NÁVOD K OBSLUZE

Mn-80

TS 26
Zakázkové číslo vyražené na stroji:

S vyvojem výrobní techniky jde i vývoj strojů, jejichž konstrukce jsou stále přizpůsobovány novým požadavkům účelného obrábění. Nemůžeme proto zaručit shodnost návodu se strojem ve všech podrobnostech a žádáme proto zakazníky, aby při výměně náhradních dílců uvedli vždy typ stroje, zakázkové číslo součástky, aby objednávka mohla být vyřízena podle provedení dodaného stroje.
Předmluva

Dovolujeme si Vám předložit tento návod s prosbou, abysle mu věnovali svou pozornost a dobře se obeznámení s jeho obsahem. Tento návod má Vás seznámiti se správným postavením, obsluhou a uvedením stroje v chod. Nesplnil by své poslání, kdyby s jeho obsahem nebyli dobře obeznámení vedoucí oddělení a ti, kdo stroj přímo obsluhují. Je velmi důležité seznámiti se se všemi částmi stroje před jeho věnovali velkou péči. Budete-li se řídit pokyny uvedenými uvedením do chodu a zvláště obsluze stroje jest třeba v tomto návodu, ušetříte si čas a zamezte ztrátám. Před uvedením stroje do chodu seznamte se velmi dobře a pečlivě se všemi obsluhovacími prvky. Pracovní přesnost každého stroje se kontroluje nejpřesnějšími měřicími přístroji. Pečlivost a důkladnost, s jakou se lato-kontrola provádí, zaručují naprostou přesnost stroje v rámci přijímacích norem platných pro tento stroj. Proto je nutné při dopravě a usazování stroje počínal si opatrně, aby přesnost stroje byla zachována. Dodržte-li všechny pokyny v návodu uvedené, budeš s přesnosti a výkonem stroje spokojen. Přejeme Vám úspěšnou práci na našich strojích a nejlepší výsledky.
Doprava stroje a usazení.

Stroj opatřený ochranným nátěrem proti vlhkosti jest při dopravě přišroubován na silných dřevěných latích a obal taktéž pozůstavá z latí, které chrání stroj před poškozením. Doporučujeme sejmouti se stroje ochranný obal až na stanovišti stroje, čímž se zabrání uražení nebo poškození některé části stroje.

Při usazování stroje na pracovním místě jest nutno stroj vyrovnat do vodoráhového nejpečlivěji. Jest to jedna z důležitých podmínek výrobní přesnosti stroje.

Uvedení stroje do chodu.

Po usazení stroje je tento nutno před spuštěním pečlivě očistití od ochranného konservačního nátěru. Po promazání všech maznic stroje a všech pohybových dílů a ploch stiskně se tlačíkto vypínáče a páskou 4 spustí stroj. Spuštění stroje se provede na nejnížší otáčky, aby stroj měl možnost důkladného promazání. Nastavení otáčecí čet pracovního vřetená udává tabulka připevněná na krytu výměnných kol.

Návod k seřízení ložisek vřeteníku.

Pracovní vřetená běží v bronzových ložiskách, které jsou pro snadné seřízení radiální vůle opatřena vnějším kuželem a zajištěna matkami. Osvětová vůle jest vymezena kluzným kroužkem rovněž matkou zajištěným. Mazání třecích ploch obstávají přestěpené vložky, které ssají olej z jímek. Tyto je nutno denně dolévat vhodným vřetenovým olejem, zaručené jakosti.

Přední ložisko: šroub 26, který udržuje ložiskovou pánev v nastavené poloze se povolí. Pootočením vleva (předpokládá se s místa obsluhy) uvolní se matka 27 hřáčkovým klíčem. Matka 28 se v téže směru přitahuje tolik, až je možno vřetenem otáčetí s vynaložením malé síly. Pracuje-li stroj trvalé ve vysokých otáčkách nesmí se vůle v ložisku vymezit tolik, aby ložisko hřálo. Utažení matky 27 a šroubu 26 pojistí se nastavená poloha pánev.
Části pro obsluhu stroje.

1. Skříňka se svorkovnicí pro připojení sítě.
2. Pojistky předřazené ochraněmu vypínači a přepínači směru točení.
3. Páka přepínače směru točení pracovního vřetena.
4. Páka kleštínového upínání materiálu za běhu stroje.
5. Zdrsněné kolečko pro vyrování nepřesnosti upínacího materiálu.
6. Rukojeť páky trojáku pro obrácení směru posunu suportu.
7. Rukojeť víka krytu výměnných kol.
10. Ruční kolo pro podélné pojíždění suportu.
11. Páka pro zapínání matky při podélném posuvu a řezání závitu.
12. Rukojeť příčného posuvu suportových sní.
13. Rukojeť pro posuv horního suportu.
14. Páka pro utažení čtyřhranné nožové hlavy.
15. Páka pro utažení pinoly koníka.
16. Páka pro zajištění polohy koníka na loži.
17. Ruční kolo pro posun pinoly koníka.
18. Páka pro uvolnění řemenu při změně poměru převodových stupňů.
Zadní ložisko: toto se zatahuje obdobně povolením šroubu 29 pomocí matky 30. Zpětným dotažením šroubu 29 se pánev pojistí.

