

In order to be able to effect the best possible service on the CENTRIFUGE 157MPRF in the event of possible operational disturbances or routine inspection, it is of utmost importance that the sections of these instructions are followed very carefully.

The instructions are prefaced with check list and 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. Total dismantling for extensive service operations.
 4. Checking and replacement of individual parts or sections.
 5. Assembly of the centrifuge.
 6. Service plan.
 7. Packing and despatch.
- Spare parts list.

In the event of errors on the control or the power print, these may be returned to O. DICH INSTRUMENTMAKERS Aps for exchange.

During the guarantee period, all defective parts must be returned to us for inspection and/or exchange, unless other agreements have been made.

Failures and damages arising during return transport (despatch) to us, as a result of poor packing and the lack of transport security in accordance with section 7, are not covered by the guarantee.

When despatching the centrifuge, it is of utmost importance that the transport security is mounted (see Section 7.0.0).

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CHECK	REPLACEMENT	
Fuse 3,15 Amp. type FF	Fuse 3,15 Amp. type FF	fig. 4 (15)
Opto-tacho		display 10
	Opto-tacho	section 4.9.0
Lid lock system		point 1.3.7
	Locking magnet	section 4.2.0
Unbalance switch		point 1.3.8
	Unbalance switch	section 4.10.0
Rotor code reader		display 3
	Rotor code reader	section 4.4.0
Motor brushes	Motor brushes	2.2.3 - 4.7.1
Motor		section 4.7.4
	Motor	section 4.7.0
Drive belt	Drive belt	4.7.0 - 4.8.5
	Display	section 4.5.0
	Rotor system	point 6.3.3
Power supply (power board)	Power supply (power board)	section 4.6.0 diagram 157.10.27
	Mains transformer Main switch	section 4.6.0 diagram 157.10.27
Microswitch		display 11
	Microswitch	section 4.11.0
Control board		display 12
	Control board	section 4.0.0 diagram 157.12.25
Compressor board		display 12
	Compressor board	section 4.1.0
Temperature sensor		display 12 12
	Temperature sensor	section 4.3.0

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Failures and faults in the operation of the centrifuge are registered and handled by the microprocessor and shown in the display. The following is a complete list of the error and instruction messages which can appear in the display.

Under certain circumstances, the centrifuge can display errors without any apparent reason. Therefore, always cancel an error message by pressing **ENTER** and restart the centrifuge. If the centrifuge hereafter displays errors, the reason can be one of the following:

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- | | | |
|---|---|--|
| PROGRAMMED G-VALUE
ABOVE ROTOR LIMIT !
---AWAIT rotor stop
* ENTER to continue | 1 | The programmed G-value is higher than that allowed for the relevant rotor.
Check max G-value on the rotor or better in the rotor list in instruction for use. |
| ROTOR NOT IN TABLE !
Call O.Dich service department.
* ENTER to continue | 2 | No rotor code on the mounted rotor, or the rotor mounted is of newly-developed type which is not coded in the centrifuge's memory. |
| R O T O R E R R O R
Wait until rotor
stopped
* ENTER to continue | 3 | Defect or unclear rotorcode.
Error in rotor code reader or its circuit.
If displayed after replacement of the motor, the reason could be that the direction of rotation is incorrect |
| * U N B A L A N C E
Wait until rotor
stopped
* Enter to continue | 4 | Possible reasons: Rotor incorrectly secured.
Foreign bodies between rotor and flange
Samples placed unsymmetrical in rotor.
Faulty unbalance switch. |
| CHANGE OF RUNNING
SET VALUES :
USE PROGRAM 0
* ENTER to continue | 5 | If one of the key's G Time or Acc are activated during centrifuging. Use program "0" if the parameters are desired to be changed during centrifuging. |
| * POWER FAILURE ***
Wait until rotor
stopped
* ENTER to continue | 6 | Power failure or too low voltage during a program sequence. |
| BATTERY BACKUP ERROR
Call O.DICH service department
* ENTER to continue | 7 | Failure in the battery back-up. |
| * LID UNLOCKED ****
(start pressed or
rotor running)
* ENTER to continue | 8 | The start button has been activated with open lid, or with lid partly closed, especially on type 157.MP.RF. Press at point (T) so that button (D) springs out. |

*** LID LOCKED ***
Press ENTER to open

9 Shown after 2 mins. **without operation.**
In this condition, all unnecessary power is switched off and the lid is locked. The centrifuge can be opened by pressing the button (D) after ENTER has been pressed.

