

MICROCENTRIFUGE

TYPE 154.00

INSTRUCTION 2

In order to be able to carry out the best possible service on the MICROCENTRIFUGE Type 154.00 in the event of operational failures or routine inspection, it is essential that the various sections of these instructions be followed very carefully.

The instructions start with a check list and a spare parts list with reference to the following main sections:

1. The centrifuge cannot be started. Fault-finding and testing without dismantling.
2. Fault-finding and testing with partial dismantling.
3. Complete dismantling for major service work.
4. Checking and replacement of single parts or sections.
5. Assembling the centrifuge.
6. Packing - dispatch.

In the event of failure in the servo-print, the control-print or the power-print, these can be returned to O. Dich Instrumentmakers for exchange.

Unless otherwise agreed, during the guarantee period all defective parts must be returned to us for inspection and/or exchange.

We cannot be held responsible for any failure or damage arising during dispatch as a result of poor packing and inadequate transport security not conforming with section 6.

| CHECK | REPLACEMENT | |
|----------------------------|--|--|
| 3.15 Amp fuse type FF | 3.15 amp fuse type FF | Fig. 2 |
| Opto-tacho | | 1.3.9 |
| | Opto-tacho | Section 4.8.0 |
| Locking and control system | | 1.3.9 |
| | Locking magnet coil | section 4.3.0 |
| Unbalance switch | | 1.3.7 + 1.3.8 |
| | Unbalance switch | section 4.9.0 |
| Motor brushes | Motor brushes | 4.6.1 |
| Motor | | section 4.6.0 |
| | Motor | section 4.7.1 + 4.7.4 |
| Drive belt | Drive belt | 4.7.1 - 4.7.3 |
| | Display | 3.3.2 + 3.3.3 |
| | Rotor system | section 2.0.0 + 3.0.0 + 3.1.0 + 3.2.0 |
| Power supply | Power supply | section 4.5.0 diagram 154.10.27 |
| | Mains transformer Fuse holder Main switch Main filter input | section 4.5.0 diagram 154.10.27 |
| Microswitch | Microswitch | section 4.10.0 |
| Control-print | | 4.1.0 - 4.1.7 diagram 154.10.25 |
| | Control-print | section 4.4.0 diagram 154.10.25 |
| Servo-print | | 4.1.0 - 4.1.7 diagram 154.10.26 |
| | Servoprint | section 4.2.0 diagram 154.10.26 |
| Speed adjustment | | 3.3.2 + 3.3.3 + 4.2.7 |

SPARE PARTS LIST - TYPE 154

154.00.13 Rotor shaft system complete
154.00.23 Unbalance switch
154.01.14 Plastic foot for baseplate
154.02.19 Guide pin
154.02.26 Drive belt
154.02.50 Hexagonal key for emergency opening
154.03.03 Lid
154.03.09 Locking pin
154.04.01 Motor complete
154.04.02 Brush holder cap
154.04.03 1 set of motor brushes
154.08.20 Rotor key
154.10.01 Fuse
154.10.02 Microswitch
154.10.06 Main switch
154.10.07 Fuse holder complete
154.10.08 Mains filter input
154.10.11 Control knobs (set)
154.10.14 Locking magnet coil
154.10.15 Dust washer
154.10.16 Mains transformer
154.10.17 Flat cable with plugs
154.10.18 Mains lead
154.10.22 7-segment display
154.10.24 Opto-tacho unit
154.10.25 Control-print
154.10.26 Servo-print
154.10.27 Power-print
154.11.01 Frontplate