Osová vůle: aby se vřeteno otáčelo s nejmenší přípustnou osovou vůlí, nutno dbáti toho, aby se mezi kluzný kroužek 31 a řemenici 32 nedostala nečistota.

Při seřizování osové vůle se povolí červ 34 a matka 33 se háčkovým klíčem doleva s citem přitáhne. Je-li vůle správně vymezena, dotáhne se zpět červ 34.

Upozornění: vymezení ložiskových vůlí má prováděti zkušený odborník, neboť jest třeba při seřízení vycvičeného citu a odpovědnosti za nerušený a přesný chod stroje.
Výměna kleštín.


Seřízení výměnných kol.

Pro běžné stoupání závitů je na vnitřní straně víka 50 připevněna tabulka. Při změně převodu povolíme šrouby 51, 52, 53 a sejmemme podložky a ozubená kola. Planetové soukolí 54 s kolem o 100 zubech snímáme vždy, řežeme-li závit. Vždy když měníme kola, tyto vkládáme do záběru čistá a před spuštěním stroje kola namažeme. Šroubem 55 uvolňujeme a pojišťujeme lyru 56.
Křížový suport.

Vymezení vůle spodního šroubu pro příčný posuv je nutno provést tak, že se uvolní šrouby 60 a 61 a šroubem 62 se matka šroubu, která jest rozříznuta, opatrně stáhne tak, až se vůle v závitu vymezí. Potom se šrouby 60 a 61 znovu utáhnou. Po nějakém čase jest nutno sejmouti klíčku 63, dělicí kroužek 64, uvolnití červy 65 a přitažením šroubu 66 vymežime vůli, která vznikla opotřebováním nákrusku šroubu. Vůle v závitu horního suportu se vymezí tak, že se uvolní šrouby 67 a přitažením červí 68 se roz-
říznutá matka sevře. Opětným dotažením šroubu 67 se matka v nastavené poloze pojistí. Vůle v nákružku šroubu horního suportu se vymezí podobně jako u dílů spodního příčného.

Koník.

Hlavní technická data:

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Výška vřetena nad ložem</td>
<td>mm</td>
<td>89</td>
</tr>
<tr>
<td>Výška vřetena nad suportem</td>
<td>mm</td>
<td>40</td>
</tr>
<tr>
<td>Rozpětí hrotů</td>
<td>mm</td>
<td>250</td>
</tr>
<tr>
<td>Šířka lože</td>
<td>mm</td>
<td>120</td>
</tr>
<tr>
<td>Točný průměr nad ložem</td>
<td>mm</td>
<td>150</td>
</tr>
<tr>
<td>Průměr tříčelistního skříčidla</td>
<td>mm</td>
<td>85</td>
</tr>
<tr>
<td>Kleština upíná do Ø</td>
<td>mm</td>
<td>10</td>
</tr>
<tr>
<td>Dosažitelné závity normálními výměnnými koly</td>
<td>mm</td>
<td>0,2-3</td>
</tr>
<tr>
<td>6 otáček vřetena</td>
<td>min</td>
<td>150-1500</td>
</tr>
<tr>
<td>Vrtání pracovního vřetena</td>
<td>mm</td>
<td>18</td>
</tr>
<tr>
<td>Stoupání vodicího šroubu</td>
<td>mm</td>
<td>3</td>
</tr>
<tr>
<td>Potřebný výkon motoru 1500/min.</td>
<td>kW</td>
<td>0,25</td>
</tr>
<tr>
<td>Váha stroje s dřevěným stolem asi</td>
<td>kg</td>
<td>135</td>
</tr>
</tbody>
</table>
Doslov