M O T O R E R R O R
V E R L O A D--
---Await rotor stop
ENTER to continue

10 The centrifuge cannot achieve the programmed G-value.
Possible reason: Failure in centrifuge's bearings.
Drive belt loose.
Error in the Opto-tacho system.

M O T O R E R R O R
Wait until rotor
stopped
* ENTER to continue

11 Motor and/or rotor not rotating.
Possible reasons: Defect motor. Possible worn brushes.
Blocked rotor or spindle.
Defective left microswitch.
Broken drive belt.

TEMPERATURE ERROR
(above max. limit)
---Await rotor stop
* ENTER to continue

12 Cooling unit out of operation and temp. above 40 deg. C.
Possible reasons: Defective cooling unit.
Defective compressor board.
Defective temperature sensor.
Defective control board.

Type 157.MP and 157.MP.RF centrifuges are provided with a service program which makes it possible to call for the informations listed below.

In order to enter the service program, key the following:

Open the centrifuge lid and press the START .

The display will now show * LID UNLOCKED ****

Now hold the TIME and the 0 key down at the same time and press ENTER .

The display now shows:

Mains (hours : sec)
ENTER to continue

Total time with voltage on the apparatus.

Motor (hours : sec)
ENTER to continue

Total operation time for rotor and spindle.

Rotor
(3volutions
ENTER to continue

Total number of revolutions.

No: of start cycles
ENTER to continue

Total number of starts.

After ENTER has been pressed, the display will show the last program used.

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- 157.MP.RF/GB
- 1.0.0 Cooling centrifuge can not be started
- .1 There is no text in display.
Check the following points:
- .2 Main power supply 220 volts 50 Hz
- .3 The main switch (E) is on (light) 1+4
Centrifuge's switch (13) is on (text in display).
- .4 The power cable (14) must be pressed completely
into the centrifuge's power connection.
- .5 The two 3,15 Amp. FF fuses are in order 4
- .6 The power cable is checked for intermittent failure,
e.g. when the cable is moved (bent at the plugs).
- 1.2.0 The centrifuge can be started from keyboard but
there is no text in display.
- .1 Defective display or display cable.
- 1.3.0 There is text in display, but an error message is shown
each time the centrifuge is started.
- See list on page 3 + 4.
- .1 There is text in display, but the centrifuge does not start
when START is pressed.
- Check the following points:
- .2 The electronic clock must be set at a minimum of 10 secs.
The centrifuge will not start if the clock shows 00.00
- .3 The lid must be completely closed. When the lid is closed, it 1
must be pressed right down so that the button (D) springs out.
Press on the black disk (T) on top of the lid.
- .4 Immediately after the switch (13) has been switched on and 1+4
there is text in the display, the lid must be able to be opened
by pressing the button (D).
- N.B! The lid cannot be opened when the display shows LID LOCKED.
- .5 When the mains voltage is switched off, the lid must be locked.
- .6 With the mains voltage cut off, the lid can be opened with 3+5
the emergency key provided with the apparatus. The key must be
inserted in the hole (11) in the right-hand side of the centrifuge.
The lid is unlocked by turning the key clockwise.
- .7 Testing of lid-locking system.
- The locking pawls must work freely when the right microswitch 3
is activated with a ballpen and the like through the right-hand
locking pawl hole (C).

1.3.8 Testing of unbalance switch.

The unbalance switch must be activated if the centrifuge, with slowly rotating rotor, tilts approx. 45 deg. to the right.

- .9 The error message in the display must be able to be cancelled by pressing ENTER when the centrifuge has stopped.

If the centrifuge still does not function after section 1.0.0. has been gone through, it is necessary to dismantle the centrifuge before further fault-finding and service can be carried out.

