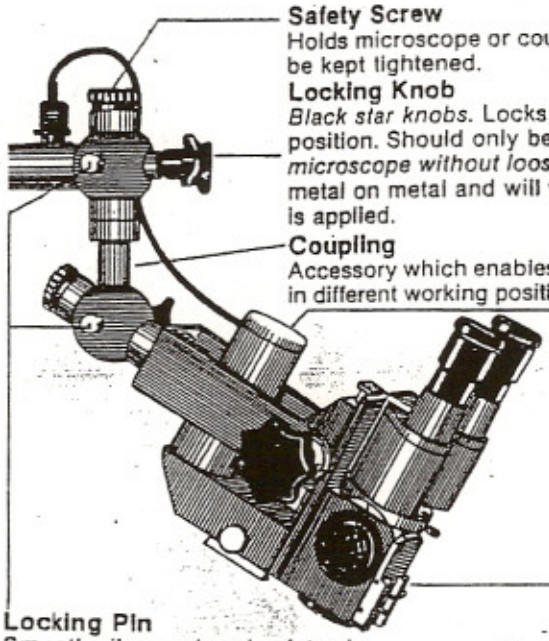
Guide To Zeiss OPMI 1 Surgical Microscopes

OPMI 1

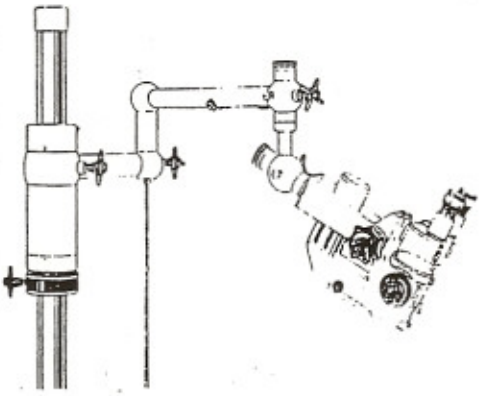
The OPMI 1 is the basic Zeiss operation microscope. The OPMI 1 microscope body, features, and adjustments are common to all microscopes in the OPMI series.



Safety Screw
Holds microscope or coupling securely in place. Must be kept tightened.

Locking Knob
Black star knobs. Locks adjacent part into desired position. Should only be finger tight. *Do not move microscope without loosening these knobs* - these are metal on metal and will wear out if too much stress is applied.

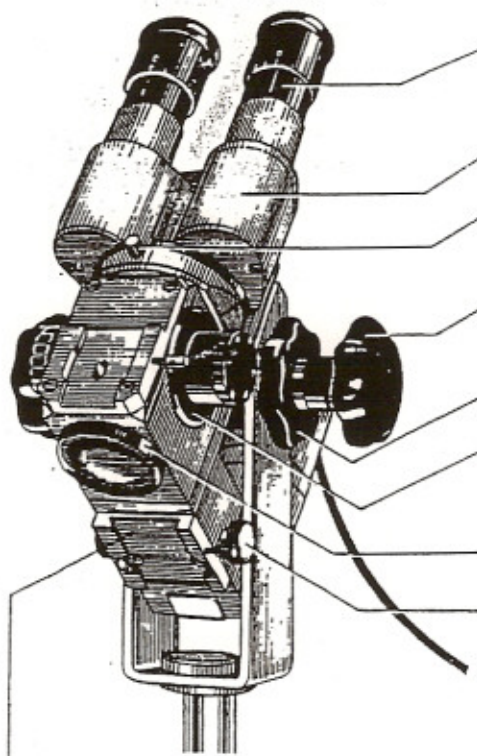
Coupling
Accessory which enables the microscope to be utilized in different working positions for all types of operations.



Lamp Housing
Either made of metal or plastic
USE A CLOTH to change light bulb - this prevents a burn. Also the grease of our fingers reacts with the bulb surface and shortens the life of the bulb.
If bulb is handled, wipe clean before using.

Dovetail
A device upon which some accessories can be added to the microscope.

Locking Pin
Smooth silver-colored safety pin. Pull out to release coupling.



High-eyepoint Eyepieces
Magnification 10X, 12.5X, 16X and 20X. Non-spectacle wearers leave the rubber eye cups up. Spectacle wearers fold rubber eye cups down. Personal correction can be put into eyepiece ±8 diopters. Press orange diopter lock to obtain personal correction. Releasing this locks in the correction which will stay even if eyepiece is accidently moved.

Binocular Tube
Available in different focal lengths and angles.

Microscope Locking Screw
Knurled silver-colored screw. Holds binocular tube and/or beam splitter in place.

Fine Focus
Sharpens the field of view. Used also to determine the amount of friction in up and down movement. To loosen or tighten move one knob clockwise and the other knob counterclockwise until desired friction is obtained.

Brake
Holds the microscope body in a desired position. When positioned the body stays rather than drifting up or down.

Magnification Changer
Either in three or five step. Brings a particular object into closer vision, eg. to look at whole eye and then just the iris.

Objective
Front lens of the microscope body. Varies in focal length. The larger the number, the longer the working distance.

Filter Control Knob
Either black or silver colored metal. Inserts a filter into the light pathway. These filters may be green or blue. On some models this knob is replaced by a slider.

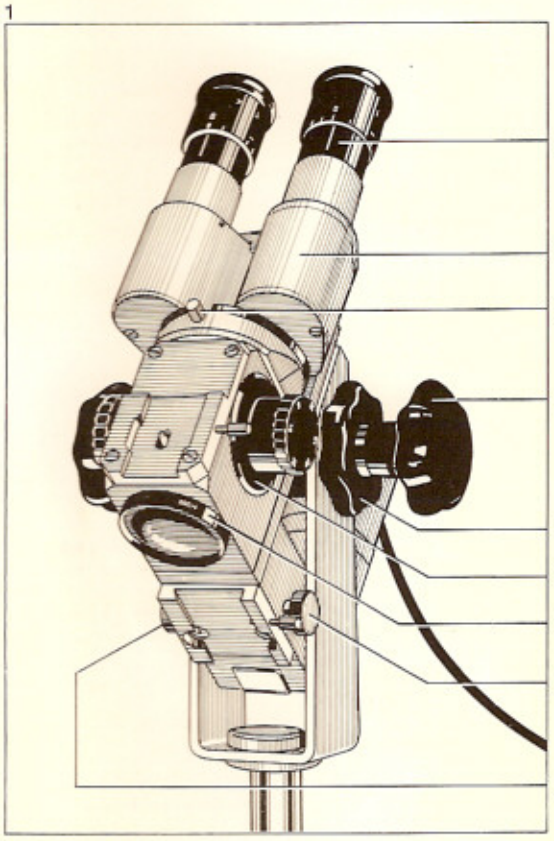
Dovetail
A device upon which some accessories can be added to the microscope.

Earlier OPMI 1 microscope body
Usually colored white. Fine focus knobs black or silver colored. Brake has two parts - smooth black surface with a silver colored lever on it.

Latest OPMI 1 microscope body
Rounder body. Smaller magnification changer knobs. Single holding arm. Filter on slider or knob.

Description of controls on OPMI 1 microscope body

1



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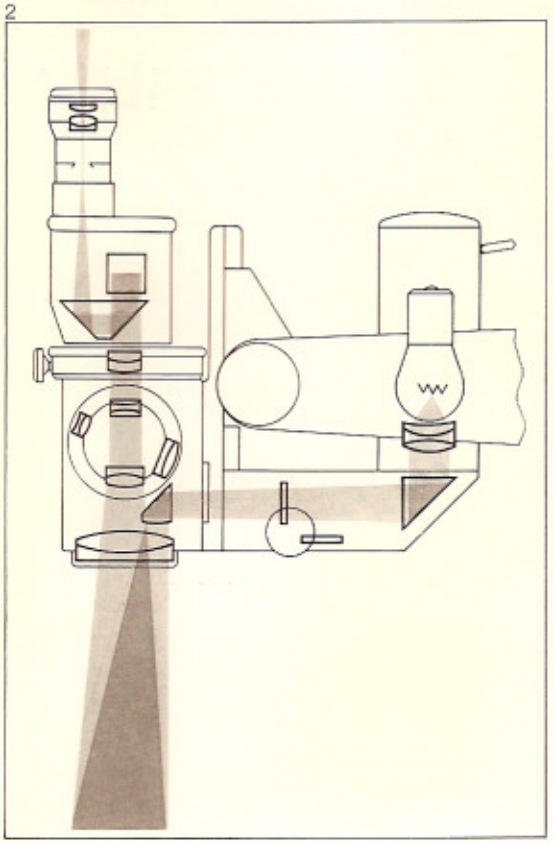


A High-eyepoint eyepieces for magnifications of 10x, 12.5x, 16x, and 20x. These eyepieces can be set within a range of ± 8 dpt and can be equipped with reticles for photo, cine, and measuring purposes (eyepiece micrometer). Moreover, a 12.5x eyepiece without diopter setting is available which cannot be equipped with reticles. For use of eyepieces, please see Section 7.1 "Special hints".

B Binocular tube with focal lengths of f = 125 mm or 160 mm, for straight or inclined viewing.

C Locking screw for fixing the binocular tube B inserted in the adapter ring of the microscope body.

D Focusing knobs. If the two opposite knobs are turned towards each other, the focusing motion stiffness is reduced or increased depending on the sense of rotation.

E Clamping ring for varying the tilting motion stiffness of the microscope about the axis of the focusing knobs.

F 5-step magnification changer. The total magnifications are given in tables (see Section 8). The use of the magnification changer does not affect the working distance.

