.5. Insert the calipers into the boring shaft. By screwing/ unscrewing the centering bolts and rotating the boring shaft with the calipers, it gets the same distance from the shaft to the inside surface of detail (image 10 and 10.1).

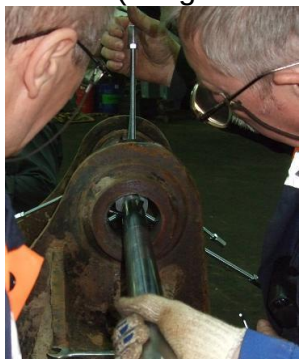


Image 10

Image 10.1

2.6. For more precision centering process providing in two stages by the following continuity:

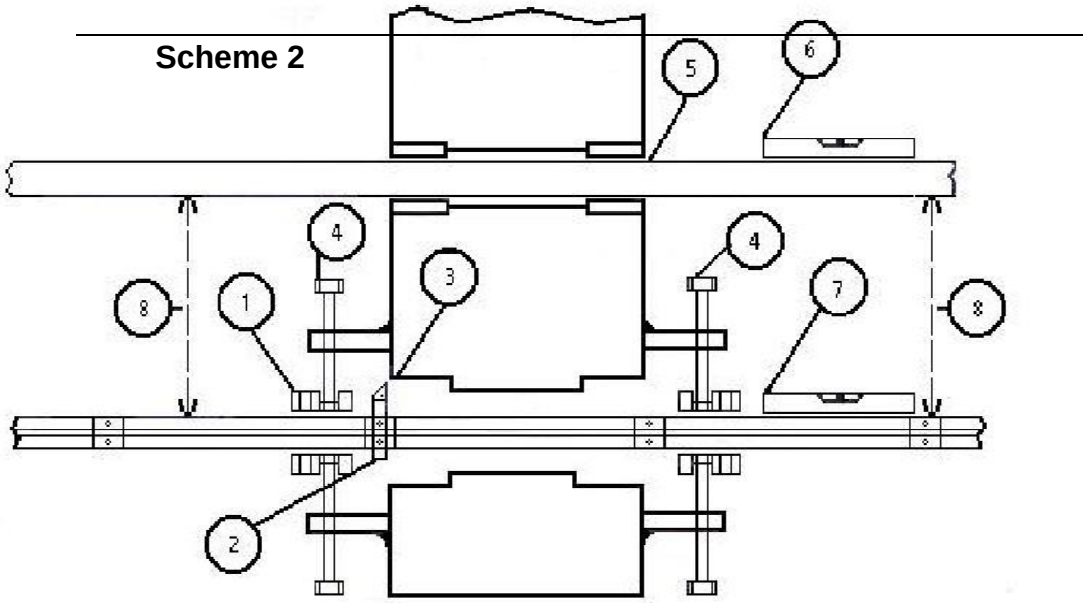
Side 1 – side 2 – side 1 (again) - side 2 (again).

WARNING!
While centering it is necessary to protect the boring shaft surface against mechanical damages and sparks.

In case of much worn surface to be reconditioned there has to be used another theoretical method including the method of connection to other near-located unworn surface.

It is recommended to check if adjusting axis of the repairing hole is parallel to another one. For doing this insert another boring shaft into other unworn hole and check if they are parallel to each other through the water level or another more precision measuring method and tool (see scheme 2).

Scheme 2



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3. Supports

The standard configuration includes two main (image 11) and two subsidiary supports (image 12).

Image 11

Image 12

Main supports (image 11) are for the purpose of the boring shaft positioning with rotating and feeding allowance (scheme 3) and mounting the drive unit.

Subsidiary supports (image 12) are the same like the main and are designed for mounting inside the detail if there is big depth of boring or sizable distance between bored surfaces.

Mounting of the drive unit to them is impossible.

The configuration includes 4 (411) or 3 (611) sets of legs for mounting the supports to different diameters to be restored (image 13) and a set of fasteners for assembling the supports (image 14).

Image 13

Image 14

Before mounting the main and subsidiary supports they have to be assembled and tightened (see scheme 3)**:**

3.1. Choose the leg for supporting (2) in conformity with the diameter of the reconditioning hole.

3.2. Fasten the support (1) in a vice; tighten all connections (4) with wrench (image 15).

WARNING!
To avoid deformation of the external surface, fasten the support into the vice only by the brackets!
(see scheme 3, pos. 4)

3.3. Put the support (1) on the boring shaft and unscrew the adjustment bolts (3) until it touches the surface of the detail (image 16).