Zkušenosti shrnute v tomto návodu k obsluze jsou výsledkem naší dlouholeté a svědomité práce ve slavbě strojů a jsou také nejlepším předpokladem k nejhospodárnějšímu využití stroje. Všechny díly našich strojů jsou zhotoveny z nejvýhodnějších materiálů za využití nejmodernějších výrobních postupů a kontrolních zařízení. Při dodržování všech provozních předpisů může proto být docílena nejvyšší možná přesnost i výkonnost stroje při nejméněm opotřebení příslušných součástí. Vyskytnou-li se však přes všechna opatření nějaké závady v provozu stroje, ať již zaviněné neodržováním předpisů, neodbornou obsluhou nebo následkem náhodného poškození, jest bezpodmínečně nutno ihned vyřadit stroj z provozu. Menší škody mohou být odstraňovány přímo ve Vaší dílně, aniž by tím utrpěla přesnost stroje. Při větších poškozeních doporučujeme, abyste nás o jejich rozsahu podrobně informovali, abychom Vám mohli posloužit potřebnými pokyny a eventuálními podklady k provedení opravy skutečně rychle a účelně. Telefonické nebo telegrafické objednávky náhradních součástek řídte výhradně na náš závod a k vůli pořádku prosíme o současné písemné potvrzení. V zájmu zajištění přesného vyřízení takových objednávek je nutno vždy uvést správné pojmenování součástky a zkratek nebo přesný popis její funkce ve stroji s udáním čísla vyraženého na poškozeném díle, případně dílec načrtnout.

Děkujieme Vám
Serial Number on Machine:

With the development of manufacturing processes new machines are developed whose design is being adapted continuously to the new requirements of efficient machining. It follows that the Operating Instructions may not always conform in detail to the machine. In ordering spare parts, customers are, therefore, requested to always state the type of the machine and the order number of the part, thus enabling the order to be carried out in conformity with the supplied machine.
We have pleasure in submitting this Manual to you and wish to request you to pay special attention to same and become thoroughly acquainted with its contents. This Manual will inform you on the correct erection, servicing, and starting of the machine. It would fail, however, in its purpose if the foremen and operators were not thoroughly acquainted with its contents. It is of great importance to become familiar with all parts of the machine previous to putting same into operation; special care must be paid above all, to servicing. If you follow the instructions contained in this Manual you will save time and avoid losses. Before setting the machine into operation you must be thoroughly acquainted with all controls of the machine. The working accuracy of each machine is ascertained by high-precision instruments. The system and special care with which this test is carried out ensure absolute accuracy of the machine within the scope of the acceptance standards involved. To maintain this accuracy, the machine must therefore be transported and installed with special care. If you follow the instructions contained in this Manual you will be satisfied with the accuracy and performance of the machine. We wish you success and the best possible results on our machines.
PRINCIPAL DATA OF THE MACHINE

Kind of machine: Bench Centre Lathe for Fine Mechanics
Type: Mn-80A
Manufactured by: TOS Čelákovice, National Corporation
Year of manufacture:
Serial number: 04
Overall length of machine: mm 1150
Width: mm 570
Heigh: mm 1200
Total weight without attachments kg 135
Operating tension of electric motors:
All-up power input of the machine kW 0,37

The machine is most suitable for fine mechanics and optical industry, research laboratories, pattern shops as well as for wireless sets industry etc.

Inventory No.:
Supplier:
Order number:
Date of delivery:
Time of guarantee:
Place and date of installation:
Notes regarding changes of machine site:

TECHNICAL DATA OF THE MACHINE:

1. Working range:
   Swing over bed mm 160
   Swing over saddle mm 90
   Height of centres over bed mm 80
   Turning length mm 300

2. Working spindle:
   diameter and length of the front bearing mm 38 x 50
   Centering diameter of the front spindle nose mm 40 j 5
   Thread of the front spindle nose M 39 x 4
   Bore of the working spindle mm 18
3. Spindle speeds:
   Number of steps 9
   Ranges of speeds r.p.m. 150, 250, 400,
   600, 750, 1000,
   1250, 1600,
   2000

4. Feeds of saddles:
   Range of longitudinal feeds mm 0,01 to 0,15
   19 metric threads with a pitch from mm 0,2 to 3
   15 Whitworth threads – number of threads per inch from 38 to 7
   17 module threads – pitch of module 0,2 to 1,5
   18 Diametral pitch: number of threads per inch dia. from 20 to 80
   (is supplied against a special order of the customer only).

