Instruction Manual
No.:

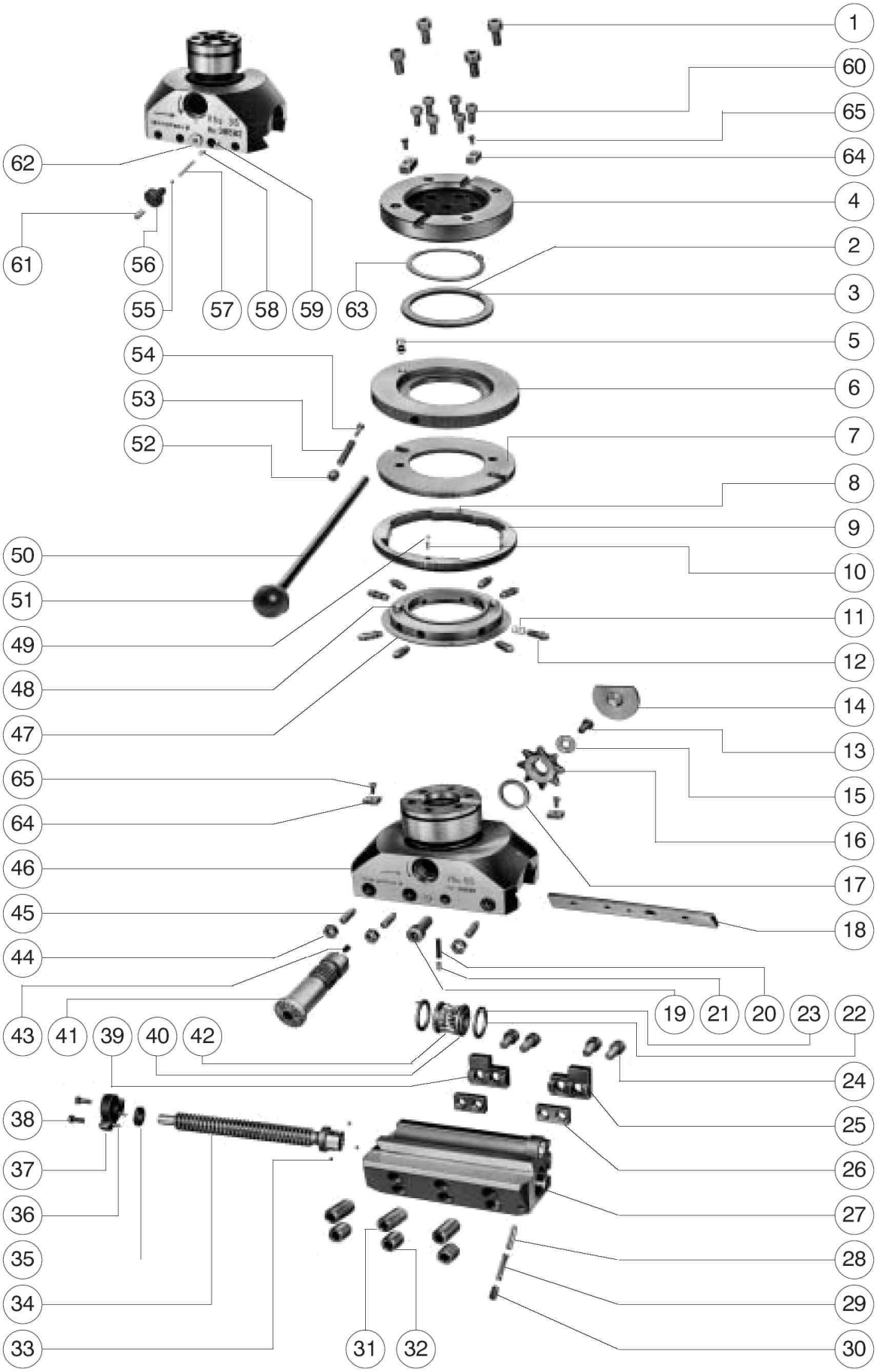
Vhu

Universal Boring Heads
Vhu 1 3/8”

Producer:

Moskevska 63
101 00 Praha 10 – Vrsovice
Czech Republic
Phone: +420 246 002 249
Fax: +420 246 002 335
e-mail: sales@narexmte.cz
www.narexmte.cz