Scheme 3

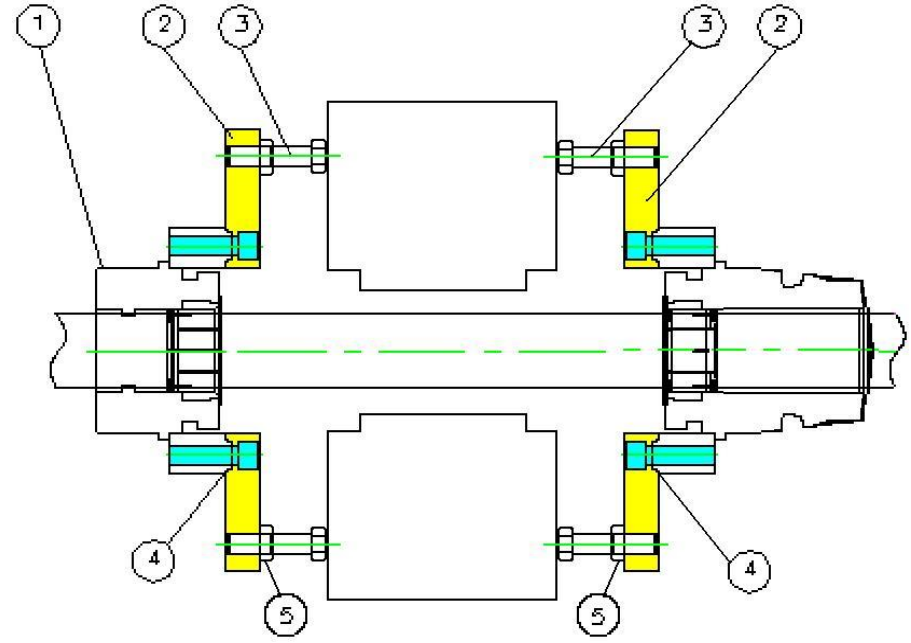


Image 15

Image 16

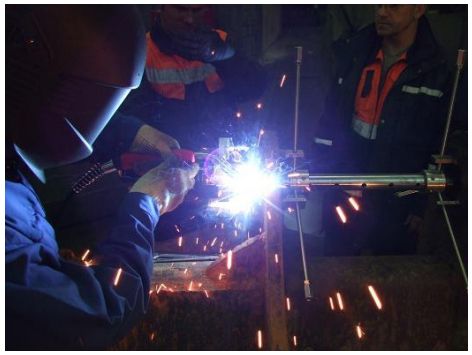


Image 17

Image 18

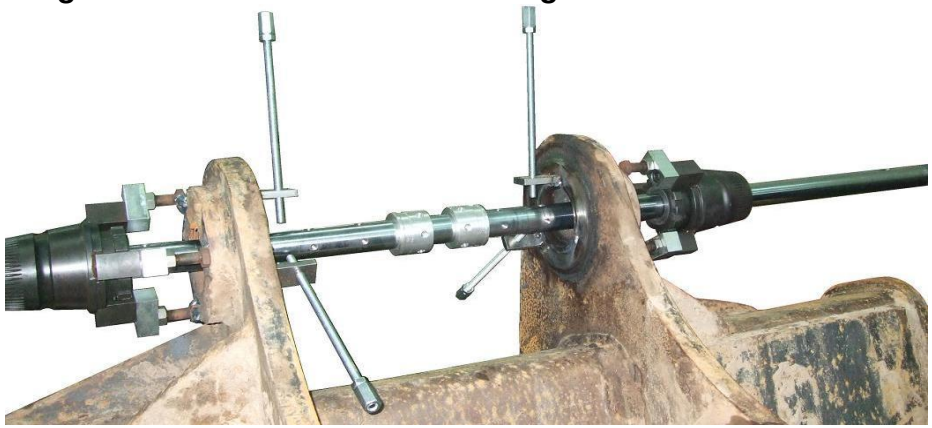


Image 19

3.4. Take off the support, fasten it into the vice and tighten the lock nuts of the bolts.

3.5. Place the support and weld the bolts (3) to the surface (image 17 and 18).

WARNING!
While welding the supports it is necessary to protect the boring shaft surface against mechanical damages and sparks.

3.6. After placing the supports the centering set has to be removed (image 19).

Due to the fact that the connection of the drive unit is possible only with the main support, it is necessary to determine the preferred location for the unit.