5. Lead screw:
   Diameter x pitch Tr 16 x 3

6. Saddles:
   Working stroke of cross slide mm 100
   Working stroke of tool slide mm 100
   Lead of the moving screw threads mm 1,5
   1 division of the tool slide in – dexing ring mm 0,05
   1 division of the cross slide in – dexing ring
   (related to the worked diameter) mm 0,1
   Standard tool section mm 10 x 10

7. Tailstock:
   Diameter of centre sleeve mm 20
   Working stroke of centre sleeve mm 80
   Internal taper of centre sleeve Morse 1
   1 division of indexing ring equals to mm 0,05

8. Collet chucking attachment:
   Maximum diameter of round iron mm 10
   Maximum diameter of square iron mm 7 x 7
   Maximum diameter of hexagonal iron – width of spanner jaws mm 8
   Step collets for external chucking from mm 10 – 40
   Step collets for internal chucking from mm 10 – 50
TECHNICAL DESCRIPTION OF THE MACHINE:

The lathes of the Mn-80A type are intended for the fine mechanics and optical industry, the wireless sets industry, the research labs, as well as for pattern shops etc. Current turning operations, the lathe being suitable to perform, can be completed by finishing operations with the use of additional attachments. The machine is suitable for all boring, milling, indexing operations as well as for cutting of different threads and layout operations of parts on bed surfaces etc., making the lathe a real multi-purpose machine tool.

The working spindle derives its 9 ranges of revolutions from 150 to 2000 r.p.m. The drive of the machine is effected by means of V-belts which are stretched by means of a swivelling countershaft. The electric motor, the countershaft as well as the electric installation are situated in the left part of the bench, on which the lathe is assembled.

The Headstock with its sliding seating of the working spindle is equipped with a collet chucking attachment, making the use of round, square and hexagon iron turning operations and the chucking of rings on outer and inner diameters possible.

The drive to the lead screw is done by means of change gears, into which a planet gearing is assembled, reducing by 20x the set pitch. By only shifting of the clutch an advantageous use of displacing the longitudinal feed for threading is made of, without making a change of the change gears necessary.

The saddles are lead in narrow prismatic guide-ways. The auxiliary attachments as travelling steady, milling attachment, vertical slide with chucking angle make the saddles suitable for universal operations.

The tailstock, sliding on the bed, can be easily removed, having on its centre sleeve a scale in mm rise for reading of depth while performing the boring, reaming and threading operations. It can be replaced by a lever drilling tailstock, which forms an additional equipment of the machine.

TRANSPORT OF THE MACHINE AND ERECTION

The machine, prior to despatch from the factory, is protected with a paint coating avoiding the corrosion and is attached to wooden skids. Against damaging the lathe is protected by a crating made of laths. It is recommended to remove the crating not sooner until the machine is forwarded to its site of installation, avoiding the damage to paint as well as to the protruding parts.
The lathe should be carefully levelled by means of a spirit level. A correct levelling of the machine is of vital importance which ensures a perfect accuracy of same during operation. It is recommended to check from time to time the accurate level of it, ensuring the correct position of bed against a distortion.

ELECTRICAL INSTALLATION OF THE MACHINE, ELECTRICAL EQUIPMENT AND CONNECTION TO THE MAINS
Fig. 1, 2, 3

In the manufacturer's workshop the machine is fitted with electrical equipment, corresponding to the voltage and frequency prescribed by the customer and complying with the regulations which are in force in Czechoslovakia. The electric equipment is completely installed, interconnected and tested. The customer has only to connect the mains to the terminal board D1.

The electric equipment, including electric motor and lead-in terminal board, is located in the left portion of the bench. Protecting, interconnecting and control instruments are situated on a common plate fixed to the door which covers the said portion of the bench. Control devices are accessible from the outer side of the door, i.e. from the operator's position.

Specification of the used instruments

<table>
<thead>
<tr>
<th>Designation</th>
<th>Function</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>V 1</td>
<td>Switch</td>
<td>N 453 5574-03/35</td>
</tr>
<tr>
<td>S 1</td>
<td>Contactor</td>
<td>VM4, VM10, 220 V</td>
</tr>
<tr>
<td>T 1*</td>
<td>Single phase transformer 32 VA</td>
<td>JV 32</td>
</tr>
<tr>
<td>D 1</td>
<td>Lead-in terminal board</td>
<td>6035-00</td>
</tr>
<tr>
<td>D 2</td>
<td>Interconnecting terminal board</td>
<td>6035-00</td>
</tr>
</tbody>
</table>

* for 400–500 voltage only

Specification of the built-in three-phase electric motor

<table>
<thead>
<tr>
<th>Design</th>
<th>Output kW</th>
<th>Voltage V</th>
<th>Frequency cycles</th>
<th>Current A</th>
<th>RPM</th>
<th>Shape</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>220</td>
<td>50</td>
<td>1,9</td>
<td></td>
<td>1380</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>380</td>
<td>50</td>
<td>1,1</td>
<td></td>
<td>1380</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>415</td>
<td>50</td>
<td>1,07</td>
<td></td>
<td>1380</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>500</td>
<td>50</td>
<td>0,81</td>
<td></td>
<td>1380</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M1</td>
<td>0,37</td>
<td>60</td>
<td>1,8</td>
<td></td>
<td>1670</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>415</td>
<td>60</td>
<td>1,05</td>
<td></td>
<td>1670</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Specification of the built-in single-phase electric motor