Vhu 1 3/8” – Position numbers of spare parts

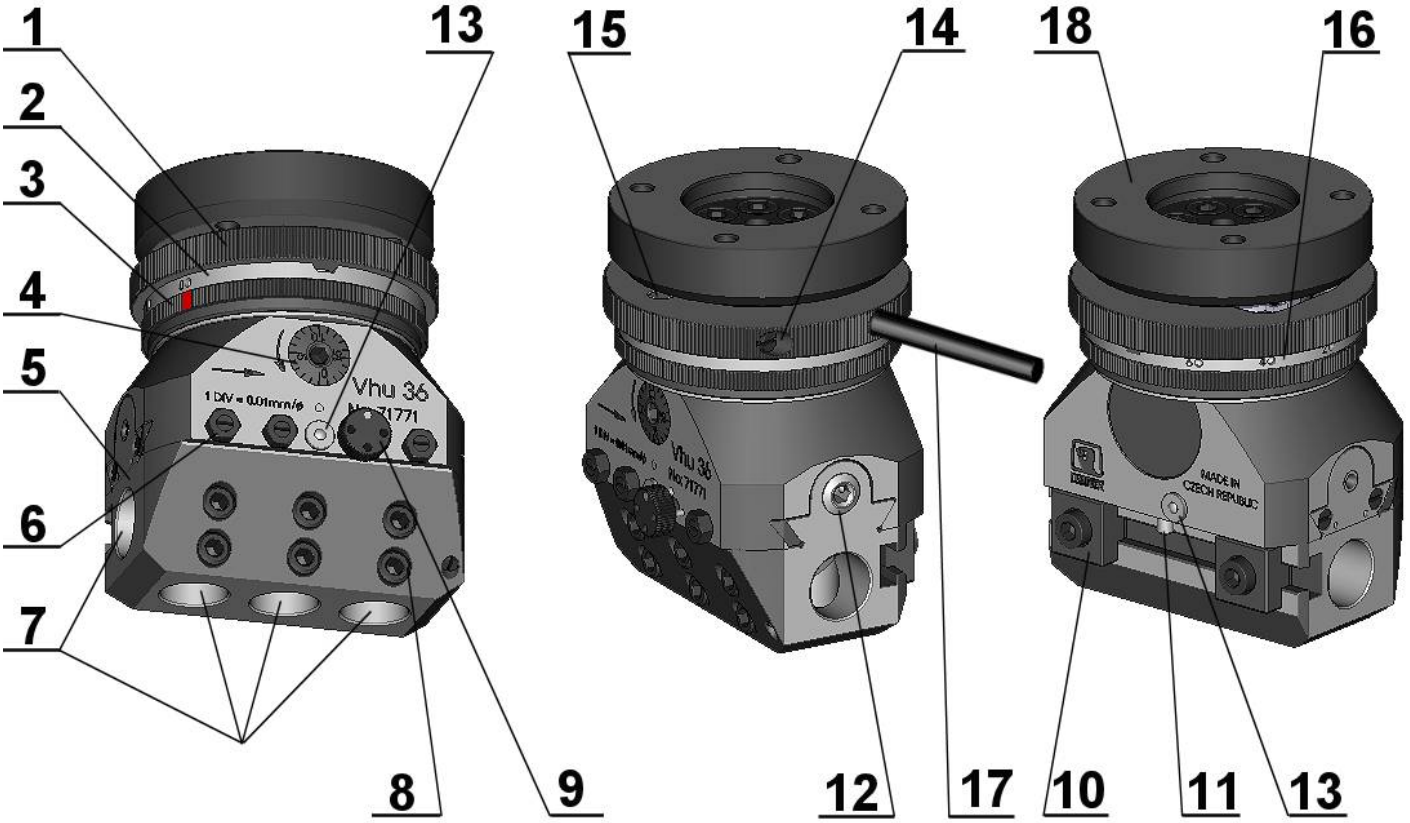


Application:

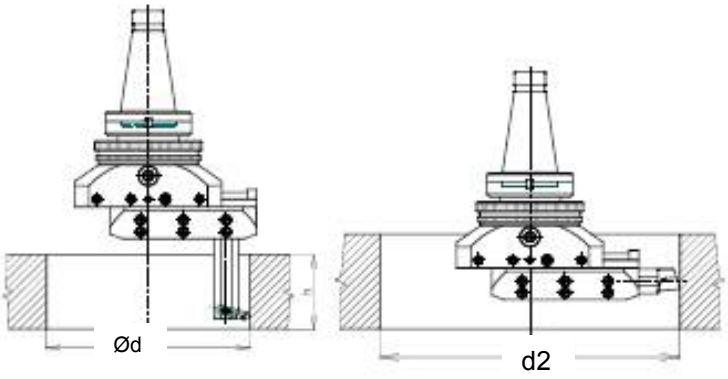
The Vhu 1 3/8“ universal boring head is suitable boring, surfacing, external turning, external as well as internal recessing and thread cutting operations.
When automatic cross feed to the tool slide is combined with feed to spindle of the respective machine, it is possible in addition, to bore tapered holes and cut tapered threads. The included angle of taper is dependent on the feeds available on the respective machine.