155.01.20 Vibration damper

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- 1.0.0 The centrifuge cannot be started.
- 1.0 There is no light in the display or control lamps.
Check the following points:
- .1 Main power supply - 220v 50Hz.
- .2 The mains cable (14) must be pushed right into the centrifuge's supply socket. 2
- .3 The main switch (13) is on (I).
- .4 The 3.15 amp fuse (15) has not blown.
- .5 Check the mains cable (14) for periodic failure, for example by bending it at the plugs.
- 1.2.0 If there is no light in the display (7), control lamp (2) or stop (10) after the points 1.1.1 - 1.1.5 have been checked, examine the following: 1
- .1 When the main switch (13) is slowly switched on and off, it is possible to hear the shifting of the locking system. 2
- .2 If the locking system can be heard to shift, the failure can be lack of connection to or in the flat cable 154.10.17 between the control print 154.10.25 and the servo print 154.10.26, for example if the flat cable's multiplugs are not pressed completely in place in the respective sockets, or if there are bent or broken pins in the plugs. 9
- 1.3.0 There is light in the display and control lamps, but the centrifuge does not function in the normal manner.
Check the following:
- .1 That the electronic clock (6) and (7) is set at, at least 10 secs. The centrifuge cannot be started if the clock shows 00.00. 1
- .2 That the cover is completely closed.
- .3 Both microswitches 154.10.02 must be activated when the cover is opened and closed (can be heard). 6+9
- .4 When the main switch (13) is switched on, the lid is normally able to be opened. The lid can always be opened with the hexagonal key, which is inserted in the hole (11) in the right-hand side of the centrifuge and turned clockwise. 2
- .5 When the power supply is switched off, the lid must be locked.
- .6 The lid must be able to be opened a few seconds after connecting the mains voltage by means of the main switch (13). 2
- .7 Testing of the unbalance switch.
The last figure in the display (7) must blink when the side of the centrifuge cabinet is hit with the flat of the hand. 1
- .8 The indication of failure (blink) must always be able to be annulled by briefly pressing START (8). 1
- .9 The locking system with opto-tacho unit is tested by turning the rotor shaft (1) quickly with the fingers, whereby the locking system must shift. This can be heard and observed in the locking-pin holes (C) in the cabinet. 1

| | | |
|--------|---|------|
| 1.3.10 | If the centrifuge starts, but stops again after a few seconds, there is a failure in the tacho system, for example: | |
| | the multiplug (16) is not in place | 6+10 |
| | failure in the opto-tacho unit 154.10.24 | 7 |
| | failure in the servo print 154.10.26 | 9 |
| | If the centrifuge does not function after all the points under the main section 1.0.0 have been checked, it must be completely or partly dismantled before any further trouble-shooting or service can be carried out. | |
| 2.0.0 | <u>Fault-finding and testing with partial dismantling of the centrifuge.</u> | |
| 1.0 | <u>Dismantling step 1.</u> | |
| .1 | Remove the mains cable (14). | 2 |
| .2 | Dismantle the rotor using the rotor key 154.08.20 | 3 |
| .3 | Close the lid. | |
| .4 | Press the main switch (13) into the on position (I). | 2 |
| .5 | Screw the 4 M5 screws out of the bottom of the centrifuge. See fig. 4 | |
| .6 | Carefully lift the cabinet free of the baseplate and rotor flange (1) and position it as shown in fig. 6. | |
| 2.2.0 | <u>Checking and testing.</u> | |
| .1 | Check that the DIN plugs (16) and (26) and the leads (17) and (18) are pressed fully into place. | 6 |
| .2 | Check that the motor's carbon brushes (19) are in order. | 6+7 |
| .3 | Check the drive belt 154.02.26. | 6+7 |
| .4 | Replace the cabinet, plug in the mains lead and test the centrifuge. | |
| 3.0.0 | <u>Complete dismantling.</u> | |
| .1 | Proceed in accordance with section 2.0.0. | |
| .2 | Remove the multiplugs (16) and (26) from their respective sockets on the servo print 154.10.26. | 6 |
| .3 | Remove the leads (17) from powerprint 154.10.27. Note! Remove by pulling only on the plugs - <u>not on the leads.</u> | 6 |
| .4 | Remove the cabinet with locking system completely from the baseplate. | |
| 3.1.0 | <u>Dismantling of the motor and rotor system.</u> | |
| .1 | Remove the motor leads (18) from the powerprint - <u>pull only</u> on the plugs. Note! The upper lead has a <u>red plug</u> which, out of regard for the direction of rotation, <u>must</u> be connected to + (upper). | 7 |
| .2 | Remove the motor and rotor system 154.02.00 by unscrewing three M6 screws from underneath. | 7+12 |