<table>
<thead>
<tr>
<th>Design.</th>
<th>Output kW</th>
<th>Voltage V</th>
<th>Frequency cycles</th>
<th>Current A</th>
<th>RPM</th>
<th>Shape</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>M1</td>
<td>0,25</td>
<td>220</td>
<td>50</td>
<td>3,5</td>
<td>1390</td>
<td>M101</td>
<td>2APJC71-4</td>
</tr>
</tbody>
</table>

### Specification of fuses and protecting relays, 3-phase supply

<table>
<thead>
<tr>
<th>Design.</th>
<th>Function</th>
<th>Voltage V</th>
<th>Frequency cycles</th>
<th>Current A</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Short circuit protection of motor</td>
<td>220</td>
<td>50</td>
<td>4</td>
<td>E27,2410T-4</td>
</tr>
<tr>
<td>P2</td>
<td></td>
<td>380</td>
<td>50-60</td>
<td>4</td>
<td>E27,2410T-4</td>
</tr>
<tr>
<td>P3</td>
<td></td>
<td>415</td>
<td>50-60</td>
<td>4</td>
<td>E27,2410T-4</td>
</tr>
<tr>
<td>P4</td>
<td>Protection of control circuit</td>
<td>220-500</td>
<td>50-60</td>
<td>4</td>
<td>E27,2410T-4</td>
</tr>
<tr>
<td>P5</td>
<td></td>
<td>220</td>
<td>50-60</td>
<td>6</td>
<td>E27,2410T-6</td>
</tr>
<tr>
<td>P6</td>
<td>Overload protection</td>
<td>380</td>
<td>50-60</td>
<td>2,3</td>
<td>R100-2,3</td>
</tr>
<tr>
<td>F1</td>
<td></td>
<td>415</td>
<td>50-60</td>
<td>1</td>
<td>R100-1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>500</td>
<td>50-60</td>
<td>1</td>
<td>R100-1</td>
</tr>
</tbody>
</table>

### Specification of fuses and protecting relays, 1-phase supply

<table>
<thead>
<tr>
<th>Design.</th>
<th>Function</th>
<th>Voltage V</th>
<th>Frequency cycles</th>
<th>Current A</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>P1</td>
<td>Short circuit protection of motor</td>
<td>220</td>
<td>50-60</td>
<td>10</td>
<td>E27,2410T-10</td>
</tr>
<tr>
<td>P4</td>
<td>Protection of control circuit</td>
<td>220</td>
<td>50-60</td>
<td>4</td>
<td>E27,2410T-4</td>
</tr>
<tr>
<td>F1</td>
<td>Overload protection of motor</td>
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By positioning the switch V1 to the left or to the right the sense of rotation is selected. Should the voltage drop occur, the switch is to be reset in the middle position and then the required sense of rotation re-engaged.
DESCRIPTION OF THE MAIN ELEMENTS OF THE MACHINE, THEIR OPERATION AND MAINTENANCE

Survey of control elements and principal dimensions of machine (Fig. 1)

1. Clutch for changing-over to thread cutting – feed.
2. Lever for reversing the direction of rotation of the lead screw.
3. Wheel for set-up of clamping pressure of the collet.
4. Control lever of the collet chucking attachment.
5. Handwheel for longitudinal feed of saddle.
6. Handle of saddle slide cross feed.
7. Lever for tightening the square tool holder.
8. Lever for engaging the nut of the lead screw.
9. Feed screw handle of the swivelling saddle.
10. Lever serving for tightening the centre sleeve of tailstock.
11. Lever for tightening the tailstock on bed.
12. Handwheel for feeding the tailstock centre sleeve.
13. Lever for loosening the belt while changing the direction of rotation.

V 1 Switch
D 1 Lead-in terminal board

THE HEADSTOCK (see fig. 4,5).

The working spindle is placed in sliding bronze-bearings, which are – to enable an easy removal of the play of – the bearings – held by means of set nuts in conical bushes. The play in longitudinal direction is removed by means of a friction ring, being easily set by the nut. The lubrication circuit of the sliding surfaces of the working spindle is carried out by means of felt inserts, sucking the oil from tanks. Replace the used oil daily.

SET-UP OF THE SPINDLESTOCK BEARINGS.