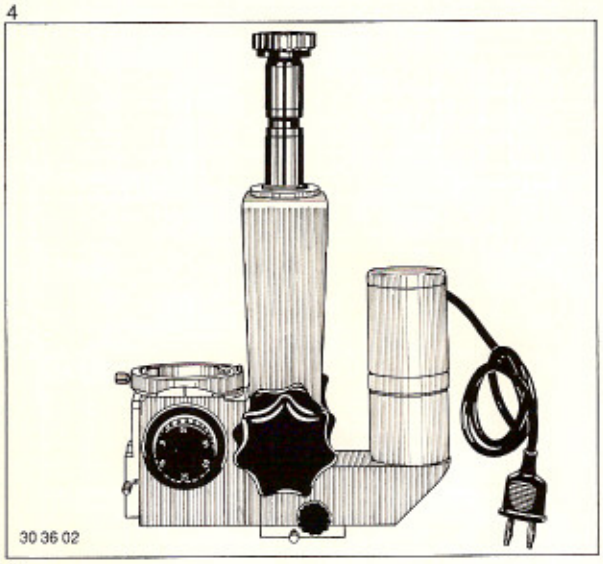
G Objective in position. There are objectives with focal lengths of 50 mm (working distance only about 33 mm) as well as focal lengths according to the magnification tables (see Section 8). With the latter, the focal lengths are identical to the working distance. For microsurgery, only objectives up to f = 400 mm are suitable. (For special purposes, objectives with f = 500 mm, 800 mm, 1,250 mm and 2,000 mm can be supplied).

H Knob for inserting a daylight filter into the beam path.

J Knob for inserting a minus-red filter into the beam path.

2. Parts list

4



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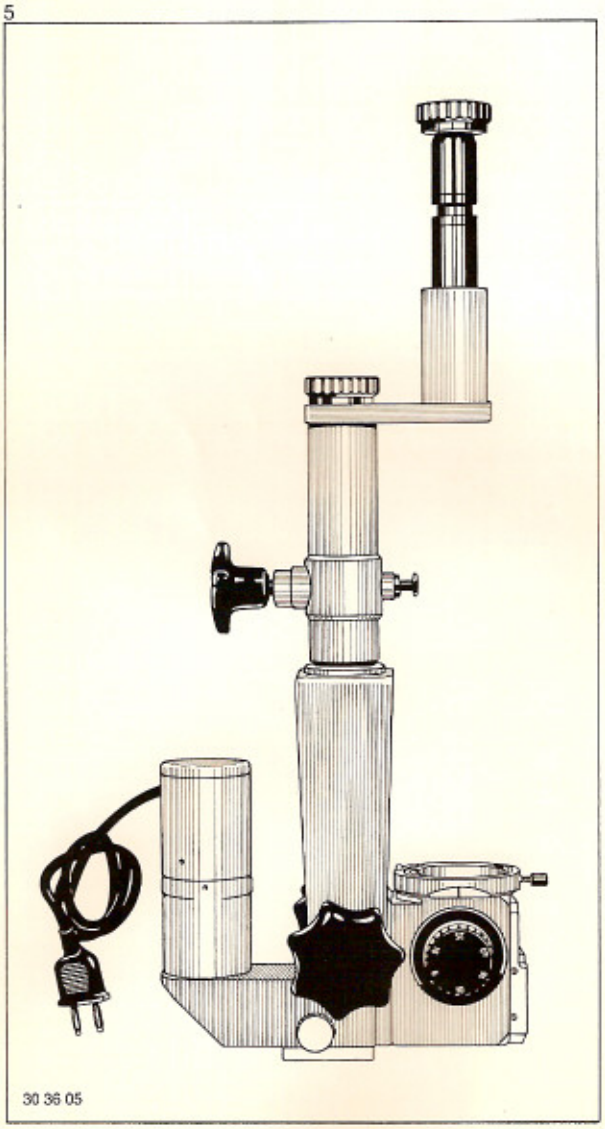

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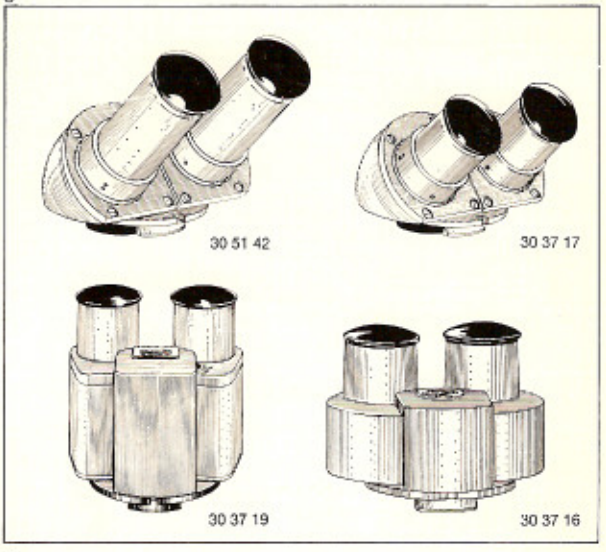

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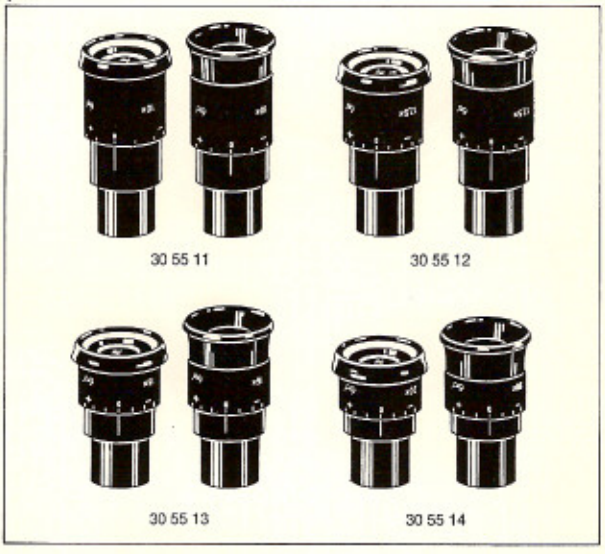
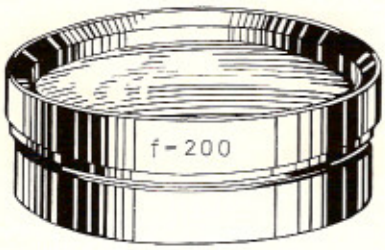


Microscope body	30 36 02
Microscope body (for ophthalmology)	30 36 05
Straight binocular tube f = 160 mm	30 37 19
Inclined binocular tube f = 160 mm	30 51 42
Straight binocular tube f = 125 mm	30 37 16
Inclined binocular tube f = 125 mm	30 37 17
High-eyepoint eyepieces, 10x	30 55 11
High-eyepoint eyepieces, 12.5x	30 55 12
High-eyepoint eyepieces, 16x	30 55 13
High-eyepoint eyepieces, 20x	30 55 14

8



30 51 32
30 51 31

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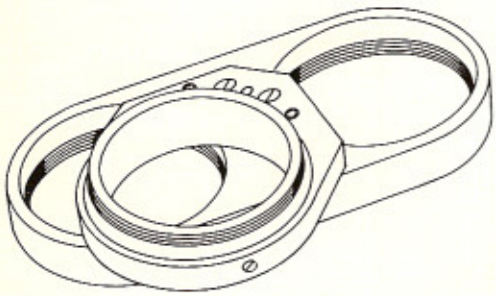