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- 3.1.3 When the motor and rotor system are to be mounted on the baseplate, it is very important that the footplate (22) does not rotate when the M6 screws are screwed in. 7
The vibration damper (21) will be ruined if the footplate rotates when tightening the M6 screws.
- 3.2.0 Dismantling of the rotor system 154.00.13, the opto-tacho system 154.10.24 and the unbalance switch system 154.00.18.
- .1 Remove the clips (23) so that the leads from DIN plug (16) are free. 8
- .2 Unsolder the two leads (24) from the unbalance switch 154.00.23.
- .3 Loosen the motor's M5 screws (25) and remove the drive belt 154.02.26. 7
- .4 Dismantle the rotor system 154.00.13 by removing the four M5 screws from underneath. 7
- .5 Lift the rotor system 154.00.13 free from the motor plate 154.02.01. 8
 Remove the opto-tacho system 154.10.24 by unscrewing the M3 screw (27).
- 3.3.0 Dismantling of locking and control system.
- .1 Place the cabinet on a table.
- .2 Remove the top plates (3, 4, 5 and 6) from the control knobs with a knife. The control knobs can now be removed using a box spanner or a screwdriver. 1
- .3 Screw out the M3 screws (A) and carefully lift up the frontplate. Note that the two covers at START and STOP will afford a certain resistance. 1
- .4 Unlock the lid with the hexagon key through the hole (11) in the right-hand side of the cabinet. Open the lid completely. 1
- .5 Screw out the M4 screws (B). When the cabinet is now lifted away, the locking and control unit 154.00.10 will remain standing on the table. 1
- 4.0.0 Checking and replacement of single parts or sections.
- 1.0 Checking of: control-print 154.10.25
 servo-print 154.10.26
- .1 Dismantle the centrifuge: points 2.1.0 - 2.1.6
 3.0.0 - 3.0.4
 3.3.0 - 3.3.5
- .2 Loosen the two M4 screws (28) and remove the three M3 screws (29) from the front stay. The servo-print 154.10.26 can now be swung out for inspection. 9
- .3 Check the various parts of the control system and rectify possible failures.
- .4 Place the frontplate loosely on the locking frame and mount the control knobs.
- .5 Position the locking frame on the baseplate.
- .6 Insert the multiplugs (16) and (17) in their respective sockets. 2
 Connect the mains cable (14) and switch on (I) the main switch (13).