The front bearing can be set up by loosening the screw 26, which holds up the bearing brass in the adjusted position. By turning to the left (seen from the operator's site the nut 27 is loosened by a hook spanner. The nut 28 is then tightened so as to remove the improper play of the bearing. A correctly set-up bearing permits to indicate a deviation, ascertained by an indicator (a dial indicator) placed on the seating of the working spindle, ranging from 0.01 to 0.015 mm. A test is carried out in such a way that a bar having a length of approx. 500 mm is set into the spindle bore. By pressing against the contact of the dial indicator the bearing play can be ascertained. In case the machine
is running steadily within the highest range of revolutions, it is necessary
to rise the play from 0.02 to 0.03 mm. In other words, when the play is set
to minimum, the machine – upon influence of higher temperatures – stops and
a rapid wear of the sliding surfaces occurs. Having set up the bearings do not
fail to fix the bearing by tightening the screw 26 and nut 27 accordingly.

The rear bearing is set up in the similar way i.e. by loosening the screw 29 and
by tightening the nut 30 again. Having set up the bearing, the screw 29 has
to be tightened and the set up position of the bearing brass has to be secured
again.

The axial thrust of the working spindle is taken up on the front face of the
bearing brass of the front bearing by means of a collar on the spindle from
one side, in the rear by a friction ring 31. In case the friction surfaces get
worn out and an injurious play arises, then the screw 34 has to be loosened
and the play has to be set up by a nut 33 in such a way that the spindle can
be turned by hand without using an excessive force. While setting up the play,
care is to be taken that no impurities cannot penetrate between the friction
ring and the friction surface of the bearing as well.

NOTE:
The set up of the bearing play should be carried out by a skilled repair man,
so as to ensure an accurate and trouble-free exploitation of the machine.

CROSS SLIDE REST (see fig. 6, 7).

The slide is displaced along the bed on guiding surfaces exactly ground, either
by hand or mechanically, while the cross slide rest is displaced on the slides –
with the swivelling tool holder – by hand only.

The set up of the play in the thread of the cross slide rest screw is carried out
by loosening the screws 60 and 61, while by screw 62 the screw nut being
split, is tightened as far as to eliminate the injurious play of the screw. After
having set up the nut by screw 62 do not fail to re-tighten the screws 60
and 61 again. The axial thrusts of the screw are taken up by a collar placed
in the bearing. The play is set up by removing the handle 63 with the indexing
ring 64 and after having loosened the screws 65, the play caused by the wear
of the contact surfaces, can be adjusted by tightening the screws 66 again.
When setting up the play in the thread of the swivelling slide the screws 67 are
firstly to be loosened and by means of set screws 68 the nut is to be tightened
in such a way so as to set up the play. By tightening the screws 67 again the
nut in its set up position is secured.
The axial play of the collar of the swivelling slide screw is removed in a similar way as it is the case with the cross slide screw prior to removing the handle as well as the indexing ring.

The slide carriages are lead by front slide bar of prismatic shape and its play is removed by loosening the screw 76, shifting the wedge by screw 77.
A similar way is to be followed out, when setting up the play of the cross slide, i.e. the screw 78 is to be loosened and the screw 79 is to be tightened again.
The tool slide screw 80 is to be loosened and the play by tightening the 81 is set up. Care is to be taken that after having adjusted the wedges the both screws are properly tightened, otherwise there is a danger of getting a wedge loosened which would damage the guideways by rubbing them by chips.

The guideways are to be cleaned regularly and lubricated by a proper machine oil so as to avoid their scratching and damaging by chips.

THE TAILSTOCK (fig. 8 and 9)

Can be easily shifted along the whole length of the bed, being loosened and fixed in its set position by lever 11. This lever is set so as not to obstruct the slide nor the bed itself. When removing the tailstock of the bed, screw 71 is turned. Using the tailstock for further operations care is to be taken that the set up position of the lever is maintained again by turning the screw 71 into its proper position. The centre sleeve can be set up in its position by lever 10.
To remove the centre from the sleeve the handwheel 12 is shifted in, so as to touch the centre by the feed screw 72 releasing it from its taper. The taper of the centre sleeve equals to Morse 1. The centre sleeve is provided with a scale in mm rise from 0 to 80 mm en abling to read the depth when boring, threading or another operations are carried out. To enable an accurate reading an indexing ring with 30 divisions on its circumference is provided.
One division equals to 0.05 mm. For turning of long tapers the tailstock can be set from its centre position by loosening the screws 75, shifting it by screw 74 and securing it in the set position by tightening the screws 75 again. Should the tailstock be re-set exactly, a centering pin is clamped between the centres and with the aid of a dial indicator the tailstock can be set.

THE COLLET CLAMPING ATTACHMENT WITH THE MACHINE RUNNING
(fig. 4 and 10).