30 16 21

10

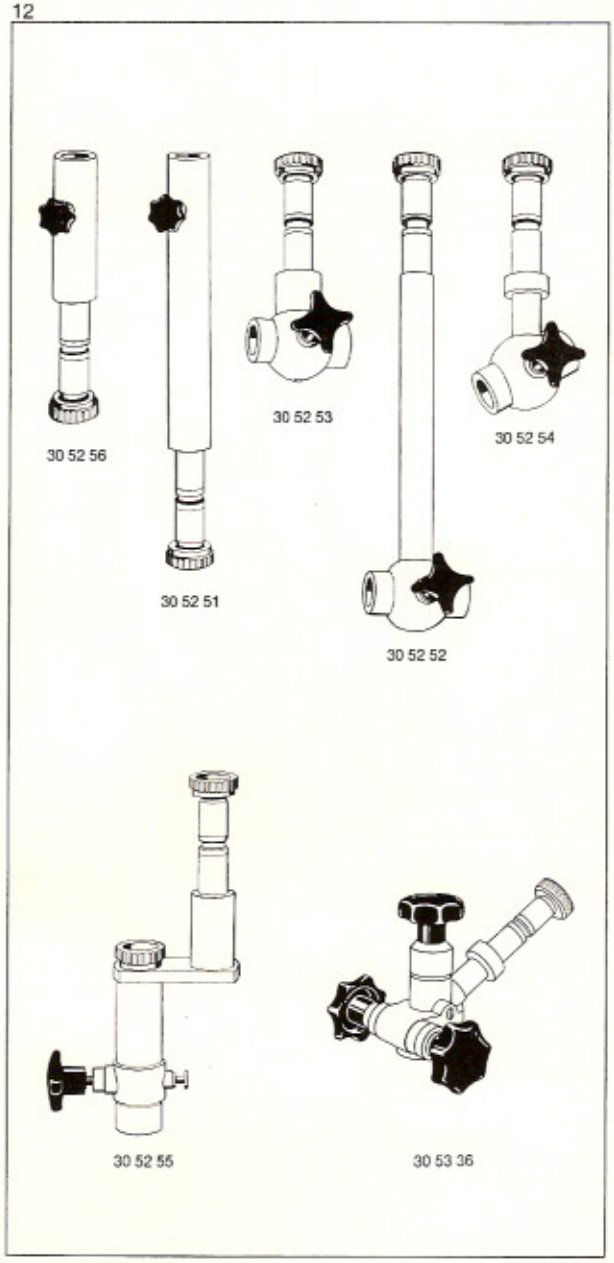
39 01 58
39 01 86

11

38 00 18-1740

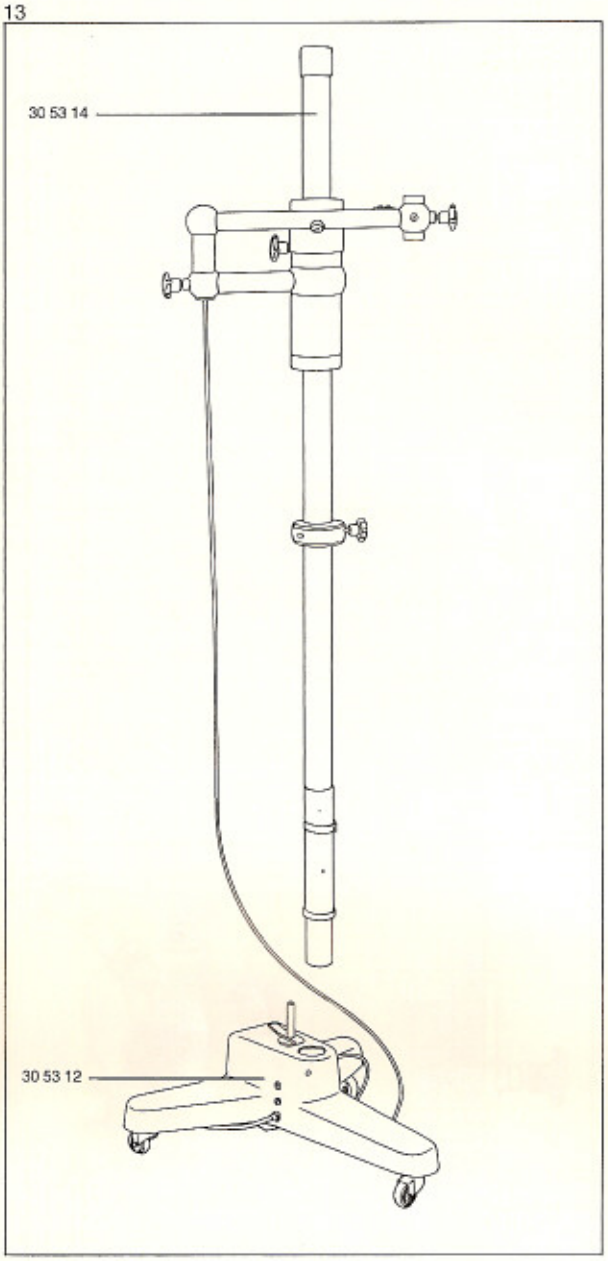
Objective f = 200 mm	30 51 32
Objective f = 125 mm	30 51 31
(for further objectives see Section 8)	
Objective quick changer	30 16 21
6 V 30 W filament lamp	39 01 58
6 V 50 W filament lamp	39 01 86
6 V 15 W filament lamp	38 00 18-1740

12



Coupling K 0/120	30 52 56
Coupling K 0/235	30 52 51
Coupling K 90/60	30 52 53
Coupling K 90/260	30 52 52
Coupling K 120/76	30 52 54
Coupling K 120/76 with gear mechanism	30 53 36
Coupling K 0/parallel	30 52 55

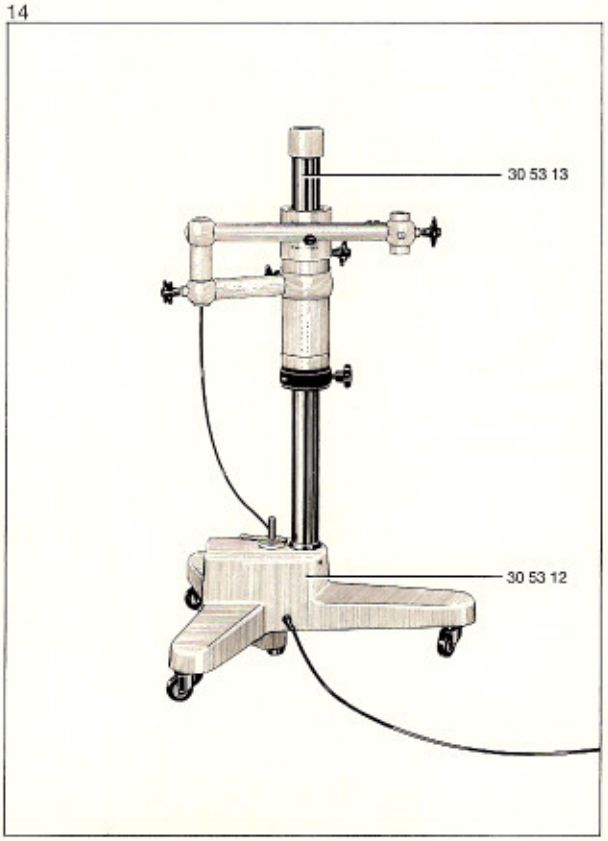
13



1.
1.9 m rollable floor stand, consisting of:

1.9 m column with counterweights	30 53 14
Stand base	30 53 12
Power supply assembly, 40 VA/80 Ws	30 53 16
Power cable, 6 m	30 53 19

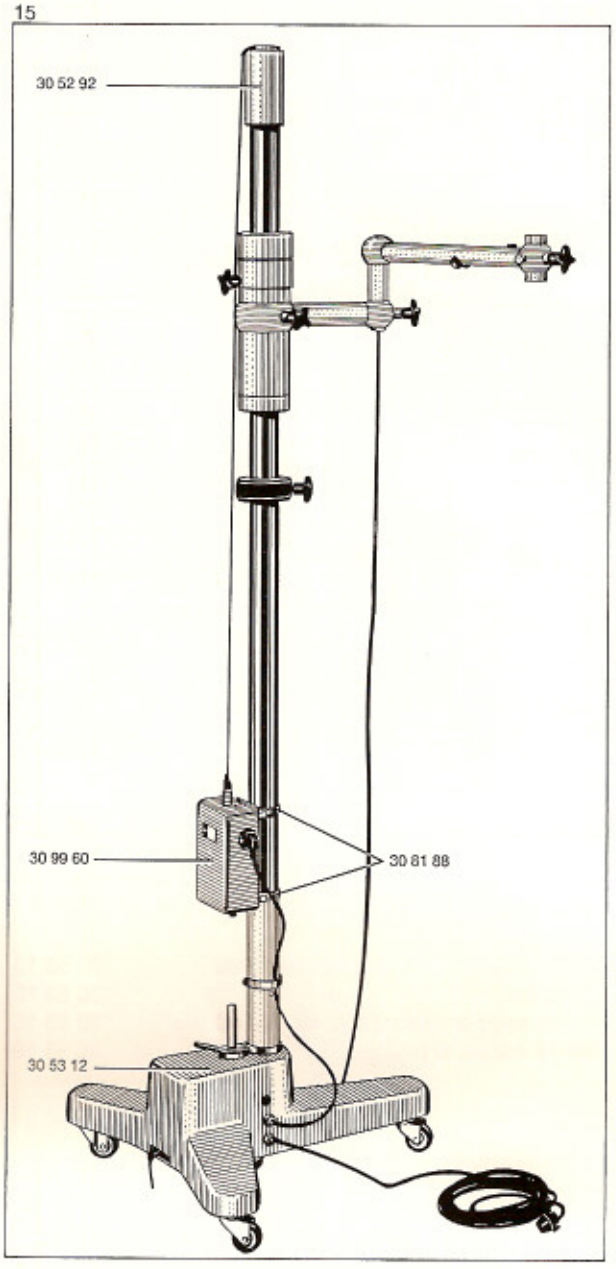
14



2.
1.0 m rollable floor stand, consisting of:

1.0 m column with counterweights	30 53 13
Stand base	30 53 12
Power supply assembly, 40 VA/80 Ws	30 53 16
Power cable, 6 m	30 53 19

15

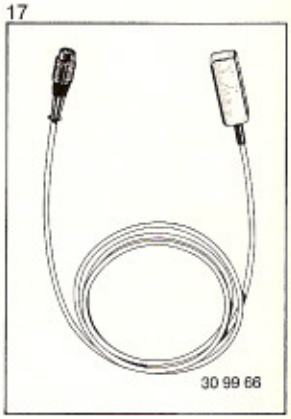


Motor head equipment for subsequent installation on rollable floor stands:

Motor head 24 V, 50 and 60 Hz	30 52 92
Power supply unit 5.5 VA, 110 — 240 V, 50 and 60 Hz	30 99 60
Power cable, 6 m	38 00 71-2840
Clamps	30 81 88
Foot switch (Fig. 16) or	39 35 01
Hand switch (Fig. 17)	30 99 66

16

17



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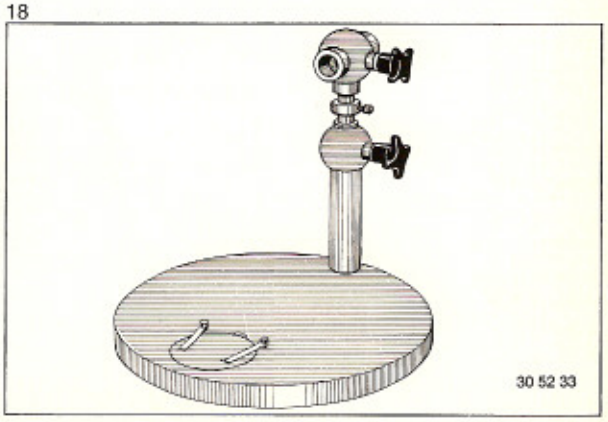

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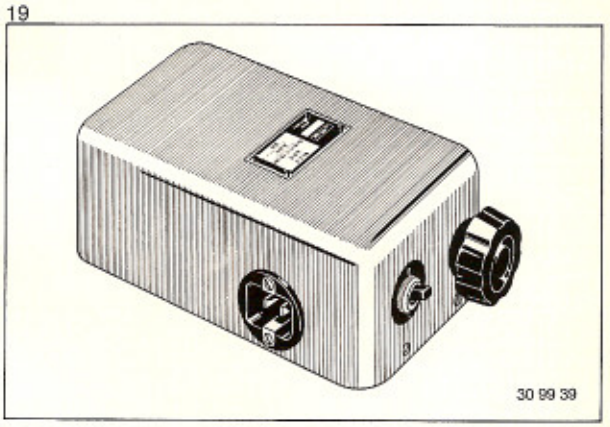

3.