The Vhu 1 3/8“ universal boring head considerably increases the field of application for your jig boring and other boring machines.

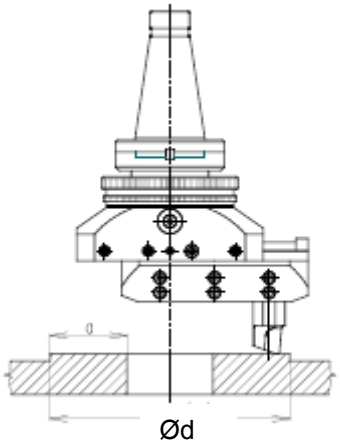
1. Braking ring
2. Engagement ring
3. Control ring
4. Tool slide fine setting dial
5. Tool slide
6. Setting screw
7. Holes for tools
8. Clamping screw
9. Tool slide lock screw
10. Stop
11. Stop pin
12. Dial for quick traverse of tool slide
13. Lubrication nipple
14. Clutch adjusting
15. Clutch
16. Automatic transverse feed dial
17. Holding rod
18. Flange



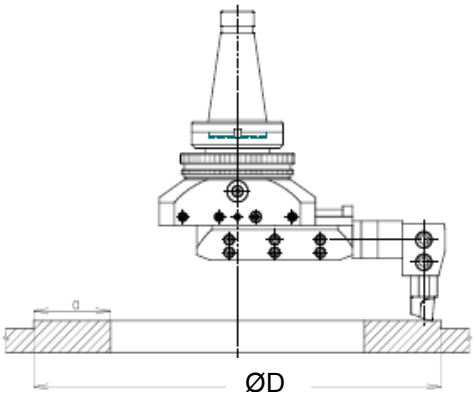
Hole boring



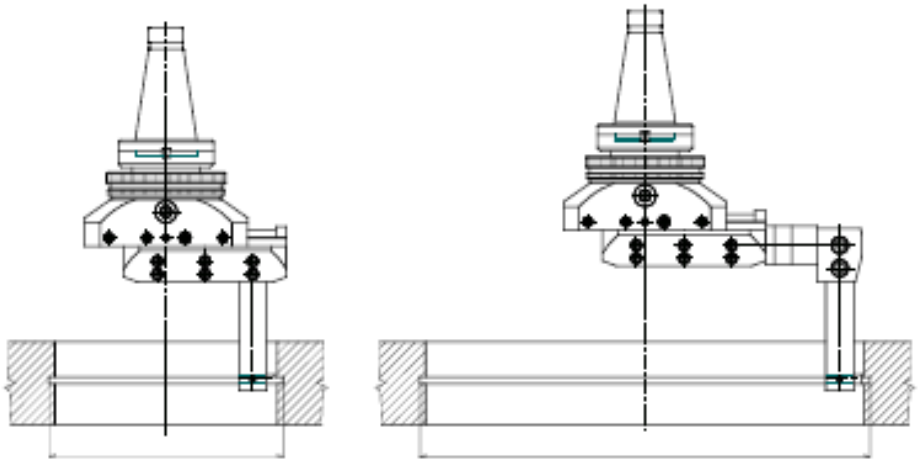
Surfacing on small diameter front facing



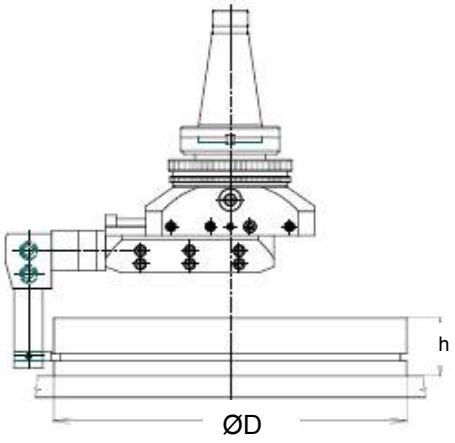
Surfacing on larger diameter front facing