3.7. Place the drive unit on the main support and fasten the fixing clamps clockwise until they stop (image 20).

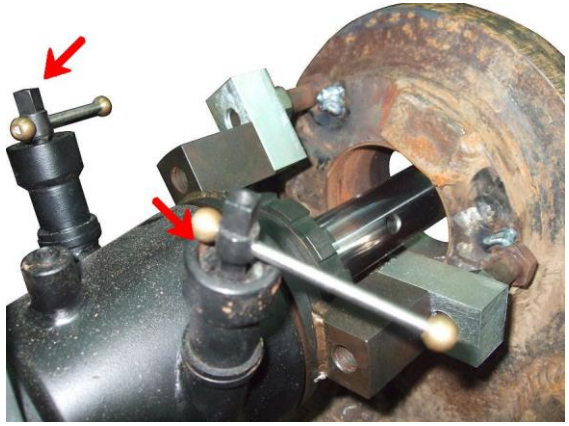
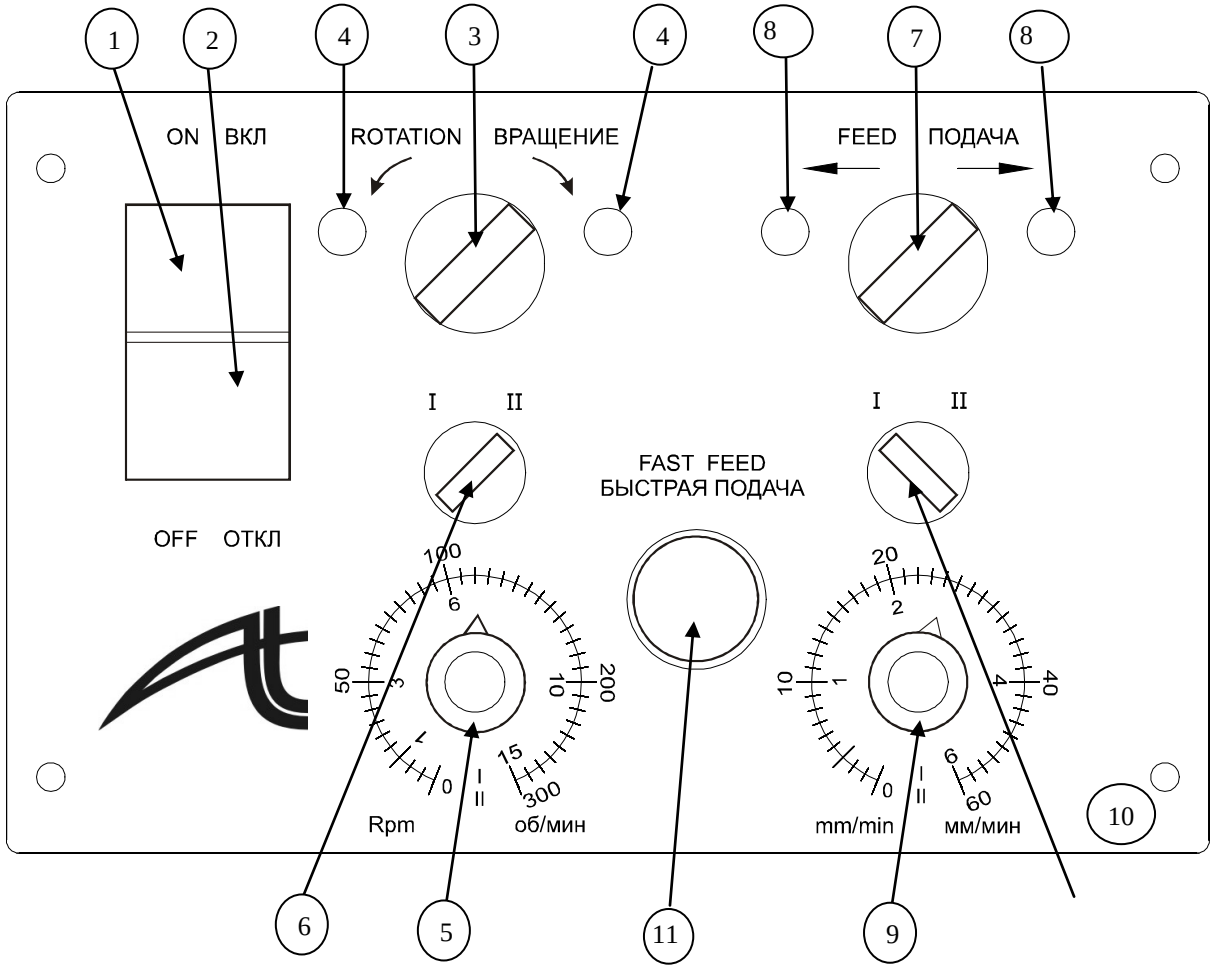


Image 20

4. Control panel

Front side of the control panel **AVANTECHNO-411/611**



1 – Power button (with LED indication ON status)

2 – OFF button (regular and emergency conditions)

3 – Switch of boring/ welding shaft rotation direction

4 – Rotation status indicators for boring/ welding shaft

5 – Rotation speed control (logarithmic scale)

6 – Range switch for rotation control

7 – Switch of boring/ welding shaft feeding direction

8 – Feeding status indicators for boring/ welding shaft

9 – Feeding speed control (logarithmic scale)

10 – Range switch for feeding control

11 – Fast feed button

5. Boring process

5.1. Insert the boring shaft through drive unit and all the supports, comparing the key groove of the shaft with the appropriate unit`s and supports` details (image 21).