2.0.0 Fault-finding and testing with centrifuge dismantled

NOTE: Plug indications with "P" refers to power board. 10+15+16

- .1 Remove power cable from mains socket.
- .2 Remove the bottom screws (A) from the side plates, after which the side plates can be removed by pulling downwards. 1
- Pull downwards only, to avoid damage to the guides at the top.**
- .3 Remove the four M5 screws (H) of the hexagon socket type located internally and upwards in the top of the cooling section. 1
- .4 Remove the power cable (14) from the upper part of the centrifuge. 4
- .5 Remove 8 pcs M4 screws (U) outside the rubber gasket (outer periphery) on the top of the centrifuge. 3
- .6 Using the fingers, push the cooling chamber downwards and free of the cabinet.
- .7 Lift the cabinet approx. 5 cm. and place the centrifuge part's plug in the mains well at the back of the centrifuge, after which the cabinet is supported on the plug (14). 6
- .8 Lift the cabinet slightly at the front edge and remove the two plugs (J8 and J9) foremost on the control board. The plug (J5) can now be removed (placed rearmost to the right on the control board). 18
- .9 Remove the plug (J2P) located in the centrifuge's left side lowermost on the power board (position power board vertically). 10
- .10 Push the cooling chamber to the rear and lift the cabinet free (lift the back end of the cabinet more than the front end).
- 2.1.0 If one is not in possession of an extra front plate with display, it will be necessary to remove the front plate with display from cabinet.
- .1 Remove the four M3 screws (26) on the back of the front plate (inside the cabinet). 6

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2.2.0 Checking and testing

- .1 Carefully mount the two plugs (J8 and J9) on the control board. 18
- .2 Short-circuit the pins in the plug (J2P) on the power board. 16
- .3 The motor brush (19) must be in order (min. 9 mm long). 8
- .4 Mount the rotor - it is not possible to operate the centrifuge without the rotor.
- .5 Connect the centrifuge to the mains supply.
- .6 All of the functions of the centrifuge may now be tested.

WARNING: When test running in open condition, out of regard of safety the speed must not exceed 500 X g.

3.0.0 Dismantling the motor and rotor system 157.02.00.

- .1 Lift the cooling chamber carefully free of the spindle and tilt it carefully out to the right (approx. 45 Deg). Avoid bending the tube sharply.

- .2 Remove the motor plug (J3P) from the power board. 16

Pull only on the plug.

- .3 Remove the motor and the rotor system 157.02.00 from the baseplate by unscrewing 1 pc. M6 screw (D) from below and 2 pcs. M6 screws (D) from the top side. 7+8+10

- .4 When the motor and rotor system 157.02.00 is dismantled from the base plate or is to be mounted on the baseplate, it is important that the footplates (22) does not rotate when the M6 screws are tightened. 7

The vibration damper (21) will be ruined if the footplate (22) rotates during tightening.

3.1.0 Dismantling the rotorsystem 157.00.13 complete.

- .1 Dismantle the centrifuge in accordance with points 2.0.0 - 2.0.10 and 3.0.0 - 3.0.4 .
- .2 Remove the plugs (J2) and (J10) from the tacho-board 7+22
- .3 Loosen the M5 screws (25) and remove the drive belt 154.02.26 8
- .4 Rotor spindel system 157.00.13 complete with rotor code reader and tacho-board is dismantled with four M5 screws.