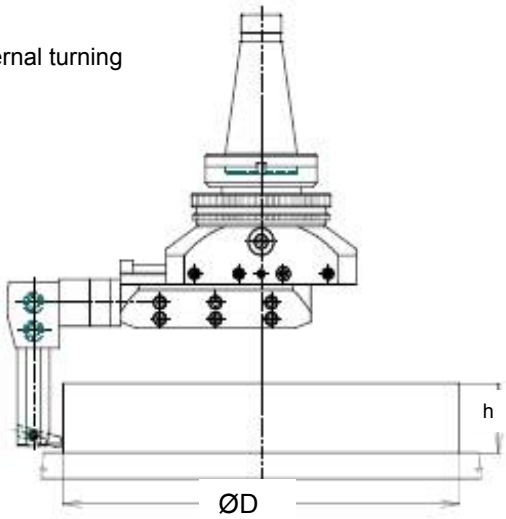
Recessing in bore



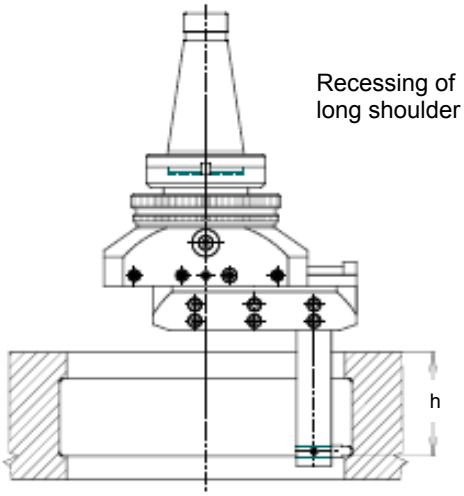
Recessing on surface



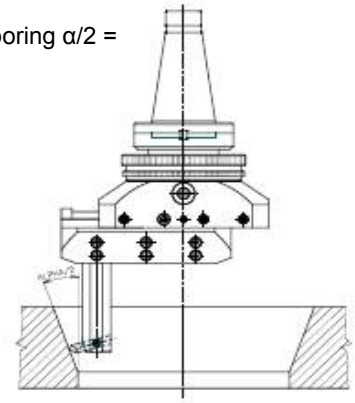
External turning



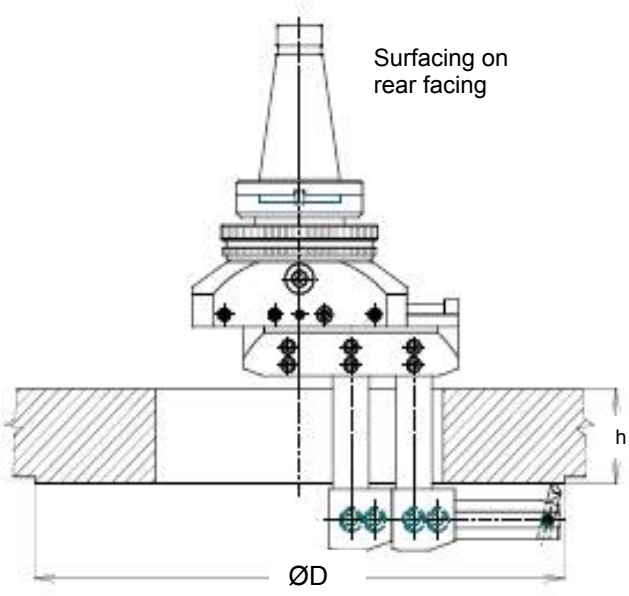
Recessing of long shoulder



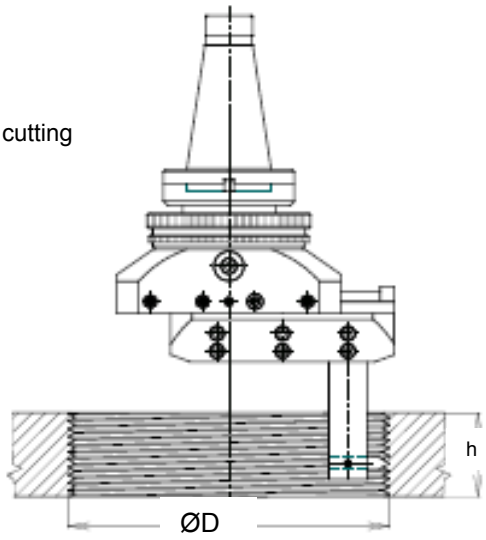
Taper boring α/2 = 5° - 85°



Surfacing on rear facing



Thread cutting



I. Boring and External Turning

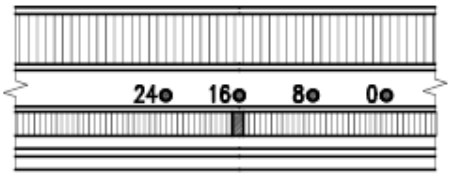
In boring and external turning by means of the Vhu 1 3/8“ head, no cutting feed need to be engaged, as actuation of the braking ring (1) might result in a change of set measurement.
The tools are clamped in holes (7) with the aid of the fixing screws (8). They are set in position by turning the graduated scale (4). One division of which equals displacement of