Image 21

Image 22

5.2. Select the working zone of the boring shaft, calculate the cutting tool movement and tighten the collet clamping shank (image 22).

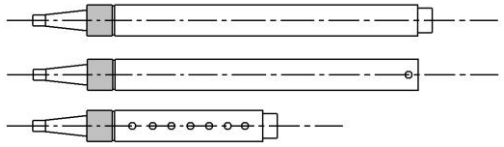
5.3. In case of shortage of shaft`s length join it to the additional shaft that includes in the standard configuration using Morse tapers, locatedat the end of the shaft (image 23).

Image 23

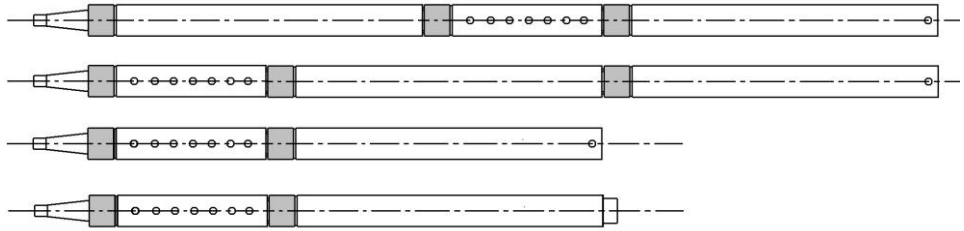
Image 24

5.4. Supply boring bar set AVANTECHNO-411 consist of two segments 2200 mm. and 1800 mm. long with holes for the cutting work tool.

5.5. Supply boring bar set AVANTECHNO-611 consist of two segments: with length 2000 mm. without holes under the cutting work tool and with length 1000 mm. with holes for the cutting work tool.



5.6. In case of boring of holes till 125 mm. need to choose one of the modifications for boring bar assembly.



5.7. By boring of holes with size more than 125 mm, are used anti-vibration tool holder, describe in chapter 9.
Fixture of the anti-vibration tool holder can be done on each segment at any place of the boring bar.

5.8. Choose the direction of boring shaft`s rotation depending of the type of tool holder (left or right).

5.9. Fasten the cutting bit with the holder, inserting it into the right hole of the boring shaft.

5.10. Bring the cutter pressing FAST FEED button almost until it contacts the work surface and adjust correctly the cutting diameter (image 24).

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WARNING!
It is necessary to select the proper depth of cutting (depending on type of material, diameter of boring, etc.). Depending of surface wear stage the boring process could be carried out once, twice or in several times.

5.11. Both speed control switches have to be installed on the “0” position.

5.12. Switch the needed direction of boring shaft`s rotation and slowly increase the revolutions until they reach the speed, which is appropriate to the boring diameter.

5.13. Switch the boring shaft into the needed feed direction.

5.14. By setting a small feed speed bring the cutting tool until it touches the work surface and wait until it bores an indissoluble ring (image 25).

Image 25

Image 26

5.15. Choose the appropriate parameters of boring process according to the detail material (image 26).

WARNING!
These models Boring and Welding Complexes are not equipped with boring depth limitation devices. Therefore, you have to follow the process visually (image 27)

Image 27

6. Welding process

6.1. Remove the cutting tool and tool holders from the shaft.
6.2. Loosen the tail collet clip.
6.3. Slowly pull out the boring shaft and remove it.
6.4. Insert the transitive nuts (only for 611), push the welding bar through the drive unit and support and fix it by the tail collets (image 28, 29).

Image 28

Image 29

6.5. Connect the gas bottle with the gas mixture (Ar 82%, CO_2 18% - ± 5%) to the semi-automatic welding machine.

6.6. Connect the welding bar to the semi-automatic welding machine by the flexible connecting cable (images 30 and 31).

Image 30

Image 31

Image 32

Image 33

6.7. Disconnect the body of the restoring detail from the welding machine and skip the welding wire (0, 8 mm) through the connecting cable, welding bar, torch in assembly and the connecting ending (image 32, 33, 34). Screw on the gas nozzle.