Table stand	30 52 33
Power supply unit 50 VA, 110 — 240 V, 50 — 60 Hz	30 99 39
Power cable, 2 m	38 00 71-2820

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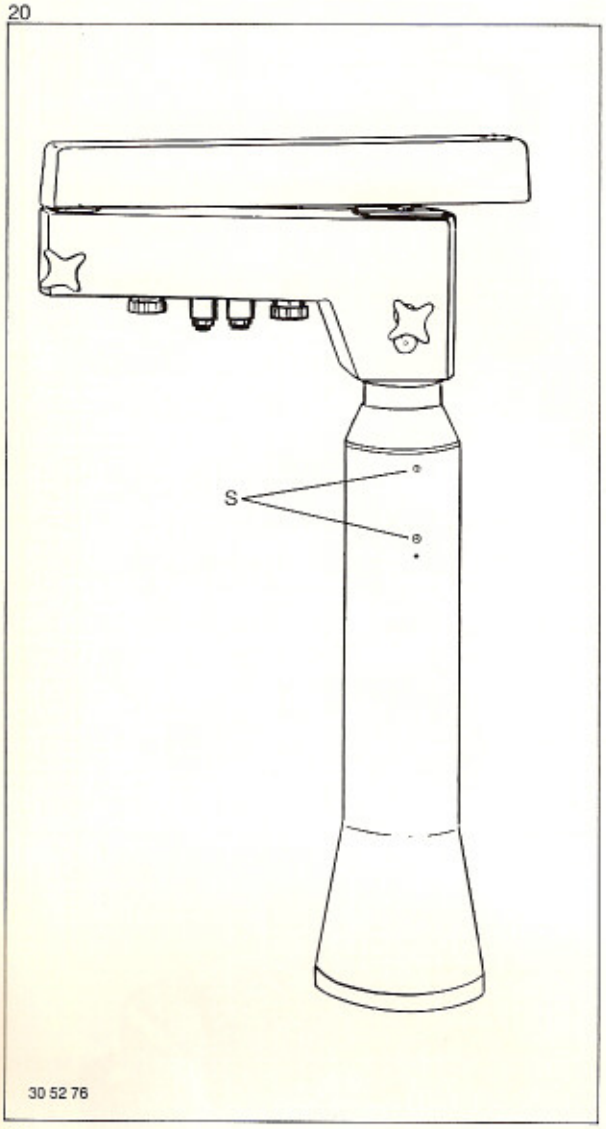

30 52 76

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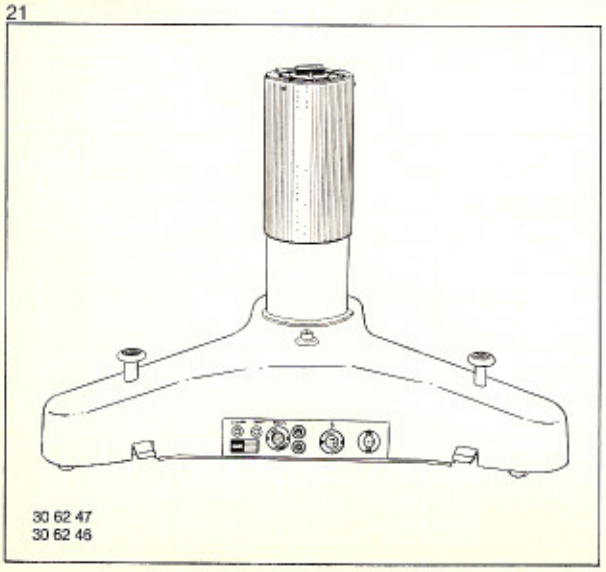

30 62 47
30 62 46

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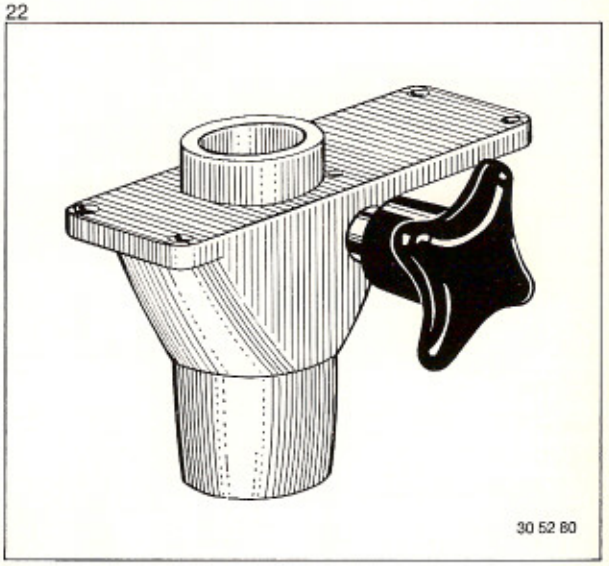
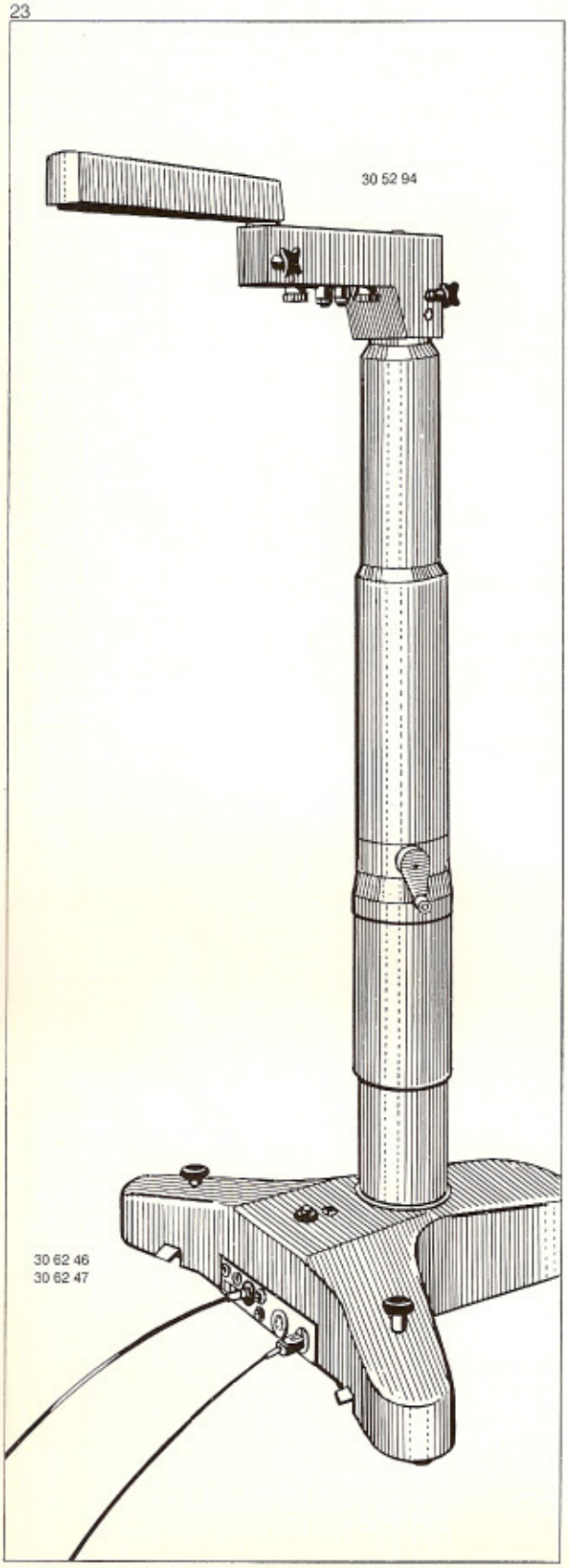


30 52 80

4.
Rollable motorized stand, consisting of:

Upper part of motorized stand	30 52 76
Motorized stand base for 220 — 240 V, 50 Hz, 5 mm/s	30 62 46
or	
Motorized stand base for 110 — 120 V, 60 Hz, 5 mm/s	30 62 47
Power supply assembly, 400 VA/80 Ws, 50 — 60 Hz	30 62 88
Power cable, 6 m	38 00 71-2840
Connecting piece (for mounting the microscope)	30 52 80

23



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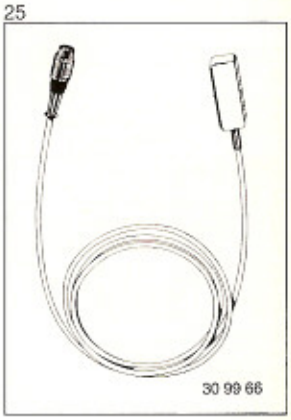
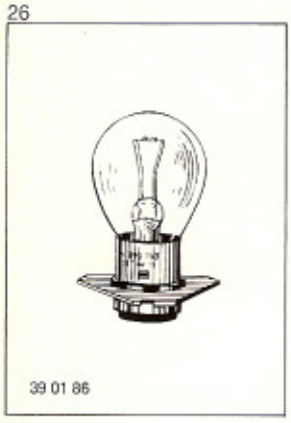


5.
Rollable motorized stand with gear adjustment, consisting of:

Upper part of motorized stand with gear (Fig. 23)	30 52 94
Otherwise same as under 4.	
For motorized stands:	
Foot switch	39 35 01
Hand switch	30 99 66

26



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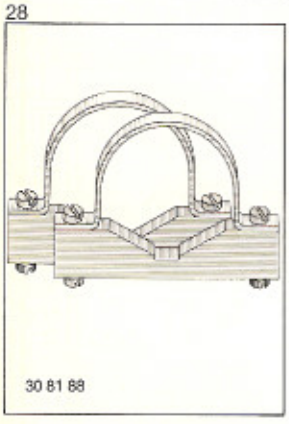

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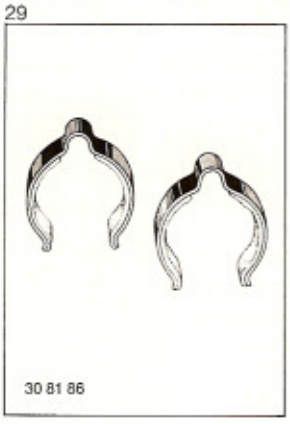
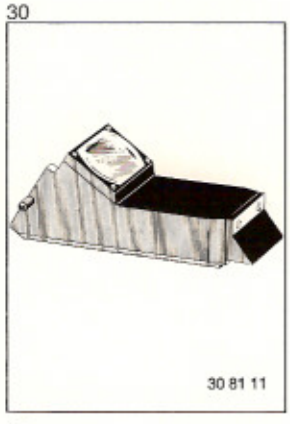


Illuminator with 6 V 50 W filament lamp:

6 V 50 W filament lamp	39 01 86
Extension cable	30 99 81
Power supply unit 100 VA, 110 — 240 V, 50 and 60 Hz	30 99 61
Power cable (connected to stand)	30 53 27
or	
Power cable, 6 m (for subsequent supply of illuminator)	30 00 71-2840
6 V 50 W filament lamp	39 01 86
Clamps (for 30 99 61 and 39 25 17)	30 81 88
Cable clamps	30 81 86

Every instrument is supplied with a set of sterilizable rubber sleeves and caps for the most essential parts and controls of the instrument.