tool slide by 0,005 mm - 0,01 as measured on diameter.
For precision re-setting of the tool from a larger measurement to a smaller one, the graduated scale (4) has to be turned backward by more than half a turn beyond the required measurement. Only then, should the graduated scale be turned forward to the required measurement.
In this manner, backlash in transmission gearing will be eliminated. Tightening of the screw (9) will help as well.
The tool being set to the required measurement, it can be secured in its position by rue screw (9) serving to lock the tool slide.

II. Surfacing Front and Rear Faces and Turning External and Internal Recesses

a)
The above operations call cross feed to the tool slide (5). Therefore, the tool slide locking screw (9) must be loosened.
b)
The Vhu 1 3/8“ universal boring head provides the following automatic cross feed to the tool slide: 0.02, 0.04, and 0.06 mm/rev. The required feed is selected as follows: the selection ring (2) has to be turned until the red gauge line on the latter ring points against the red hole attached to the figure expressing the feed rate in 0.01 mm/rev. and located on the graduated scale for automatic cross feed (17). The selected feed is best engaged as follows: the engagement ring (2) has to be gripped on its knurled part by the thumb and fore finger of one hand, whereas the braking ring (1) “clutch 15 being thrown – in”) is gripped by the thumb and fore finger of the other hand. There after, the seiected feed is engaged by turning the two rings against each other. Figure 1 shows an example of feed engagement. It shows engagement of the automatic cross feed to the tool slide of 0.04 mm/rev.

Fig.1



In all operations calling for automatic feed to tool slide it is always necessary to disengage this feed. For safety the feed has to be engaged while the machine is at a standstill.

Table of recommended widths of the cutting pass to be taken in surfacing front faces.

cross feed to tool slide	up to dia. of surfacing	max width of cutting pass in mm	up to dia of sufracing	max width of cutting pass in mm
0,04	90	3	200	2

The table applies to cutting steol of 50-80 kp/sq, mm tensile strength. The required cross feed being engaged, the braking (1) has to be turned by a minimum of one turn in the opposite direction to the spindle rotation, while the machine is at a standstill! Maximum permissible spindle speed is 800 r. p. m.!

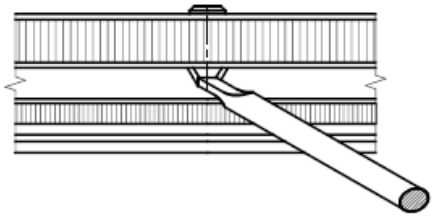
c)

The automatic cross feed to the tool slide (5) is started by braking the control ring (3) by means of the braking ring (1). The holding-down rod (16) has to be slid into the hole provided in the braking ring and leans against the fixed stop which should be suitably located near the machine spindle. In case of light-duty work of short duration, the rod can be held by hand. In both cases, however, the braking ring (1) must be coupled to the control ring (3) by means of the clutch (15) located in the braking ring (1). The clutch gas to be pressed by the finger into one of the notches provided in the control ring (3).

d)

The cross feed is automatically tripped when one of the stops (10) actuates the stop pin (11) or when cutting resistance increases, because of a large cutting pass is being taken and the tool blunting or breaking. Sensitiveness of the clutch disengagement (15) can be set by means of the clutch setting screw (14). The latter screw serves to compress or release a spring acting against the clutch (15). If the clutch setting screw (14) is screwed in deeply, try to disengage the clutch with a screwdriver (see Fig. 2.).

Fig.2



In case the clutch cannot be disengaged completely, it means that the spring coils are bearing against each other and it is necessary to slightly loosen the clutch setting screw (14).

Then, attempt to disengage the clutch (15) in the manner described above.

e)

Setting the stop for feed tripping as the required diameter is obtained. The stop (10) must be set and secured in such a manner that the cross feed to the tool slide is tripped at (the very moment the cutting edge of the tool reaches the required diameter. Therefore, disengagement of the clutch (15) has to be set so that the disengaging force produced by the stop (10) on the stop pin (11) is as small as possible. In other words, the clutch setting screw (14) has to be screwed-in as little as possible. Despite this, however, a certain amount of over-run of required measurement always takes place. This over-run is within the tolerance of the diameter of recesses made for locking rings. In case of jobs calling for closer precision limits, the stop can be set according to the following instructions:

A)

The stop (10) must be set and firmly Screwed-in so that in causes the feed to be tripped closely before the required diameter is reached. For example, the tool slide (5) is adjusted rearwards through about 0,2 mm by turning the graduated scale (4), the stop (10) is thrust against the stop pin (11) and firmly secured by screws. After a try-out of feed tripping (clutch disengagement), the difference between the required and actual diameters should be ascertained by a gauge.