The machine is equipped with an attachment for chucking of bars by collet Mn-809. For chucking of rings on external surface serves the collet Mn-810, while for chucking of rings at internal diameters
the ring collet Mn-811 is used. The collet for bar irons serves for chucking up to 10 mm, while the square material can be chucked up to 7 mm and the hexagon up to 8 mm as well. By stepped collets Mn-810 rings, having a diameter from 10 to 40 mm, graded by 1 mm can be chucked. A set of these collets consists of 5 pieces. The collet Mn-811 for chucking on internal diameters can be used within a range from 6 to 50 mm with a graduation to 1 mm, a set consisting of 5 pieces.

The change of a collet is effected by turning the knurled nut 41 to the left and the collet is released from the thread of the chucking tube 40, to which the nut is coupled. After inserting a thoroughly cleaned collet, one has to see that the collet is tightened as far as to achieve the necessary chucking force for the material to be clamped. By pressing down the lever 4, check the collet for proper chucking force. In case the chucking power is found to be extensive and the lever 4 cannot be pressed any more, the stress is released by the nut 41. If it is found out that the chucking force of the collet is incorrect (unsufficient), the blocking index has to be turned by some teeth.

While changing a collet as well as in the case the collet chucking attachment is not in use during turning operations, care is to be taken that prior to removing the chucking tube with the nut the chucking rollers do not fall out, their designation being 42. These rollers are to be inserted in such a way that they are greased and then put into the grooves of the spindle nose. Then the chucking tube with the nut 41 is to be shifted on. If operation in centres is carried out the collet sleeve is to be replaced by a centre sleeve Mn-807, putting on the driving plate Mn-812, as per fig. 11.

THREAD CUTTING AND FEEDS (fig. 4, 10, 11).

Thread cutting is enabled by means of the lead screw having a pitch of 3 mm as well as by the change gears A, B, C, D. The drive, being derived from the working spindle, is controlled by the lever 2 over the reversing gear, the lever having its 3 positions blocked. The both extreme blocking devices ensure the engagement of the reversing gear for the sense of rotation of the lead screw in the forward or backward motion. The central position disengages the whole drive and the lead screw as well. The thread, fastened to the machine, indicates the standard pitches of metric thread from 0.2 up to 3 mm with the necessary change gears as well. If there is a pitch to be cut which is not incorporated in the chart, the ratio of the change gears is calculated by the following formula:

\[
\frac{A}{B} \cdot \frac{C}{D} = \frac{5}{3}
\]
in which A, B, C, D are change gears,
s is the pitch required and
"3" is the pitch of the lead screw.

The change gear "D" is always in the chart indicated as a gear having
100 teeth. This is made for the reason that in this gear the planet gear with
a ratio of 1/20 is incorporated, which reduces the set pitch ratio for fine feed
to the ratio within the range desired. A set of change gears indicated in the
chart is always supplied with the machine. Besides the metric threads the inch,
module and the DP threads in accordance with the chart 1c can be cut.
For these kind of threads supplementary change gears, which are not included
in the standard set, have to be ordered. These are the gears having 38, 44, 56,
57, 64, 65, 72, 70, 80, 90 and 2 x 55 teeth (as well as a gear with 50 teeth)
from standard set).

The Inch thread chart is formed from the formula:

\[
\frac{A}{B} \times C = 10 . 11 \div \frac{B}{D} \times \frac{1}{12} . 13
\]

where \(B/1\) is the Nr. of threads per inch.
The module thread for modules on the chart 1c is derived from the formula:

\[
\frac{A}{B} \times C = \frac{M}{3 . 7}
\]

where the letter "M" is substituted by the module desired.

The Diametral Pitch threads on the chart 1c are calculated from the formula:

\[
\frac{A}{B} \times C = \frac{7 . 19}{5 . \text{DP}}
\]

The change gears are changed after loosening the screws, removing the washer
with the change gears. When inserting another gear, care is to be taken that
only thoroughly cleaned gears are brought into mesh, oiling them with the other
transmission gears before starting the machine for regular operations.
As mentioned afore, the change gear is supplied with the standard machine as
a planet gear, which is engaged by depressing the ring 4, delivering a feed
movement, which corresponds to 1/20 of the set pitch. When cutting threads,
the knob 1 has to be shifted out from its outer position. By engaging the middle
position the leadscrew is disengaged.
If there is a thread to be cut, where the gear "D" doesn't possess 100 teeth,
the blocking screw 50 has to be loosened and the planet gear has to be shifted
out. Into the groove of the shaft a carrying pin (supplied as standard equipment), is inserted and in the place of the planet gear the respective change gear is put on, securing it by a distance ring and with a screw 14 as well. The gear-quadrant of the change gears 56 is then secured by the screw 55. For the arrangement of the change gears as well as of the other accessoires we refer you to fig. 11.