30



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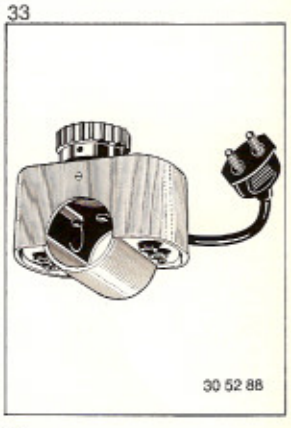

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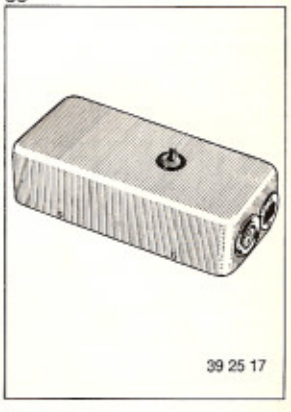
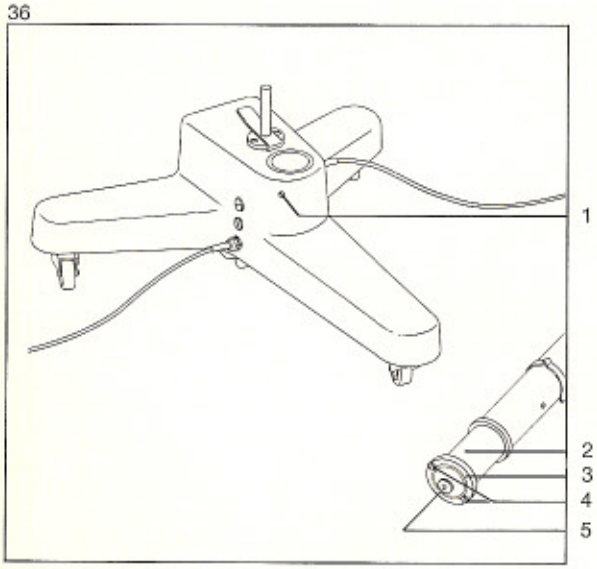


Oblique illuminator (for objective f = 200 mm only)	30 81 11
Focusing oblique illuminator with holder	30 81 60
6 V 15 W filament lamp	38 00 18-1740
Selector switch	30 52 88
Regulator for secondary voltage	30 52 11
Electronic flash power supply unit 80 Ws, 100 — 240 V, 45 — 60 Hz	39 25 17

3. Assembly

36



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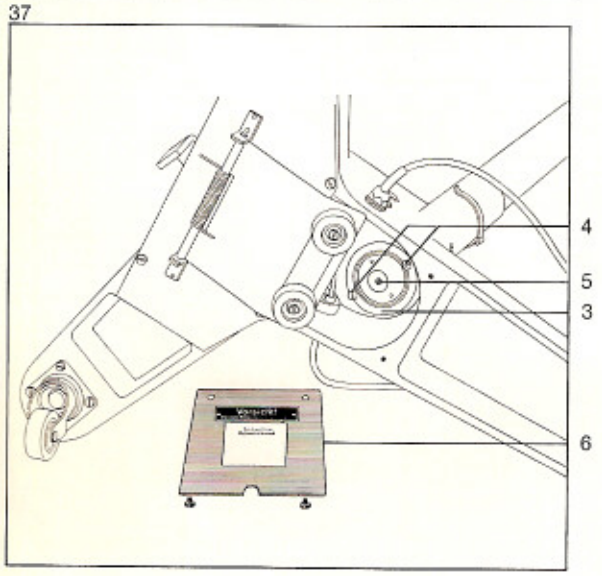
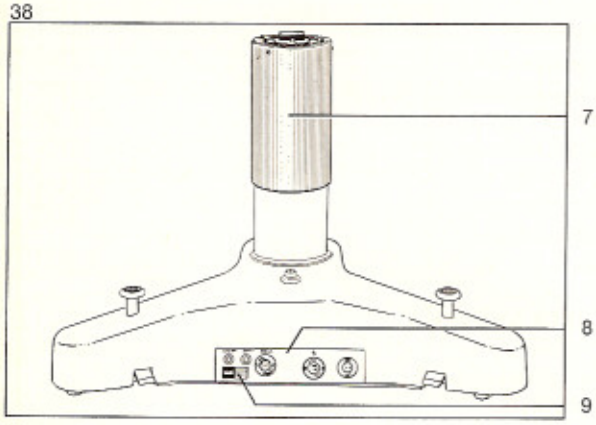


3.1 Assembling rollable floor stand with or without motor head

Base and column are delivered separately.
Loosen screw (5) locking the counterweight in the column, turn clamp bolts (4) counterclockwise so that they do not protrude from the seating face of the threaded ring, and unscrew threaded ring (3). Unscrew screw (1) in stand base, insert column into base and turn it so that borehole (2) at the bottom of the column is aligned with threaded hole (1). Insert screw (1) but do not tighten. Lay down stand. Unscrew plate (6) at the bottom. Screw threaded ring (3) onto column. Column should be about parallel to the floor. Screw in threaded ring (3) as far as it will go. Tighten screws (4) uniformly, and replace plate (6).
The floor stand can be equipped subsequently with the motor head. Please see Section 2. "Parts list". Assembly instructions M 30-05601.2.

3.2 Assembling motorized rollable stand

38



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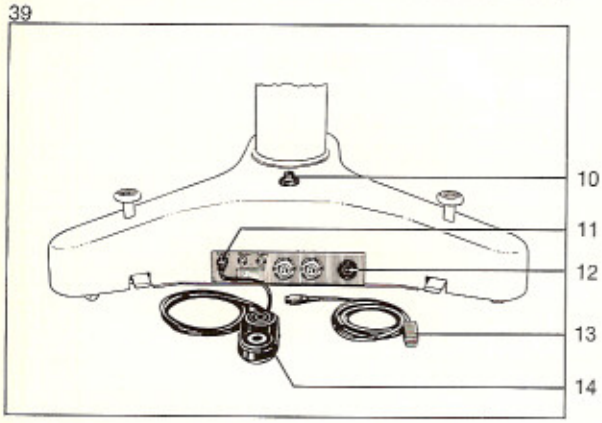
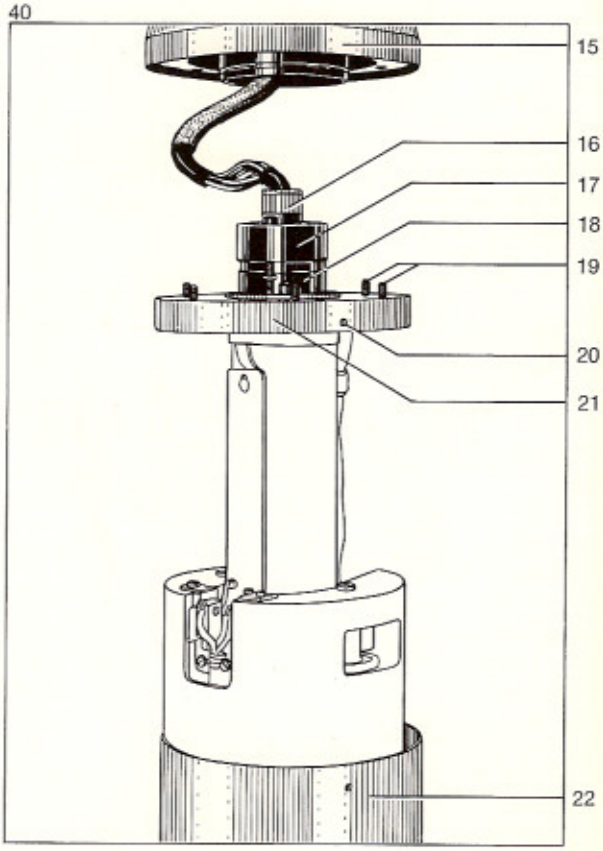


Rollable base with built-in electrical assembly 400 VA/80 Ws (8) and upper part are supplied separately. Before assembling the units, make sure that the data for **AC** operation on plate (9) correspond to the local line voltage. If only DC is available, provide a converter between stand and line.

Connect foot switch (14) or hand switch (13) to socket "Stativ" (11). (When inserting the plug, take care that the pin inside the plug engages in the groove of the socket. Secure connection by tightening the screw cap). Connect mains cable to socket (12) and to the line. Press button (10) to switch on the instrument, operate foot or hand switch and run column (7) to upper stop position. Before proceeding with the assembly, switch off button (10) and pull mains cable.

40



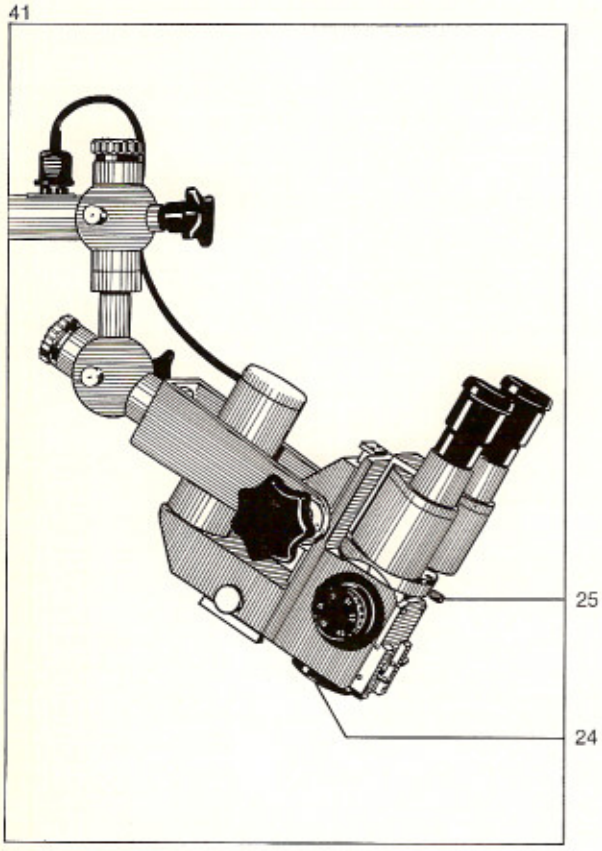
3.21
Assembling base and upper part

Loosen three screws (20) and pull tube (22) downwards. Connect plug (17) to socket (18) and secure with two screws (16). Put upper part (15) onto flange (21) and secure with six screws (19). Re-attach tube (22) to flange (21). — By loosening the hexagon socket screws "S", Fig. 20, the upper part can be extended about 350 mm. Firmly tighten the hexagon socket screws once this original height setting has been completed.