B) Now, the stop has to be set in the following way:

a)
The stop (10) should not be loosened. The tool slide (5) however, has to be adjusted rearwards so theat a gauge block of any size (e. g. 2 mm) can be slide between the stop (10) and stop pin (11).

b)
The tool slide (5) has to be secured against movement by the tool slide locking screw (9) so that its position remains unchanged while the stop (10) is adjusted.

c)
A new gauge block has to be built-up as follows:

1) if the actual diameter obtained after the trial feed tripping is larger than the required one, the new gauge block must be thinner than 2 mm by half the found difference.

2) if the actual diameter is smaller that the required one, the new gauge block must be thicker than 2 mm by half the found difference.

d)
Thereafter, the stop (10) should be loosened and trust against the newly built-up gauge block to lean against the stop pin (11). The stop should be thrust against the gauge block and firmly secured.

e)
The gauge block must be taken out and the tool slide locking screw (9) loosened. Tripping of automatic cross feed is thus set to the required diameter.

To achieve a rapid resetting of the tool slide (5) it is necessary to force an extension socket spanner into the internal hexagon of the dial for rapid feed motion (12) to a depth of approx 5 mm. The tool slide can be how quickly traversed by turning. One division of the dial for quick traverse of the tool slide stands for the feed motion of the tool slide by 1 mm = 2 mm on dia. One turn of the screw for rapid feed traverse of the tool slide stands for the feed motion of the tool slide by 3 mm = 6 mm on dia. After the slide has been reset, the quick traverse screw must be re-locked against turning. Pull out the socket spanner partly so that a length of only 2,5 mm will remain in the hole, then turn the screw in order to set the nearest scale line against the fixed scale mark of the tool slide (5). Check by turning the spanner to both slides whether the screw is secured against turning.

III. Taper boring

For taper boring the cross feed to the tool slide must be combined with the axial feed to the machine spindle.

a)
Selection of feeds to the tool slide and spindle in accordance it is possible to select the necessary feed to the tool slide and spindle from “taper boring diagram” (see enclosure). From this diagram it follows that for an angle of taper of 60º it is possible t use a tool slide feed of 0.04 mm/rev. and spindle feed of 0.07 mm/rev. From the diagram the feed to spindle in mm/min. in relation with spindle r. p. m. can be fixed. Endeavour should be always made to select as low a rate of spindle feed as possible. However, in boring tapers of small angles, it is not possible to eliminate feeds of considerable rates, which have a deteriorating effect on the surface finish obtained. The taper surface has 0.02 mm uneveness casued by the interrupted cross feed. Therefore, precision taper bores have to

be calibrated supplementarily with some other tool.

b)
Tool clamping:

In case of spindle rotation in clockwise direction, the feed movement of the tool slide (5) can operate in one direction only (see Fig. 3). Despite this, it is possible to bore expanding or contracting taper bores.
The tool being clamped in the direction of cross feed to tool slide, expanding taper is produced. If the same tool is clamped in the opposite direction to the direction of cross feed to tool slide, contracting taper will be produced. When clamping the tool it necessary to see to it that the tool point is set in a plane passing through the axis of holes for bars and holders (7) (see Fig. 4). Otherwise, the taper bore will not be accurate.

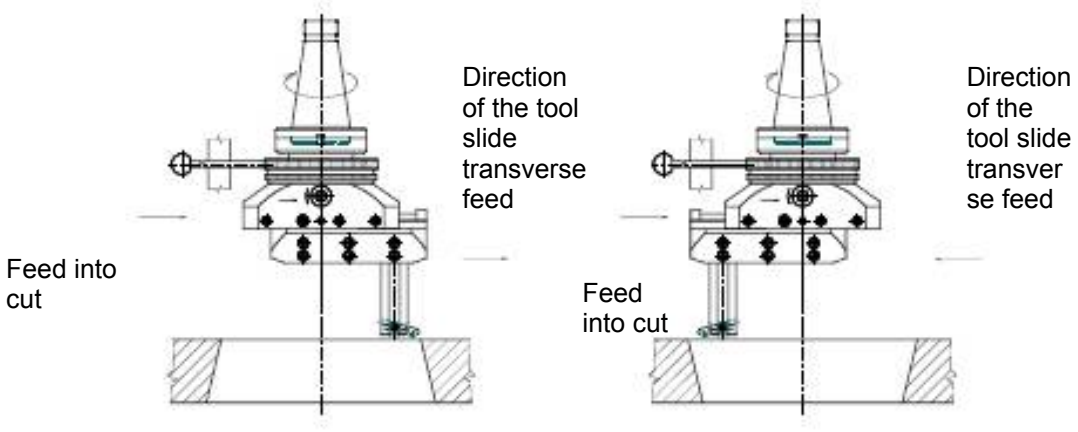
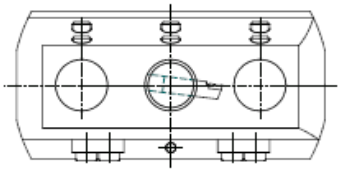