G-B 5

- 4.1.7 The tongues on the two microswitches 154.10.02 can now be pressed down and the functions of the centrifuge tested and adjusted if necessary (see 4.2.7). 9
- 4.2.0 Dismantling and replacement of servo-print 154.10.26.
- .1 Dismantle the centrifuge: points 2.1.0 - 2.1.6
3.0.0 - 3.0.4
3.3.0 - 3.3.5
- .2 The leads from the locking magnet 154.10.14 can now be unsoldered from the print. 9
- .3 Carefully pull the plug on the flat cable 154.10.17 straight out of the control-print 154.10.25. 9
- .4 Screw out the six M3 screws (29) with spacer bushes. The print with the flat cable can now be removed. 9
- .5 Withdraw the flat cable from the print and insert it in the new print. Check that all the plug pins are intact and straight.
- .6 Arrange the locking frame 154.00.10 in accordance with points 4.1.4 - 4.1.7.
- .7 Check the speed of the rotor shaft with a stroboscope.
Set the centrifuge: rotor = 6 cm and $g = 15,000$.
The speed must be 15,000 RPM.
Fine adjustment (32) is carried out on the control-print, and coarse adjustment (31) on the servo-print. 9
- 4.3.0 Replacement of locking magnet coil.
- .1 Dismantle the centrifuge in accordance with points 2.1.1 - 2.1.6
3.0.1 - 3.0.4
3.3.1 - 3.3.5
- .2 Remove the magnet armature system 154.00.16 by screwing out the M3 screws (33). 9
- .3 Unsolder the magnet coil leads (30) from the servo-print 154.10.26.
- .4 Remove the magnet coil by screwing out the screws (34). Mount the new coil and screw on tightly.
- .5 When mounting the magnet armature system 154.00.16, it is very important that the armature moves freely when the locking system is activated.
- .6 Solder the leads to the print.
Note! The leads for the magnet coil must be twisted together.
- 4.4.0 Checking and replacement of control-print 154.10.25.
- .1 Dismantle the centrifuge: points 2.1.0 - 2.1.6
3.0.0 - 3.0.4
3.3.0 - 3.3.5
- .2 Loosen the left-hand suspension angle 154.07.07 by loosening the screws (35). 9
- .3 Unsolder the leads (36) from the control-print 154.10.25.

- 4.4.4 Pull the plug on the flat cable 154.10.17 very carefully straight out of the socket.
- .5 Screw out the five M3 screws (37) and remove the control-print. When mounting the new print, remember to use the spacer bushes. Check that all the pins in the multiplug are in order.
- .6 Remount the suspension angle 154.07.07.
- .7 Arrange the locking frame 154.00.10 as per points 4.1.4 - 4.1.7 and check the speed in accordance with point 4.2.7.
- 4.5.0 Checking and replacement of power supply 154.00.08.
- .1 Dismantle the centrifuge in accordance with points 2.1.0 - 2.1.6
3.0.1 - 3.0.4
- .2 Remove the leads (18) from the power-print - pull only on the plugs. Note that the upper lead has a red plug which, out of regard for the direction of rotation, must always be connected to + (uppermost). 6+7
- .3 Remove the power supply assembly 154.00.08 from the baseplate by screwing out the three M4 screws from underneath. 7+10+12
- .4 Dismantle the power-print 154.10.27 by removing the five M3 screws (41). 10
- .5 When mounting the power-print, remember the insulation plate (42) and spacer bushes (43).
- .6 Ensure that the 220V leads and the 15-0-15V leads are correctly placed. 10+11
- 4.6.0 Checking the motor, the motor unit and drive belt.
- .1 Dismantle the centrifuge in accordance with points 2.1.0 - 2.1.6. Check the motor brushes (19) and renew if necessary. 6+7
- .2 Further dismantle the centrifuge in accordance with points 3.0.1 - 3.0.4. The drive belt 154.02.26 can now be inspected and adjusted if necessary (see 4.7.3). 7
- .3 Remove the motor leads (18) from the power supply - pull only on the plugs. Note that the upper lead has a red plug which must always be connected to + (uppermost). 7
- .4 The motor can now be tested with an external variable DC supply - max. 190V.
- 4.7.0 Replacement of motor 154.04.01 and drive belt 154.02.26.
- .1 Dismantle the centrifuge: points 2.1.0 - 2.1.6
3.0.1 - 3.0.4
3.1.1 - 3.1.3
- .2 Loosen the motor's M5 screws (25). The drive belt 154.02.26 can now be adjusted or replaced in accordance with point 4.7.3. 7+8
- .3 The new belt, which is provided with two adjusting marks 100 mm apart, is mounted and the M5 screws tightened lightly. The correct belt tension 1.7% is achieved by swinging the motor around the one screw until the distance between the adjusting marks is 101.7 mm, after which the M5 screws can be fully tightened.

4.7.4 The motor 154.04.01 can be replaced by a new motor after the screws (25) have been removed completely. The new motor with pulley must be positioned with the leads as shown in figs. 8 and 10, and secured in accordance with point 4.7.3.