4.0.0 Dismantling and replacement of control board 157.12.25

- .1 Dismantle the centrifuge in accordance with the point 2.0.0 - 2.0.10

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- 4.0.2 Remove all plugs and pull the board away from the board guides.
- .3 Before assembling the centrifuge, all functions has to be tested, in accordance with point 2.2.0 - 2.2.6.
- .4 Adjust if necessary, the contrast of the display on the (RP1) placed in the left side of the control board. 18
- 4.1.0 Dismantling and replacement of compressor board 157.12.23
- .1 Dismantle the centrifuge in accordance with point 2.0.0 - 2.0.2.
- .2 Remove the compressor board (located underneath the base plate of the centrifuge part) from the board guides and remove the leads by unsoldering.
- .3 Solder the leads on the new board in exactly the same position.
- 4.2.0 Replacement of locking magnet
- .1 Dismantle the centrifuge in accordance with point 2.0.0 - 2.1.1. 3+5+9
- .2 Open the lid with the hexagonal key and remove the four M4 screws (B) located under the frontplate 157.11.MP.RF. 6
- .3 Unsolder the magnet coil leads (50) from the magnet board and dismantle with the two M 2,5 screws. 14
- .4 Remove the magnet coil 157.10.14 by means of the screws (34) and mount the new coil. 9
- 4.3.0 Dismantling and replacement of temperature sensor 157.12.21.
- .1 Dismantle the centrifuge in accordance with section 2.0.0 - 2.0.10 and 3.0.1.
- .2 Remove plug (J4) from control board 157.12.25. 18
- .3 Remove the locking-ring and dismantle the temperature sensor with lead and plug by drawing them up through the cooling chamber.
- .4 Mount the new temperature sensor with a little silicone between the cooling chamber and the O-rings.
- .5 When the plug (J4) has been pressed into place, adjust the test point (TP1) to 4.0 volts. 18+21
- 4.4.0 Dismantling and replacement of rotor code reader 157.12.22.
- .1 Dismantle the centrifuge in accordance with sections 2.0.0 - 2.0.10 and 3.0.0 - 3.0.1.
- .2 Loosen the M3 screw on the side of the rotor code reader. 7
- .3 Remove the plug (J3) and the rubber bellow.
- .4 Lift the rotor code reader free of the spindle and mount the replacement. Remember to apply silicone in the notch where the leads (Optical cables) pass between the rubber gasket and the spindle-housing

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4.4.5 Centrifuges with serial no. from 157 - 65.

Only necessary to replace combi plug 157.12.19 for optical cables. The optical cables (L) must be pressed completely into the unit and then secured with the union nuts (A).
Don't mount the unit to the control board when tighten the union nuts.

23.A

23.B

No tools - only tighten with your fingers.

4.5.0 Dismantling and replacement of frontplate and display

.1 Dismantle the centrifuge in accordance with section 2.0.0 - 2.1.1.

.2 Exchange the frontplate and display with the new unit.

6

When assembling, it is important that the M3 screws (26) are not tightened excessively.

4.6.0 Checking and replacement of power supply 157.00.08

.1 Dismantle the centrifuge in accordance with 2.0.0 - 2.0.10.

.2 Remove the plugs (J1P), (J2P), (J3P), (J4P) and (J5P) from the power board - pull only on the plugs.

16

.3 Remove the power supply section part 157.00.08 from baseplate by unscrewing 3 pcs.3 M4 screws of the hexagonal socket type from below.

7

.4 Dismantle the power board 157.12.27 by unscrewing the four M3 nuts (41).

10

.5 When assembling, it is important that the protection shield and the insulation plate (42) and also the bushes (43), are positioned correctly.

.6 When assembling the centrifuge, it is important that all plugs have been pressed completely into place.

4.7.0 Checking the motor and drive belt.

.1 Dismantle the centrifuge in accordance with sections 2.0.1 - 2.0.10. Check the motor brushes (19). Change if necessary (min. 9 mm).

8

.2 Remove the motor plug (J3P) from the power board pull only on the plug.

10+16

.3 NOTE! For reason of safety, the testing must not be undertaken with the rotor mounted on the spindle.

.4 The motor can now be checked with an external (variable) power supply - max. 190 volts DC.

.5 Loosen the motor screws (25) and adjust the drive belt in accordance with point 4.8.5 .

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4.8.0 Replacement of motor 154.04.01 and drive belt 154.02.26

- .1 Dismantle the centrifuge in accordance with the sections 2.0.0 - 2.0.10.
- .2 Unscrew the M6 screw (D) from the vibration damper (22) 8+10
at the right hand side of the rotor/motor unit.
- .3 Loosen the motor screws (25) and tip the motor-rotor system 7+8
157.02.00 free of the baseplate at the right hand side and
remove/replace the drive belt 154.02.26 .
- .4 The replacement of the motor 157.04.01 is carried out by removing
the M5 screws (25) completely. Mount the new motor and adjust
the belt tension in accordance with point 4.8.5.
Mount the plug (J3P). Press the plug down until the latch engages.
- .5 Mount the new motor and/or belt, which is provided with 2 adjustment
lines at a distance of 100 mm, and slightly tighten the M5 screws (25).
The correct belt tension 1,7% is achieved by swinging the motor
around the one screw until the distance between the adjustment
lines is 101,7 - 102,3 mm, after which both of the M5 screws
can be tightened completely.