Fig.3

Fig.4



c) Procedure to be followed in taper boring:

1) the tool has to be clamped according to instructions given in item b) and set to the starting diameter of boring with the aid of the scale (4);

2) the spindle has to be advanced so that the tool cutting edge is about 2-3 mm above the surface of the work. In this position, the graduated scale of the tool slide has to be set to “0”;

3) The spindle has to be retracted by a few millimetres and advanced to “0” with spindle feed selected according to the diagram. The “0” setting being accomplished, the machine has to be stopped. However, the feed should not be disengaged;

4) the stop has to be set according to Fig. 3 and secured;

5) the clutch (15) has to be thrown – in and the clutch setting screw (14) completely screwed-in. Thereby, clutch disengagement in case of an overload is avoided. For this reason, however, increased attention has to be paid when working;

6) the holding-down rod (17) gas to be slid in the hole in the braking ring (1) and leaned against the steady stop provided on the machine;

7) the machine is started. Simultaneously with the spindle feed movement the tool slide (5) also moves: thus producing the required taper bore;

8) the boring operation being completed, the holding-down rod (17) has to be slid out, the boring head returned to its starting position and by means of the stop (10) and gauge block or by means of the graduated scale (4) the next cutting pass has to be set. This procedure is repeated according to need. External tapers can be turned in a similar way.

IV. Thread Cutting

Procedure:
1) tool is clamped
2) the feed rate corresponding to the thread pitch is selected
3) the depth of the cutting pass in set by the graduated scale
4) the machine is started, the thread cut and the machine stopped
5) the tool is withdrawn by the graduated scale (4)
6) next cutting pass is set and the whole process repeated an necessary.

To a limited extent, also tapered threads can be cut with the Vhu 1 3/8“ universal boring head. Axial feed to the machine spindle controls the thread pitch, whereas the actual cutting thread is accomplished by cross feed to the tool slide. During thread cutting both feed must be continuously in operation. The tool slide cross feed is calculated from this formula:

tool slide cross feed in mm/rev. = (pitch of thread in mm) / (cotg α/2)

For tool clamping and setting to the required diameter the same instructions as in case of taper boring apply.

Lubrication:

The internal mechanism of the boring head is lubricated with vaseline force-fed in two nipples (13) with a hand grease gun.

The universal boring heads are subject of Czechoslovak patent No. 105957.