4.8.0 Replacement of opto-tacho unit 154.10.24.

.1 Dismantle the centrifuge in accordance with the points:

- 2.1.0 - 2.1.6
- 3.0.1 - 3.0.4
- 3.1.1 - 3.1.2
- 3.2.1 - 3.2.5

.2 Unsolder the leads from the opto-tacho unit 154.10.24.

7+8

.3 The leads are soldered to the new unit in exactly the same position.

4.9.0 Replacement of unbalance switch.

.1 Dismantle the centrifuge in accordance with the points:

- 2.1.0 - 2.1.6
- 3.0.1 - 3.0.4

.2 Unsolder the leads (24) from the unbalance switch 154.00.23.

7+8

.3 Remove the screw (20) and take off the switch unit 154.00.23.

.4 Mount the new unit so that the surface with the plug pins is ≠ with the line on the column (38).

.5 Carefully solder the leads to the new unit.

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4.10.0 Replacement of microswitches 154.10.02.

.1 Dismantle the centrifuge in accordance with the points:

- 2.1.0 - 2.1.6
- 3.0.1 - 3.0.4
- 3.3.0 - 3.3.5

.2 Remove the leads from the microswitches.

9

.3 Dismantle the microswitches by removing the two M3 screws and nuts.

.4 When the new switches have been mounted, place the locking frame 154.00.10 in the cabinet (see point 5.1.4).

5.0.0 Assembling the centrifuge.

1.0 Assembly is carried out in the reverse order to that of dismantling, but in order to avoid damage arising as a result of incorrect assembly, careful attention must be paid to the following points:

.1 Assembly of the locking and control system 154.00.10 in the cabinet is placed on a table as shown in fig. 5 and the lid is opened.

.2 The M4 screws (B) are placed in the cabinet.