The base and upper part of the **motorized rollable stand with gear adjustment** (Fig. 23) are assembled in the same way.

3.3 Mounting optical accessories on microscope body

41

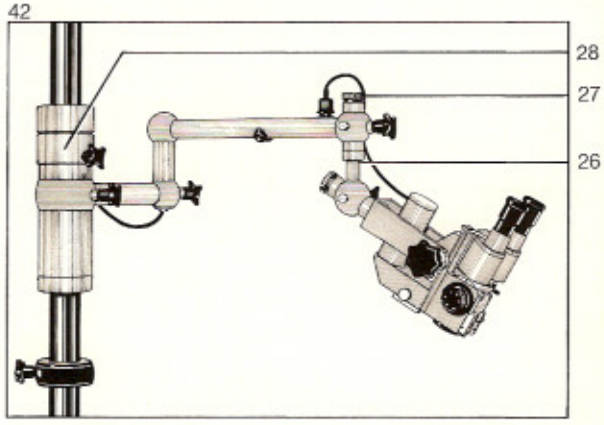


Screw in objective (24) as far as it will go. Slightly loosen knurled screw (25) and insert binocular tube. Firmly tighten screw (25).

Slide in eyepieces as far as they will go and turn them so that index line for diopter setting is visible. For further details, see Section 7.1.

3.4 Mounting microscope on rollable floor stand

42



Preliminary remarks on the following Sections 3.41 to 3.45 (weights)

The weights (28) keep the balance between the counterweight inside the column and the microscope. Once balance has been achieved, the microscope can easily be moved vertically along the column and stops at every desired height without further clamping. — If only the microscope is used, all weights are mounted. If accessories are used in addition to the microscope, such as couplings and other equipment according to Section 6. "Accessories", the weights are removed as required. If the counterweight in the column is insufficient, further weights can be added. In this case, please get in touch either with us or with our local representatives.

3.41
General examination and operation microscope, dermatoscope

Insert inclined coupling K 120/76* (26) in the stand arm and secure with screw (27). Mount microscope in the same way on coupling (26). The microscope can now be tilted from vertical to horizontal viewing direction without changing the couplings.

* Instead of the simple inclined coupling K 120/76 (26), one with gear (33) is also available; please see Fig. 12 (30 53 36). This coupling allows proper adjustment of the microscope's optical axis and unilateral load, e. g. when using accessories according to Section 6.

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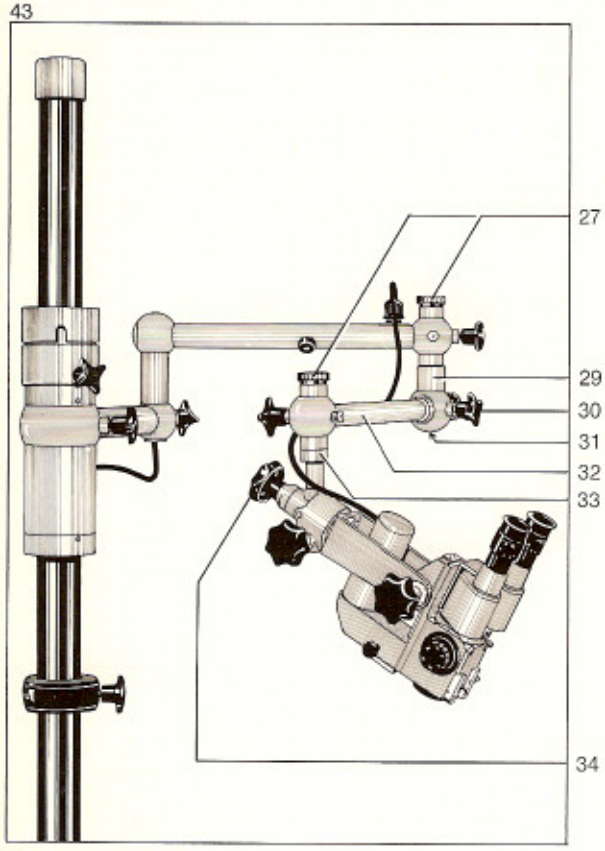

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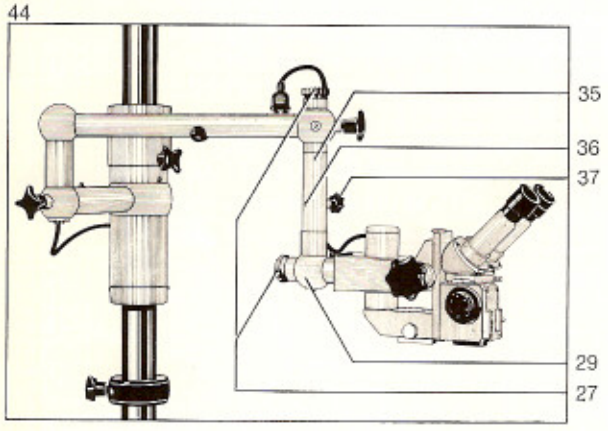


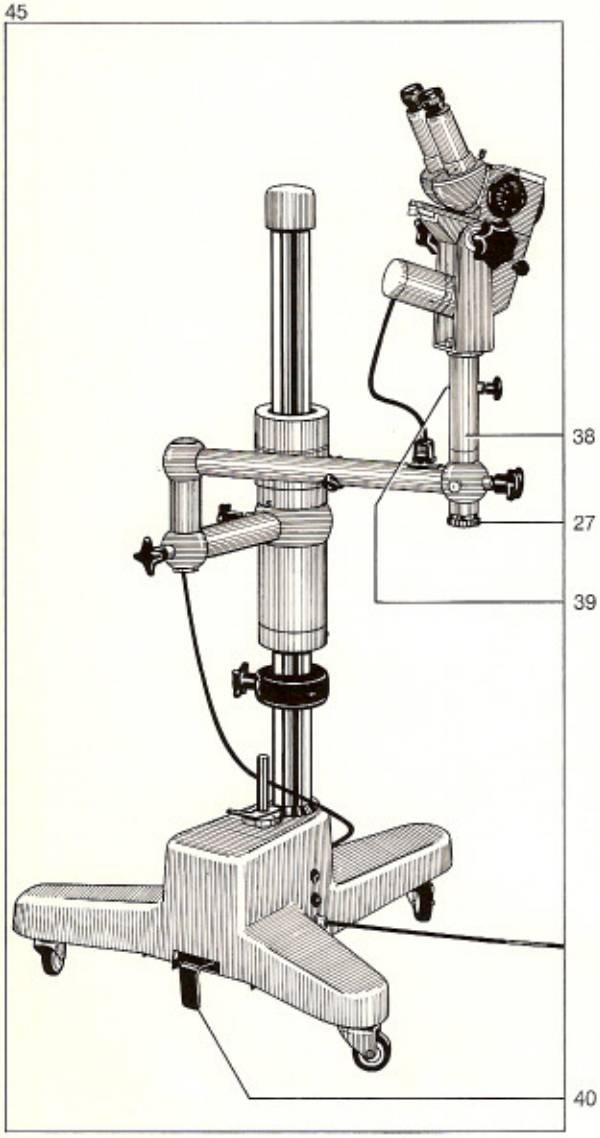
3.42
Otoscope with straight tube and wide range of coupling motion

Fix couplings K 90/60 (29), K 90/260 (32) and K 120/76 (33) in this order on stand arm and secure each of them with screw (27). Firmly tighten screw (31) and star knob (30). Slide microscope in coupling (33) and secure with screw (34). — This disposition ensures particularly smooth and wide lateral motion of the microscope.

3.43
Otoscope with inclined tube and vertical microscope axis

Insert couplings K 0/120 (35) and K 90/60 (29) between stand arm and microscope and secure with screws (27), (36) and (37). It is most important that screw (36) is firmly tightened.

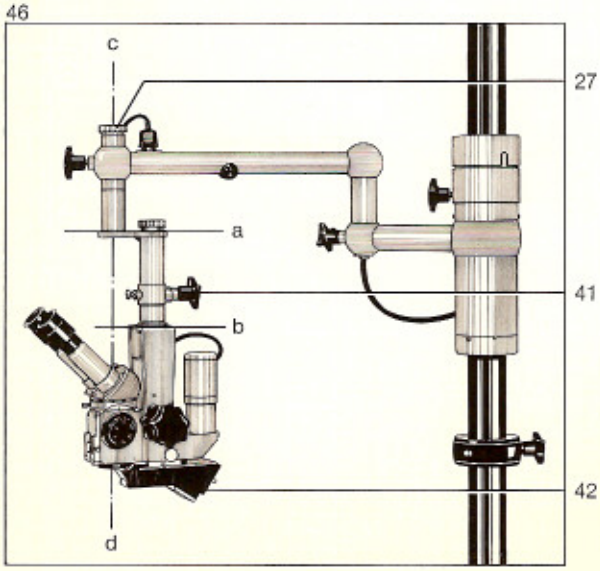
45



3.44
Colposcope

The disposition of the microscope is to be chosen according to the available examination chair, i. e. either directly on the stand arm of the 1.0-m stand or with coupling K 0/235 (38). Secure with screws (27 and 39). The stand is placed close to the examination chair with the foot switch (40) pointing to the observer.