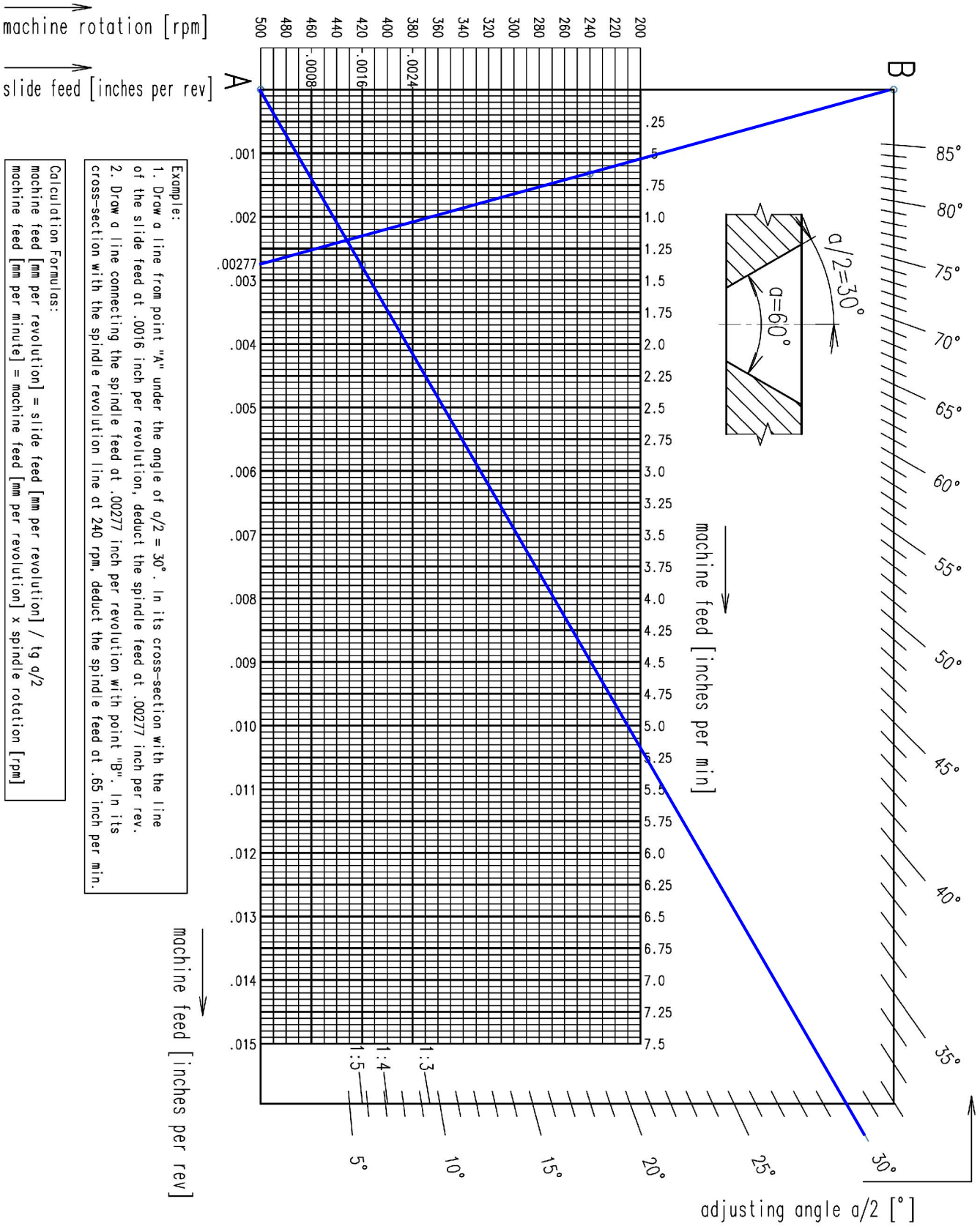
We hope that the Vhu 1 3/8“ universal boring head will enable you to carry out on your boring machines the most accurate and intricate operations with success.

Tools for Vhu 1 3/8" Boring Head

The Vhu 1 3/8" universal boring heads enable a wide range of operations to be performed. These operations, however, call for a large assortment of tool, which, in most cases, are not fully utilized. For this reason, we deliver with the Vhu 1 3/8" boring heads only the above tool as standard equipment. The tools for other special operations can be obtained by grinding from these basis tools or from the tool bits dia. 10 X L and 16 X L ČSN 22 36 92.
Apart from the specified tool sizes 22 17 10 and 22 17 11 it is possible to make use of all tools covered by these two Standard Specifications and having shanks of 10 and 16 mm dia. (i. e. tools with specification ..X 10 X . . or . . X 16 . .).

Name and desingation	Illustration	Application
Tool 221710 5 X 10 X 60 13 X 16 X 90		Roughing tool for boring through holes up to 95 mm dia.
Tool 221711 5 X 10 X 60 13 X 16 X 90		Crank tool for boring bind holes up to bottom and shouldered holes up to 95 mm dia.
dia 16 S 20 right hand cut		Tool for surfacing and boring holes of 100-150 mm dia. in steel S20 in cast iron H10 - carbide tiped
dia 16 S 20 left hand cut		
dia 16 H 10 right hand cut		
dia 16 H 10 left hand cut		

Diagram for taper boring with Vhu 1 3/8” universal Boring head



Example:
1. Draw a line from point "A" under the angle of a/2 = 30°. In its cross-section with the line of the slide feed at .0016 inch per revolution, deduct the spindle feed at .00277 inch per rev.
2. Draw a line connecting the spindle feed at .00277 inch per revolution with point "B". In its cross-section with the spindle revolution line at 240 rpm, deduct the spindle feed at .65 inch per min.

Calculation Formulas:
machine feed [mm per revolution] = slide feed [mm per revolution] / tg a/2
machine feed [mm per minute] = machine feed [mm per revolution] x spindle rotation [rpm]


narex®