1+5

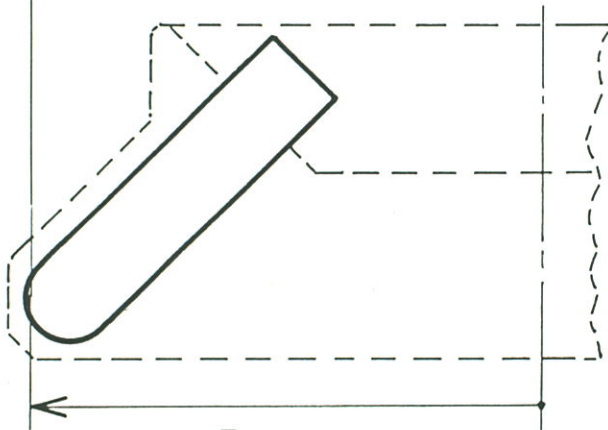
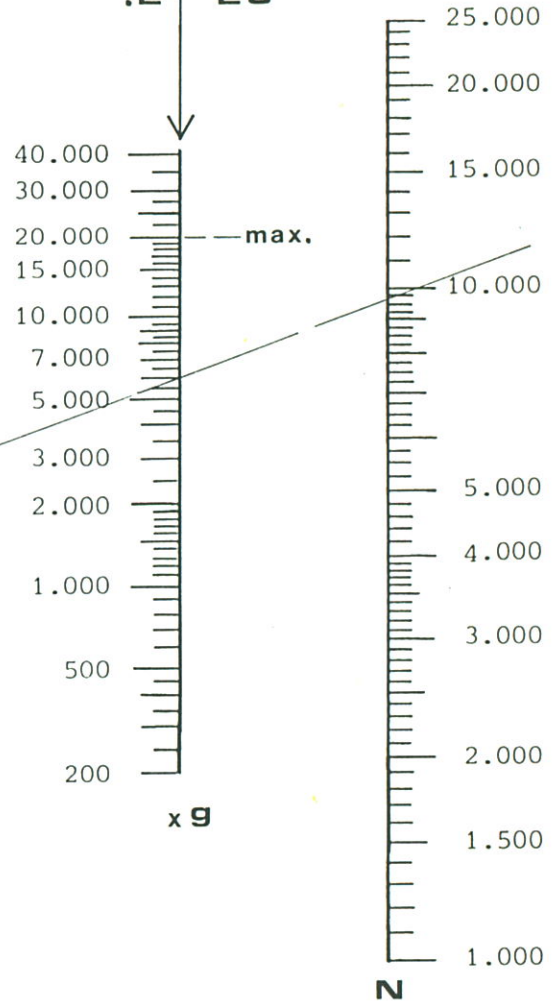
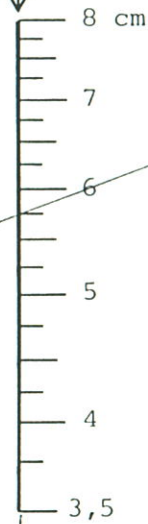
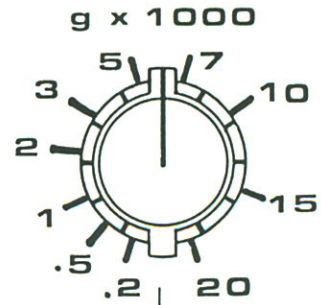
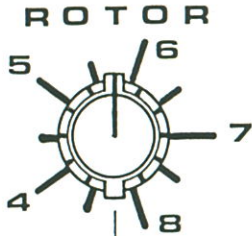
- 5.1.3 Out of regard for the locking pawls (39), the locking system is led carefully up into place and all the screws are lightly tightened. Finally, all 4 screws are fully tightened.
- .4 Slowly close the lid and check that the locking pawls (39) engage before the microswitches change. 6+9
- Note! If any adjustment is necessary, this is to be carried out only on the tongues (40) of the microswitches.
- .5 When mounting the frontplate on the cabinet, the M3 screws (A) must be tightened carefully and uniformly in order to avoid the formation of cracks in the frontplate. 1
- 2.0 Assembly of motor and rotor system on baseplate.
- .1 The vibration damper's footplate (22) must be prevented from rotating when the M6 screws are tightened. 7
- .2 If the vibration dampers (21) rotate during assembly, they will be ruined and must be replaced.
- 3.0 Assembly of rotor shaft system on motorplate 154.02.01.
- .1 When the rotor shaft system 154.00.13 is mounted on the motorplate 154.02.01, it must be ensured that the rubber guide-pin 154.02.19 is in place in the notch in the motorplate 154.02.01 and in the corresponding notch in the suspension ring on the spindle tube, after which the rotor shaft system can be secured firmly with the M5 screws. 8

The following instructions must be observed very closely in order to avoid damage to the centrifuge during transport.

- 6.0.0 The centrifuge motor and rotor system must be secured with one red and three yellow securing screws. 12
- .1 Place the centrifuge bottom upwards.
- .2 Screw the three yellow screws with washers (A) into the baseplate as shown.
- .3 The system is finally secured with the red screw and the associated bush (B).
- 6.1.0 Packing. 13
- .1 Protect the centrifuge with plastic foil.
- .2 Place the centrifuge in a special wooden crate and secure it firmly with four angle blocks of plastic (C) and (D).
- .3 Ensure that the centrifuge is held firmly in all directions before nailing on the lid of the crate.
- .4 Bind the crate with at least two steel or plastic bands.