4.9.0 Replacement of opto-tacho unit 157.12.24

- .1 Dismantle the centrifuge in accordance with point
2.0.1 - 2.0.10 .
- .2 The plugs (J2) and (J10) are removed from the tacho board. 7+22
- .3 The opto tacho board is dismantled with the screw (27). 10
- .4 Mount the new unit and check that the impuls wheel on
the spindle lies centrally in the opto-tacho unit's notch.

4.10.0 Replacement of unbalance switch 154.00.23

- .1 Dismantle the centrifuge in accordance with
section 2.0.1 - 2.0.10.
- .2 Unsolder the leads from the unbalance switch.
- .3 Unscrew the switch unit 154.00.23 from the column by 7+8
means of the screws (20).
- .4 Mount the new unit so that the flat at the terminals 8
is parallel with the column (38).
- .5 Solder the leads on.
Avoid bending the terminals closely to the glass.

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- 4.11.0 Replacement of microswitches 154.10.02 9
- .1 Dismantle the centrifuge in accordance with the section 2.0.1 - 2.0.10 and 2.1.1 + 4.2.2.
 - .2 Unsolder the leads (17) or (36). The microswitches can now be dismantled by removing 2 pcs. M3 screws and nuts. 9
 - .3 Mount the new switch and **do not tighten the M3 screws too much, as this may damage the switch.**
 - .4 Position the locking frame 157.07.00 in the cabinet.
 - .5 When the locking frame has been secured, slowly close the lid and check that the locking pawls (39) engage **before** the microswitches are activated.
 - .6 If the microswitches are activated either too early or too late, carefully bend the microswitch pawls (40) up or down.
- 5.0.0 ASSEMBLY OF THE CENTRIFUGE
- 1.0 Mounting the rotor spindle system on the motor plate 8
- .1 Before the rotor spindle system 157.00.13 is mounted on the motor plate 154.02.01, it is necessary to ensure that the rubber stop pin 154.02.19 is in place in the notch in the motorplate 154.02.01, and the notch in the spindle tube before the four M 5 screws are placed and tightened. 8+10
- 5.2.0 Mounting the motor and rotor system on the baseplate
- .1 Tighten the 3 M6 screws and make sure that the vibration damper's footplate (21) does not rotate during the tightening, as the rubber may hereby be ruined. 7
- 5.3.0 Assembly of cabinet and sideplates
- .1 Pull the cabinet down over the cooling chamber. Upon mounting, lift the rear end of the cabinet, whereby the locking spindle comes free of the locking pawl foremost on the cooling chamber. Now let the cabinet rest on the mains plug at the rear of the centrifuge part (see point 2.0.7). 6
REMEMBER THE BUTTON (D) BEFORE MOUNTING THE CABINET.

5.3.2 Mount all of the plugs in accordance with point 2.0.8 - 2.0.9.

- .3 Remove the mains plug from the centrifuge part and place the cabinet approx. 6 mm over the baseplate e.g. the thickness of a pencil.
- .4 Position the silicone gasket with its joint at the rear - at the hinge.
- .5 Remove the pencil etc. and carefully lift up the cooling chamber towards the cabinet. Secure with 8 pcs. M4 screws (U). 3+4
- .6 Secure the cabinet with four 4 M5 screws internally in the 1 corners (H) of the cooling cabinet. Mount the side plates and test the centrifuge. 1

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6.0.0 Service plan for microcentrifuge type 157.MP and 157.MP.RF

1.0 All centrifuges once a year: points 6.0.1 - 6.0.9

Can be carried out without dismanteling the centrifuge.