Image 34

Image 35

6.8. Install the telescopic welding bar to the place to be welded (image 35).

6.9. Adjust the angle of the torch so that the distance between the ending and the detail to be welded will be 6 ÷ 8 mm (image 36 and 37).

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WARNING!
Feed direction during welding – <u>toward the drive unit</u>
Rotation direction – in any direction

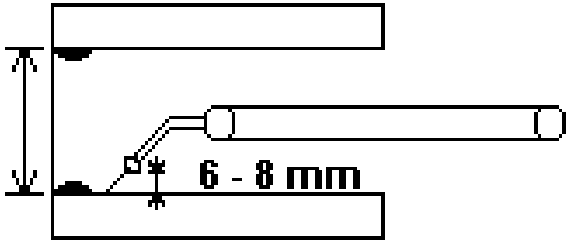

Image 36

Image 37

6.10. Connect the body of the welding machine to a well-stripped metal part of the working detail.
6.11. Set up the switch of regimes of the welding machine on 3-4-5-6 (depending on the type of the welding machine).
6.12. Set up the wire feed speed on 3÷4, 5 cm/s.
THE FEED DIRECTION HAS TO BE TOWARD THE DRIVE UNIT
6.13. Adjusts revolutions in accordance of welding diameter.
6.14. To switch on the welding machine (image 38) press once the start button, located at the end of the flexible appendix of the connecting cable.

Image 38

6.15. Adjust the semi-automatic welding machine in mode that the welding process would resemble a “Bengal Fire”; sparkles have to be 5 ÷ 20 cm long, not reaching the ground. Welding sound has to be like a light buzz
6.16. Welding completion (image 39).

Image 39

6.17. The welding also could be done in several layers without any intermediate boring.

WARNING!

For breaking the welding process is necessary to push once the button on the welding machine`s remote control, located at the end of the flexible appendix of the connecting cable and at the same time stop the rotation feeding process.

6.18. In case of welding with the AVANTECHNO-611 complex, need to prepare the drive unit in assembly for setting up the welding bar in the drive unit.
6.19. Connect the mounting device for the socket (image 40) with the rotational socket (image 41) from the supply set.

Image 40 **image 41**

6.20. Put the connecting device for the socket and the rolled over it rotational socket in the drive unit from the side of the feeding mechanism, up to the typical click of the fixation of the socket in the drive unit.
6.21. Reverse the connecting device for the socket to the rotational socket and remove it from the drive unit.
6.22. Set up the feeding socket (image 58).
6.23. Put the welding bar in the drive unit. Tighten the split terminal of feeding.

7. Fine boring process

The fine boring process is mostly analogical to the pre-boring process, except the following:

The repeated centering and the mounting of main and subsidiary supports are not required.

7.1. The fine boring process has to be execute according to item 5 (see page 10) but it requires the preliminary boring which enables to make measuring of cutting diameter.
7.2. Preliminary cutting usually makes on small depth in reduced diameter (image 42).

Image 42

Image 43

7.3. Cutting tool has to be moved out of the boring zone and the diameter has to be measured by the caliper through the neighboring hole (image 43).

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7.4. Preliminary finishing boring is made (image 44).

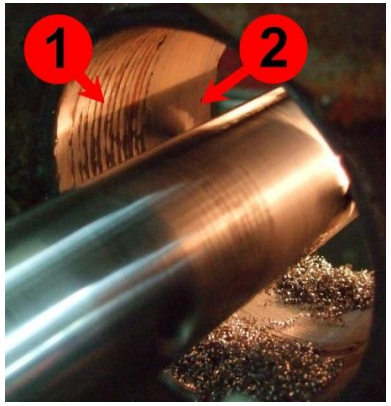

Image 44

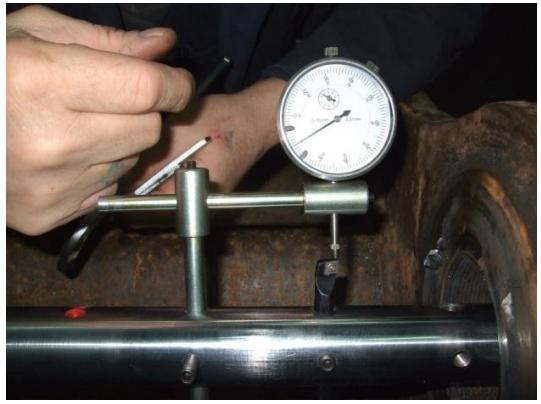

Image 45

7.5. The clock-type indicator mounted on measuring gauge holder is being inserted and fixed into the neighbor hole (image 45)

7.6. The measuring end of indicator is being rested on a cutting tool, tool holder screws are being slightly loosened and the cutting tool is being put forward by hand to a length equal to a half of the difference between the set and the probe diameters.