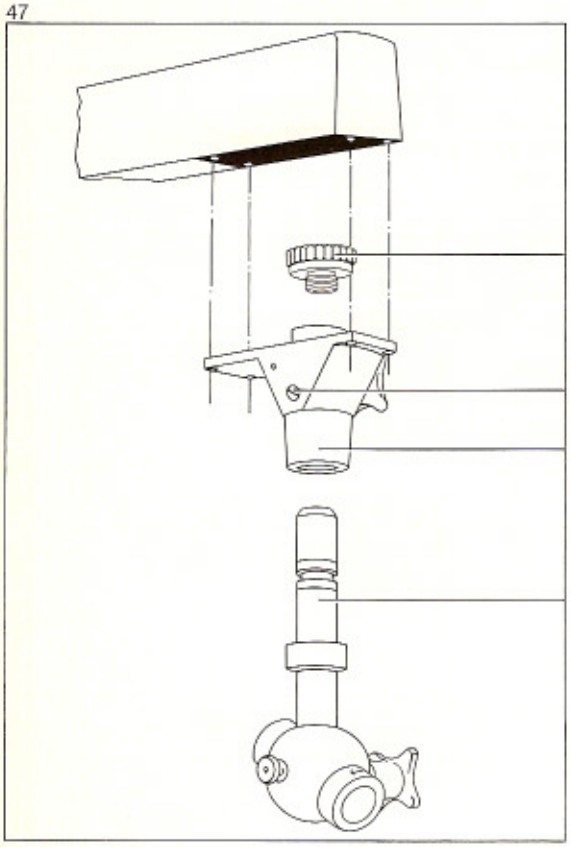
46



3.45
Microscope for ocular surgery

For this purpose, the microscope body is supplied with coupling K 0/parallel; please see also 30 36 05 (Fig. 5). This equipment is fixed on the stand arm and secured with screw (27). If coupling K 0/parallel is so adjusted with the microscope body that, with front view, edge "a" of the coupling is parallel to edge "b" of the microscope and if this disposition is secured with star knob (41), the axis of rotation of the coupling coincides with the optical axis of the microscope. As the microscope is rotated about the axis "c — d", the object is constantly within the field of view. The inclined illumination (42) which is part of the microscope equipment for ocular surgery is fixed on the holder (dovetail) at the bottom of the microscope body and clamped with the knurled screw. This inclined illumination can only be used with the objective f = 200 mm. Light impinges on the object at an angle of 45°. Another focusing inclined illumination (Fig. 31) is described under Section 6. "Accessories".

47



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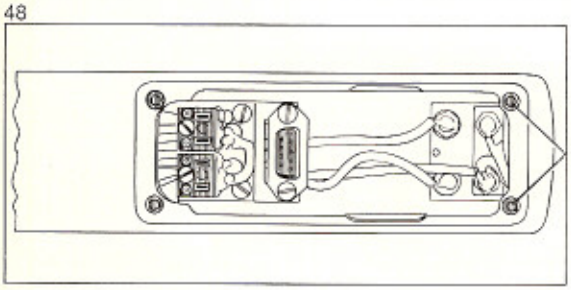

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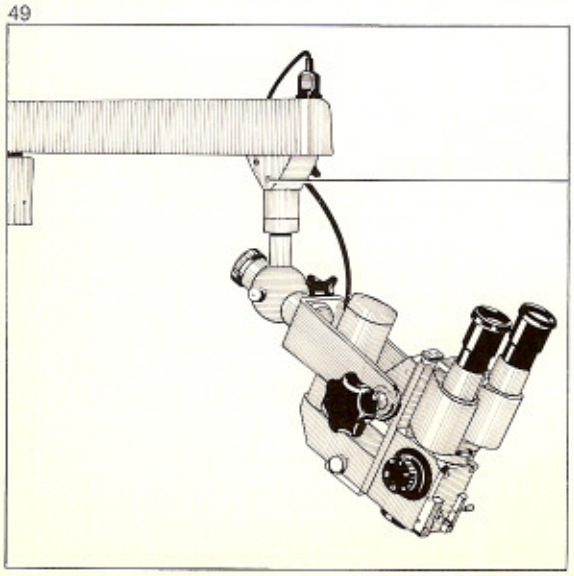


3.5 Mounting microscope on motorized rollable stand

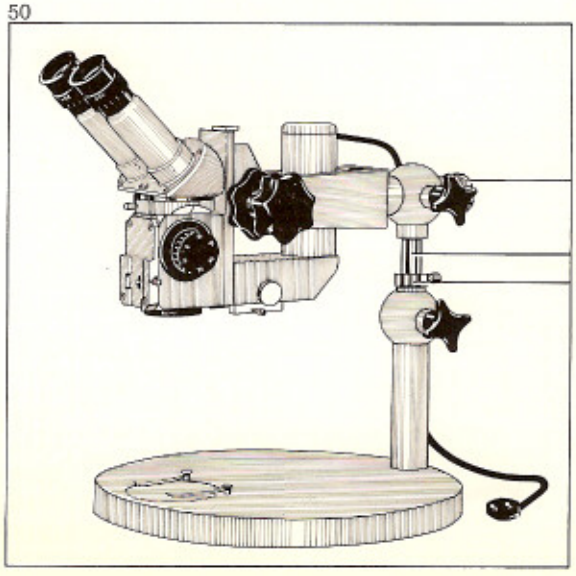
Connecting piece (44) is required for this purpose. Connect this piece first to the pivot of the coupling used, e. g. (26). Loosen screw (43), insert connecting piece, firmly tighten screw (43) and screw in locking screw (27). Insert connecting piece (44) with coupling underneath the stand arm at the front and fix it with the four hexagon socket screws supplied (45) (Fig. 49).

Note:
On the **motorized stand with gear** and on the ceiling mount, the same stand arm is used so that the above-mentioned instructions are also applicable. Moreover, the assembly of couplings and microscope is made according to one of the Sections 3.41 till 3.45.

3.6 Mounting on table stand

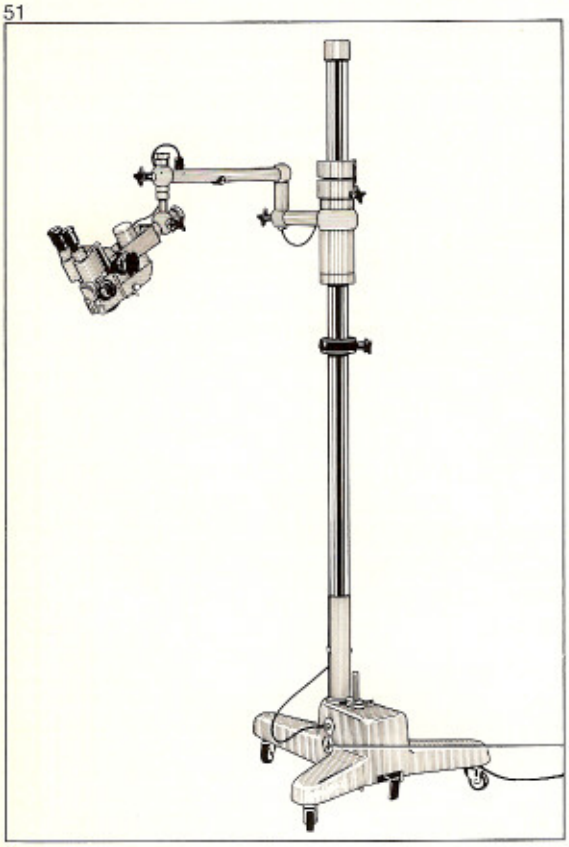
Slide microscope in coupling and secure with screw (27). Pull up microscope with pivot (46) until the desired working distance is reached. Lock this position by screwing in knurled screw of ring (47). Clamp microscope with the star knobs in the desired horizontal and tilted position. Insert circular glass plate and spring-loaded clamps in stand base.

50



4. Electrical connections

51



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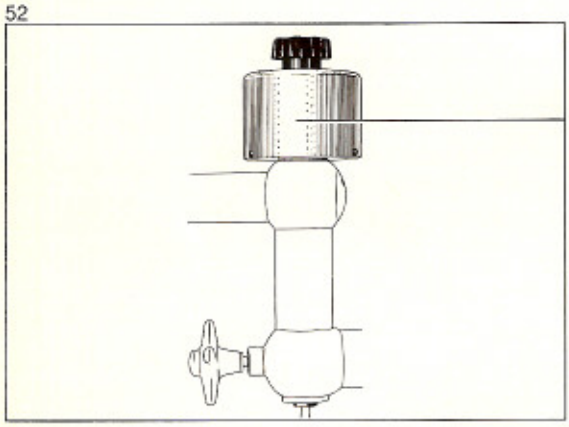

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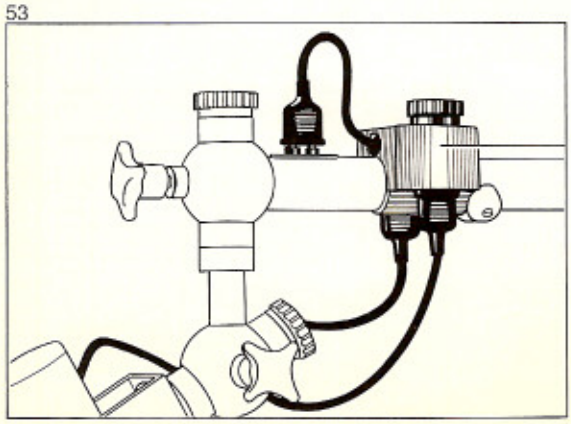


The power supply units must only be connected to AC. Should only direct current be available, a converter has to be used.

4.1 Rollable floor stand

The base of the floor stand (30 53 12) can be equipped either with a power supply assembly 40 VA (for a 30 W lamp), 40 VA/80 Ws (for a 30 W lamp and an electronic flash illuminator) or 80 VA (for a 50 W lamp). If a 40 VA/80 Ws assembly is built into the stand base, there is also a socket (40 a) for connection of an electronic flash illuminator. The voltage of the power supply assembly in the base is given on its base plate and on a tie-on label on the stand. If the voltage set does not correspond to the local one, remove the large plate at the bottom of the stand base and set the voltage selector to the correct voltage.
Connect the lamp cable of the microscope to the low-voltage socket at the front of the stand arm and the power cable to the line.