- .1 Check the lid for cracks, crackling and the like, particularly around the screw holes.
- .2 Check the functions of the microswitches
see point 4.11.4 - 4.11.5.
- .3 Check the lock hooks for breakage and overload.
- .4 Check the working ability of the locking pawls - must work freely when the right microswitch is influenced with a ballpen and the like through the right-hand locking pawl hole (C).
- .5 Check the centrifuge rotor for cracks and impact marks.
Examine particularly whether the fixing surface is free of foreign bodies and impact marks. The centre screw must be able to be turned with the fingers.
- .6 Check the rotor flange for impurities, crooked pins and marks.
- .7 Test the function of the unbalance switch
see service manual 1.3.8 - 1.3.9.
- .8 Test all of the electrical functions and examine whether the centrifuge's plugs are of the correct type with earth.
Check with an ohmmeter whether there is connection from the earth pin of the mains cable to frame.
- .9 Check that the fuses at the rear of the centrifuge are of the right type: FF 3,15 Amp superfast.

6.2.0 157.MP.RF. ONLY

- .1 Clean the cooling unit with a vacuum cleaner or compressed air.
- .2 Inspect the spindle bellows (157.19.24) and lid gasket (154.19.23) for cracks and the like.

6.3.0 The following points apply **once a year** for centrifuges with a daily motor operation time of **more than four hours**.

For centrifuges with motor operation time of **less than four hours** daily, only **every third year** or if one of the points 6.0.1 - 6.0.8 call for repair.

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6.3.1 Dismantle the cabinet - see points 2.0.0 - 2.0.10.

- .2 Change the drive belt see: points 4.8.0 - 4.8.5.
- .3 With belt removed, check the spindle bearings - must run easily without noise when rotated with fingers.
- .4 The opto-tacho unit is to be brushed or blown free of dust - can also be cleaned with a pipe cleaner in the notch.
- .5 Check the motor brushes **must be changed if less than 9 mm length.**

THE FOLLOWING INSTRUCTIONS MUST BE FOLLOWED VERY CAREFULLY IN ORDER TO AVOID DAMAGE TO THE CENTRIFUGE DURING TRANSPORT.

7.0.0 The centrifuge's motor and rotor system must be secured with three yellow and one red securing screw (see fig 2).

- .1 The three yellow screws with washers (A) are to be screwed into baseplate first.
- .2 The system are finally secured with the red screw and the associated bush (B).
- .3 Remount the sideplates.
- .4 The rotor **must not** be mounted during transport. This is to be wrapped **carefully** in paper or the like and then placed with the underside upwards in the cooling chamber.

7.1.0 PACKING

- .1 The centrifuge is to be protected with plastic foil.
- .2 The centrifuge must be placed in a wooden box and must be held in place with 10 angle-blocks of hard foam rubber.
- .3 The box must be bound externally with 2 steel or plastic bands.

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S P A R E P A R T S T Y P E 157

Unbalance switch.....	154.00.23
Plastic foot for base plate.....	154.01.14
Rotor shaft complete.....	154.02.16
Drive belt.....	154.02.26
Hexagonal key for emergency opening.....	154.02.50
Lid (without furniture etc.).....	154.03.03
Brush holder cap.....	154.04.02
1 set of motor brushes.....	154.04.03
Rotor key.....	154.08.20
Fuse 3,15amp FF.....	154.10.01
Microcontact for lid	154.10.02
Locking magnet coil.....	154.10.14
Mains transformer.....	154.10.16
Mains lead.....	154.10.18
Silicone-rubber gasket for lid.....	154.19.23
Vibration damper.....	155.01.20
Rotor shaft system complete.....	157.00.13
Motor and rotor system complete with opto-tacho unit and rotor code reader....	157 02 00
Motor complete with pulley.....	157.04.01
Opto-tacho unit.....	157.10.21
Frontplate / keyboard.....	157.11.01
LCD-display	157.11.02
Rotorcode reader (component).....	157.12.03
Mains filter with fuses and switch.....	157.12.06
Relay for compressor board.....	157.12.07
Connector (J3) for optical cables.....	157.12.19
Temperature sensor complete.....	157.12.21
Rotor code reader complete.....	157.12.22
Compressor board complete.....	157.12.23
Opto-tacho unit complete.....	157.12.24
Control board type MP.RF.	157.12.25
Control board type MP.	157.12.26
Power board.....	157.12.27
1 set rubber bellows for rotor system.....	157.19.24