7.7. The tool holder is being tightened into the boring shaft, the measuring gauge holder and the indicator are being removed and the fine boring process starts in the set diameter.

8. Completion of work

After completion of all reconditioning processes the complex has to be dismounted in the backward mode.

8.1. The bolts (scheme 5, pos.4) have to be untightened and unscrewed, and the main / subsidiary support has to be removed (image 46).

Scheme 5

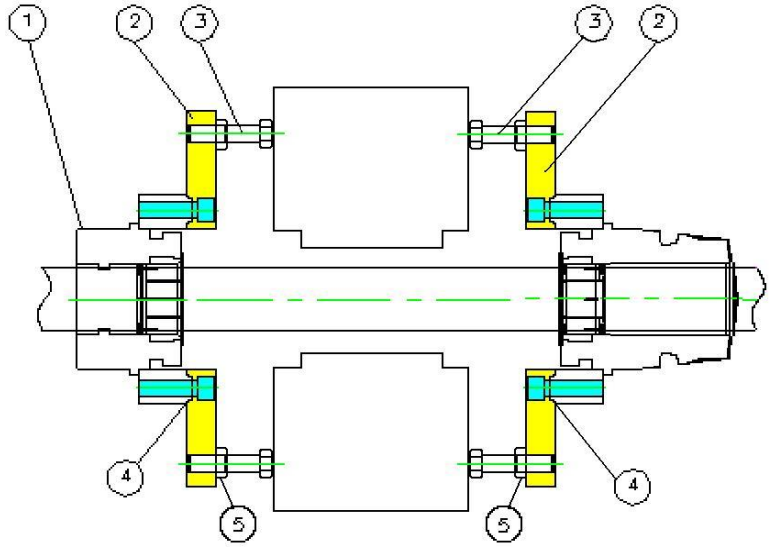

Image 46

8.2. Welded bearings bolts are being cut off with the help of angle grinder (not included in the package).

WARNING!
BEFORE STARTING THE RECONDITIONING
IT IS NECESSARY TO CARRY OUT FEW TIMES
THE WHOLE PROCESS "BORING-WELDING-BORING"
ON SIMULATORS WITH DIFFERENT DIAMETERS
TO ACQUIRE THE WORK EXPERIENCE

9. Anti-vibration tool holders

Anti-vibration tool holders assembled

Anti-vibration tool holders set consists of an integral crimp sleeve with key, mount cutter extension and counterbalance (image 47).

a. Anti-vibration tool holders assembled Ø 100 mm up to Ø 250 mm (image 48)

b. Anti-vibration tool holders assembled Ø 250 mm up to Ø 400 mm (Ø 600 mm) (image 49)

Option for assembling the tool holder extension

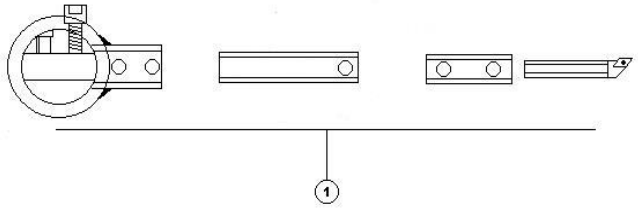

Image 47

Image 48

Image 49

10. Auxiliary equipment

Boring sets 4020, 6030, 6040

Could be additionally supplied

Smaller auxiliary boring sets could be used for carrying out boring of small diameter holes.

4020 – used with AVANTECHNO-411

Boring diameter from 25 mm up to 50 mm

6030 – used with AVANTECHNO-611

Boring diameter from 35 mm up to 70 mm

6040 – used with AVANTECHNO-611

Boring diameter from 45 mm up to 100 mm

Auxiliary boring sets 4020, 6030 and 6040 consist of:

- three reducing collets 1 (image 50),
- two small bearing sleeves and one large drive sleeve (image 51),
- two sleeves for the centering set,
- cutting feed sleeve,
- boring shaft with the same diameter.

4020 – one boring shaft Ø 20 mm, 2000 mm long,
6030 – one boring shaft Ø 30 mm, 2000 mm long,
6040 – set of three boring shafts Ø 40 mm, each of them 1500 mm long and two conical connection knots.