THREAD CHASING DIAL (Fig. 1, 6, 7)

Long metric threads can be efficiently cut with the aid of the thread chasing dial 82. Much time can be saved thereby as the reverse run of the machine is not necessary to bring the carriage to its initial position. Having disengaged the lead screw nut by means of the lever 8 (when a cut has been taken) we return the carriage to the initial position, indicated by the thread chasing dial 82.

THE LUBRICATION (fig. 1a)

The lubrication of the machine is carried out by a hand lubricator, for which a bearing oil of proper quality (J2), having a viscosity of 2.5° E at 50° C is to be used. Do not miss to refill all the lubricating spots with oil prior to starting the machine into working. In this manner all the moving surfaces are protected against a rapid wear or rubbing.

If the machine is run at the maximum speed the headstock bearings are to be oiled twice a shift.

LIST OF PARTS SUBJECT TO WEAR:

Ball bearings of the reduction gear
(countershaft) consisting of 2 pcs 6204, 20/47/14
V-belts of the reduction gear 1 pc 10 x 800
V-belt of the spindlestock 1 pc 10 x 1180

Fig. 12

Shift block of the collet chucking attachment 2 pcs
Lead screw
Front bearing of the working spindle
Rear bearing of the working spindle
Fig. 13
Upper portion of the lead screw nut
Lower portion of the lead screw nut

Fig. 14
Tool slide nut
Blocking pawl of the tool head
Tailstock nut
Steady guide insert

THE ACCESSOIRES (fig. 15, 16)

For a full exploitation of the machine not only for turning operations but also for finishing of parts the machine is equipped with extras, which make the machine suitable for performing a greater range of production possibilities. In case, some accessoires were not ordered with the machine, there is always possible to supply them additionally.

Standard equipment

Electric equipment incl. motor
Wooden bench
Chip pan
Collet clamping attachment incl. 1 collet, operating while the machine runs
Back plate for selfcentering chuck
Set of change gears
Set of spanners and wrenches for machine service
Mn 801 Standard lathe centre
Mn 807 Sleeve for lathe centres
Mn 812 Driving plate used with lathe centres

Special equipment

Mn− 802 half centre for performing turning operations of small diameters
Mn− 803 hollow centre for performing turning operations of bolts without punch
Mn− 804 hollow half centre for turning operations of pins of small diameters
Mn− 805 three pronged fork centre for woodworking
Mn− 806 drilling plate for tailstock used for the working of cylindrical parts
Mn− 808 three jaw chuck for chucking of tools with cylindrical shanks (up to dia 6 mm)
Mn- 809 chucking collet to chuck round irons
Mn- 810 step collets to chuck rings on outer diameters
Mn- 811 ring collet to chuck rings on inner diameters
Mn- 813 lapping plate for polishing by paste or emery paper to mark workpieces,
to which the pieces are to be fastened by means of putty
Mn- 814 flat drilling plate for tailstock
Mn- 815 face plate with 4 reversible jaws
Mn- 816 universal three-jaws chuck Ø 80 mm
Mn- 817 universal four-jaws chuck Ø 80 mm
Mn- 818 lever-operated drilling tailstock
Mn- 819 swivel hand support for turning operations by hand
Mn- 820 working spindle indexing device
Mn- 821 vertical slide with chucking angle to be assembled to the tol slide
in place of the tool head
Mn- 822 fixed steady clamped on bed
Mn- 823 travelling steady clamped on slide
Mn- 824 vertical slide with indexing device to be assembled on tool slide,
with collet chucking attachment.

Special machine construction

Version for 220 volts,
single-phase electric motor 0,25 kW/1390 RPM

Spindle speeds: number of speeds 6
speed range 150-1600 RPM
CONCLUSION

The experience summed up in this Manual is a result of many years of practice and diligent work in machine building and provides the best possible prerequisites for the economic use of the machine. All machine component parts are made of the most suitable materials with the use of the latest manufacturing processes and control facilities. If all the operating instructions are complied with, the highest possible accuracy and output of the machine can be obtained at minimum wear of the respective parts. Should, despite this fact, some faults in the operation of the machine occur the machine must be immediately put out of operation no matter if the defect has been caused by infringing the rules, by faulty operation or by an accident. Minor defects can be removed direct in your shop without impairing the accuracy of the machine. In case of serious damage you are advised, however, to inform us thoroughly on its extent, thus enabling us to advise you on the repairs and let you have the documents necessary for carrying out same with maximum speed and efficiency. Kindly address all your telephone or cable orders for spare parts only to our works and, for good order's sake, confirm them in writing simultaneously. Always state the correct designation and abbreviation of the part, possibly, its function in the machine with the number stamped on the damaged part and, if necessary, let us have a sketch of same to permit us to carry out the order with maximum accuracy.

Yours faithfully
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