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$$g = 11,18 \times R(\text{cm}) \times N^2 \times 10^{-6}$$

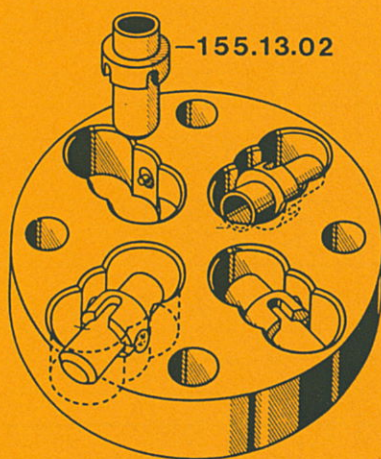


R cm.

$$N = \left| \begin{array}{l} \text{Umdrehungen} \\ \text{Omdrejninger} \\ \text{Revolutions} \end{array} \right| / \text{Minute}$$

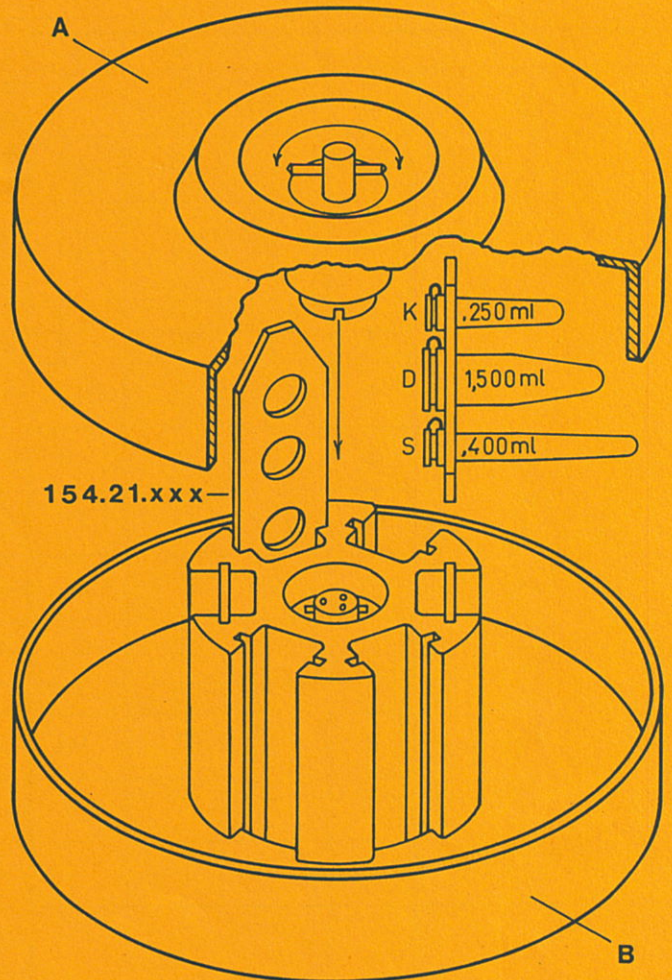


ANGLE ROTOR



SWIVEL ROTOR

154.120.U



SLIDE ROTOR

154.012.23

For MICROCENTRIFUGE type 154.00 a wide selection of suitable inserts of glass, polypropylene, polystyrol etc. is available.

We have a comprehensive programme of standard rotors for the most popular inserts (See over).

The type designations (order-numbers) of the rotors are given in connection with the appropriate inserts.

The SWIVEL ROTOR type 154.120.U is available with 4 type 155.13.02 holders for type "H" inserts.

The SLIDE ROTOR type 154.012.23 has a capacity of 6 slides.

The table gives order Nos. for standard slides type 154.21.xxx.

TYPE 154.012.02 is SLIDE ROTOR 154.012.23 without the closed two part casing (part A and B).

| TYPE | INSERTS | CAPACITY |
|-------------|---------|----------|
| 154.21.KS.5 | K | 5 |
| | N | |
| | S | |
| 154.21.KS.8 | K | 8 |
| | N | |
| | S | |
| 154.21. D.3 | D | 3 |
| 154.21. P.4 | P | 4 |

All rotors are made of aluminium and with great precision.

Rotors, holders and slides are anodized.

Upon request, special outfits can be manufactured, for example:

Rotors for special inserts

Adaptors

Combi - rotors

Slides for special inserts