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Image 50

Image 51

10.1. Remote the standard collets from the bearings.
10.2. Insert the small bush 1 (image 50) into the rotating sleeve of the bearing, combining the bearing pins with keyway bushings (image 52, 53)
10.3. Insert reducing collet (image 54) and screw nut (image 55)
10.4. On the carrier bearing where the drive unit will be attached, a small bush is not required, but there is necessary to insert a large bush into the unit inside the machine with bigger keyway (image 56, 57)
10.5. Insert the cutting bush into the drive mechanism (image 58)
10.6. Insert the boring shaft into the boring and welding machine and tighten the feed drive and the bearing collets (image 59, 60)

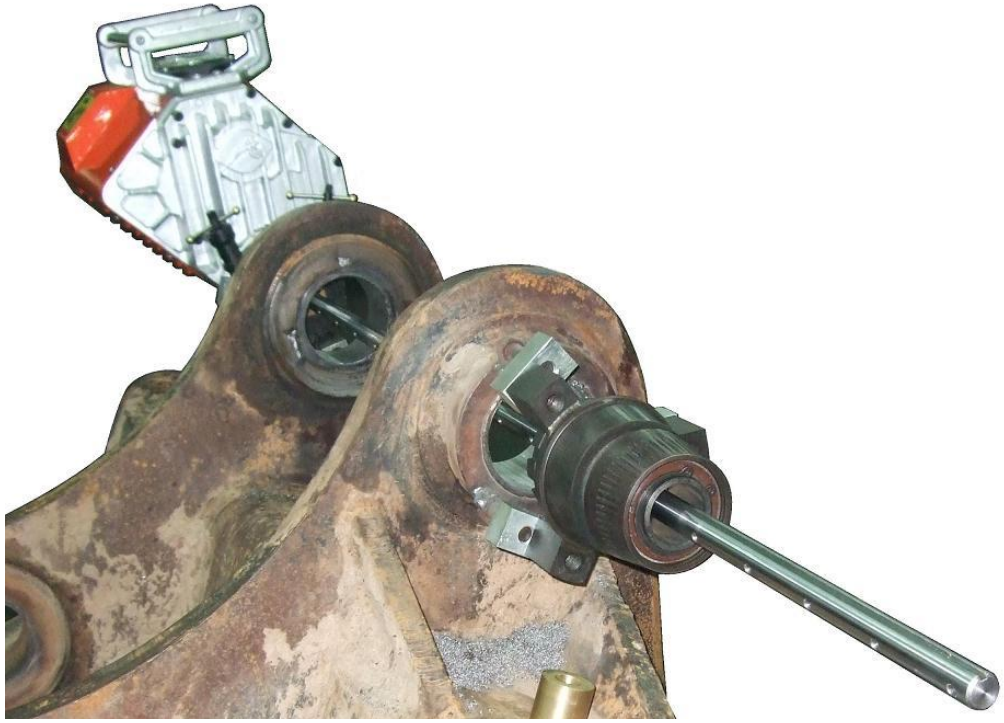


Image 52

Image 53

Image 54


Image 55


Image 56


Image 57


Image 58

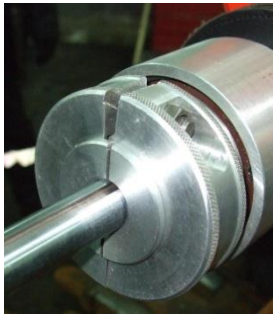


Image 59


Image 60

Facing head (FH)

The FH could be additionally supplied. It is used for facing of the perpendicular axes' surfaces of the boring bars or for boring of inside and outside grooves for Seeger rings (image 61).

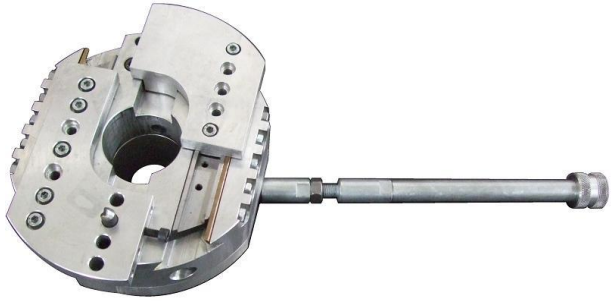
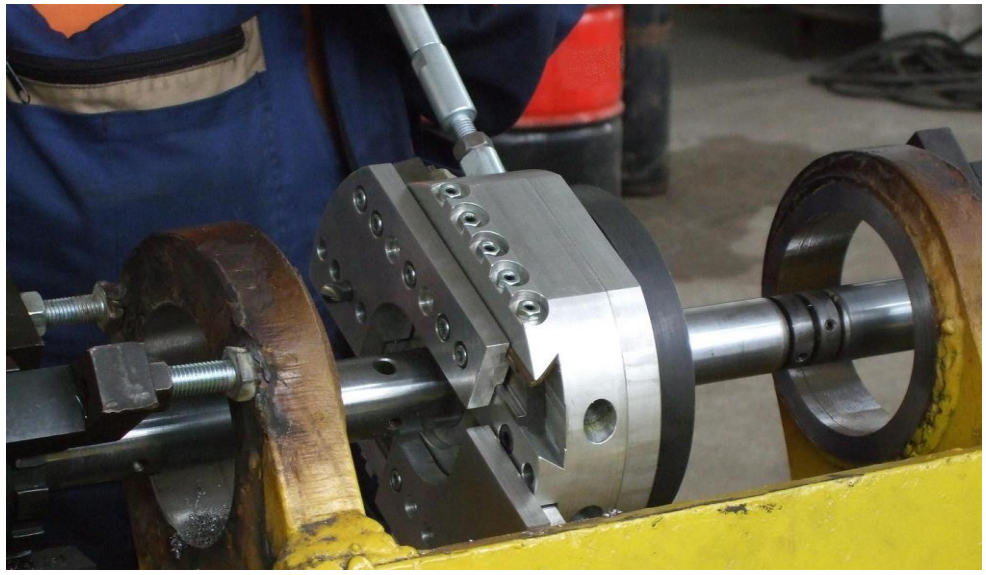


Image 61

WARNING!
By performing the process of facing, the maximum speed of the FH rotation is 45 R.P.M.



11. Instruction for safety work

Risks during work

Accidents during work with the boring and welding complex (BWC) are due to:

1. Absence or defect in the fence.
2. Loose mounting of the detail and tool.
3. Defects and blunting of the cutting tool.
4. Electric shock when a person touches the electrical circuit of the BWC or the welding machine.
5. Defects in electrical equipment and particular grounding.
6. Injuries on the eyes and bare skin surface caused by the electric arc, burns from metal thaw, poisoning with noxious gases released during welding.

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7. Explosions due to improper handling of compressed gas bottles or due to welding in containers under combustibles, or welding near to flammable and explosive substances.
8. Fire from sparks and molten metal during welding process.
9. Injuries caused by mechanical preparations of heavy details for boring and welding.
10. Clutter in the workplace.

Before starting the work

11.1. Wear properly protective clothing, fasten the cuffs of sleeves on the button, avoid tie their ribbon; hide your hair under a hat.
11.2. Check the availability and reliability of fastening the protective fencing and protective grounding to the vanishing of the corpus ot the BWC and welding machine.
11.3. Place the tools and workpiece in a certain order on a stool or on a special fixture.
11.4. Securely mount the BWC on the workpiece and tighten the cutting tool, remove the wrenches and put them on a settled position.
11.5. Check the boring shaft for absence of foreign objects inside or above.
11.6. Check the work of the electromechanical unit (floating) by turning the button on your control panel.
11.7. Right before starting to work put on protective goggles.
11.8. Before starting to weld put on a protective mask with special filters.
11.9. Make sure that the fire-fighting equipment is in a immediate vicinity and easily accessible.

During work

11.10. Smoothly connect the cutter to the workpiece, do not allow a significant increase in swarf cross-section.
11.11. To avoid injuries:
a) Do not bend your head near to the boring shaft or near to a cutting tool;
b) Do not give or take objects through the rotating parts of the BWC;
c) Do not lean on the BWC, do not put on it tools or blanks;
d) Do not install or remove the cutting tool or the gas nozzle, do not measure the work piece, do not grease, clean or remove swarfs until the BWC stops;
e) Do not cool the cutting/ welding tool or work piece with water or wet cloth;
f) Do not stop the BWC by hand inhibition of the boring/welding shaft;
g) Do not move away from the BWC, do not switch it of;
h) Do not dress and undress near to a working BWC.

11.12. Simultaneous work of two operators is categorically not allowed: first one – sets cutting or welding tool; second one – controls rotation or feed.
11.13. Before switching of the drive unit move the cutting tool from the work piece.
11.14. Use wrenches corresponding to nuts and bolt heads.
11.15. In case of cutting of the power immediately push the emergency stop button, located on the back side of the unit.

After finishing the work

11.16. Switch off the BWC by pushing the OFF button on the control panel.
11.17. Remove swarfs with a brush or a hook. Do not blow them away or clean them with hand.
11.18. Wipe clean the BWC, grease the boring shaft, put in order all tools or personal protective equipments.
11.19. Fire could start not immediately so after welding carefully examine the place of work if something glows or there is a smell of smoke or burning.

Actions in case of accidents

In case of accidents happened during work the victim or witness has to inform the administration and in case of any kinds of injuries contact a health centre or call an ambulance.

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