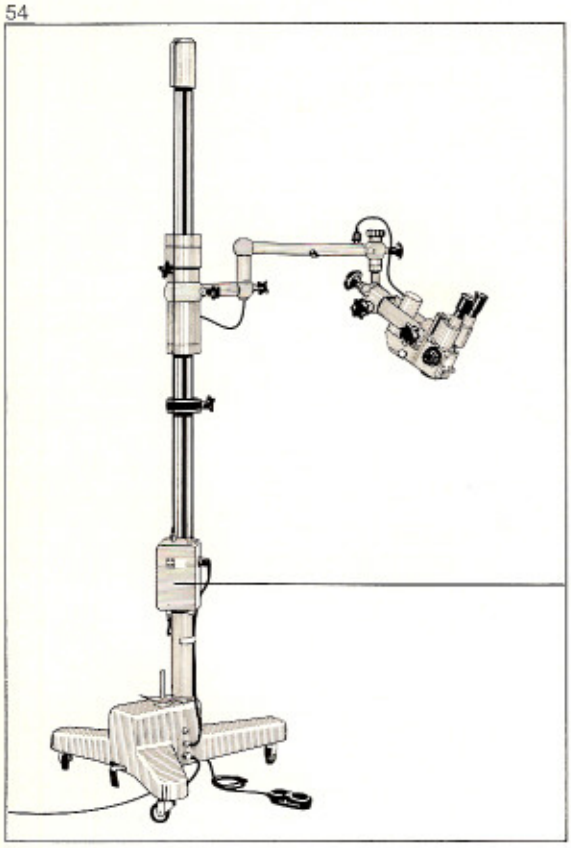
4.11
Voltage control

The service life of the filament lamp is several hundred hours with normal operation and it is considerably reduced with overload. With a voltage control (48) which can also be fixed on the stand arm subsequently without difficulties, the secondary voltage can be varied between 3 and 6.5 V and thus also the illumination of the object.

4.12
Reversing switch

If beside the coaxial illuminator on the microscope an additional illuminator (such as the one in Fig. 61) is to be used, a reversing switch (49) is required. Please also see Fig. 33. Attach the reversing switch to the stand arm with its clamp and insert its plug into the socket on the stand arm. Connect the cable of the coaxial illuminator and the cable of the additional illuminator to the reversing switch. The two illuminators can now be switched on with the reversing switch, either in combination or individually.

54



4.2 Rollable floor stand with motor head

First of all, see all instructions given under Section 4.1. Note that at the power supply unit 5.5 VA (50) for the motor head not only the local AC voltage but also the available frequency of 50 or 60 Hz is set. If this is not the case, remove the base plate of the power supply unit (50), set the voltage selector to the correct voltage and set the corresponding frequency of 50 or 60 Hz with the toggle switch.

Establish connection be tween top of power supply unit and motor head and between bottom of power supply unit and foot or hand switch.

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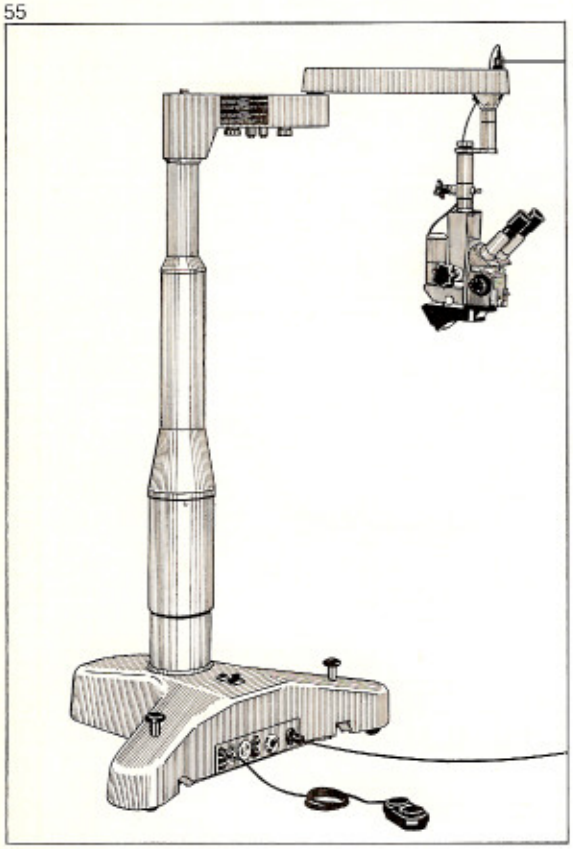

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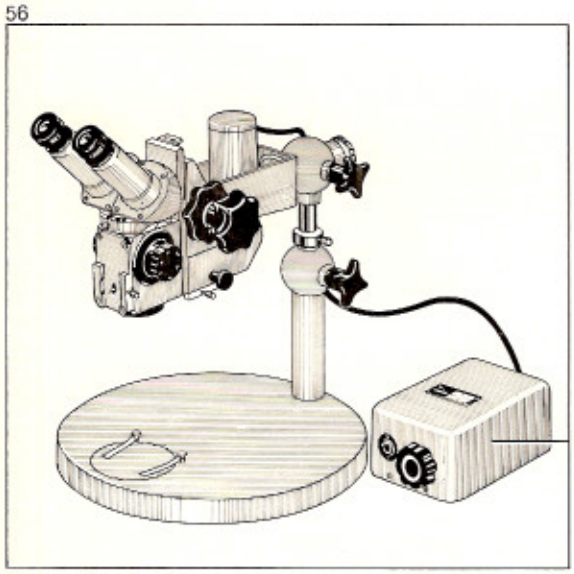

4.3 Motorized rollable stand

For connection of foot or hand switch to stand base as well as connection of power cable, please see Section 3.2 "Assembling motorized rollable stand".

At the front end of the stand arm there are two pairs of jacks (54). Connect one pair with microscope lamp cable. An additional illuminator can be connected to the second pair.
Correlation of rotary switch and pushbutton switches for illumination is given in Section 5.3.

4.4 Table stand

If the AC voltage of the power supply unit 50 VA (59) does not correspond to the local voltage, remove base plate of the unit and set the voltage selector to the correct voltage. The connection of the lamp cable of the microscope and the mains cable need not be explained.

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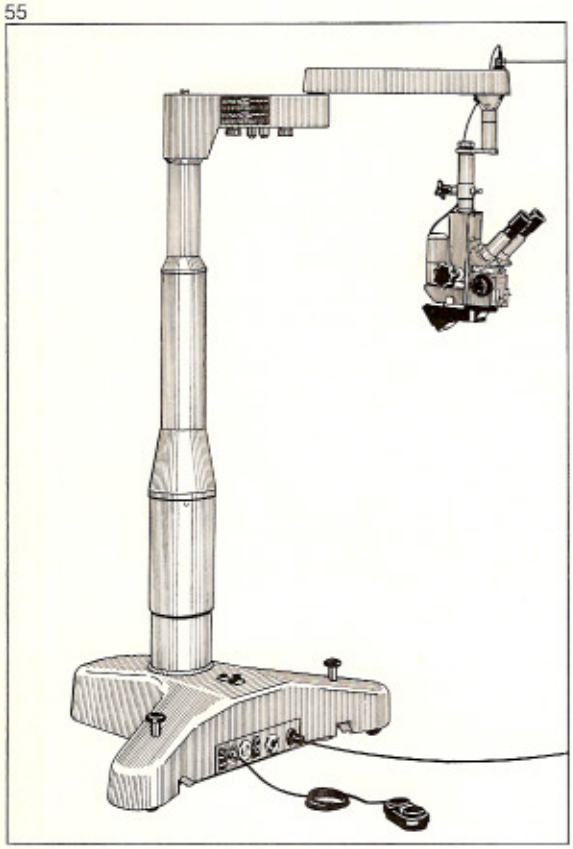

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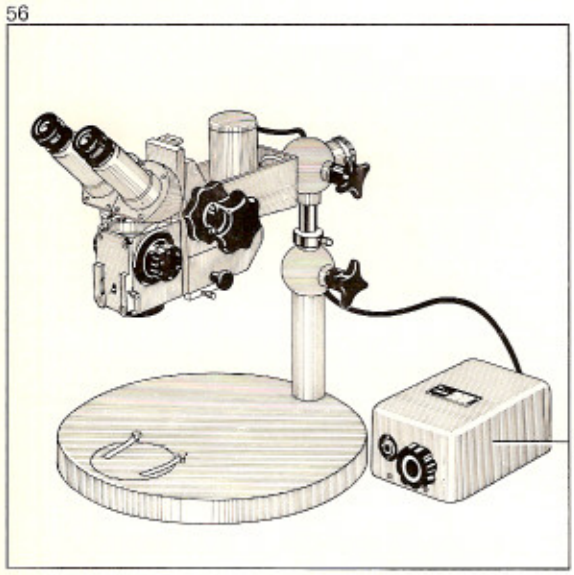

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4.4 Table stand

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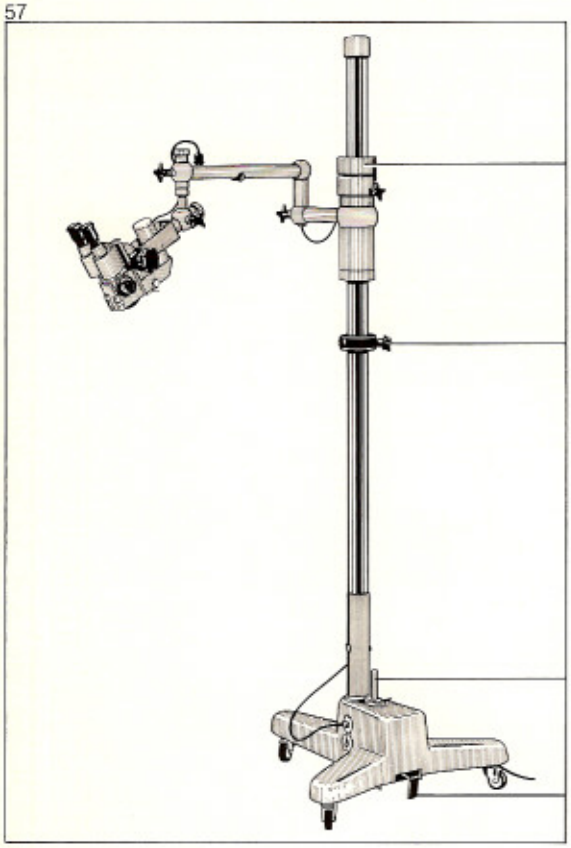
5. Operation

57



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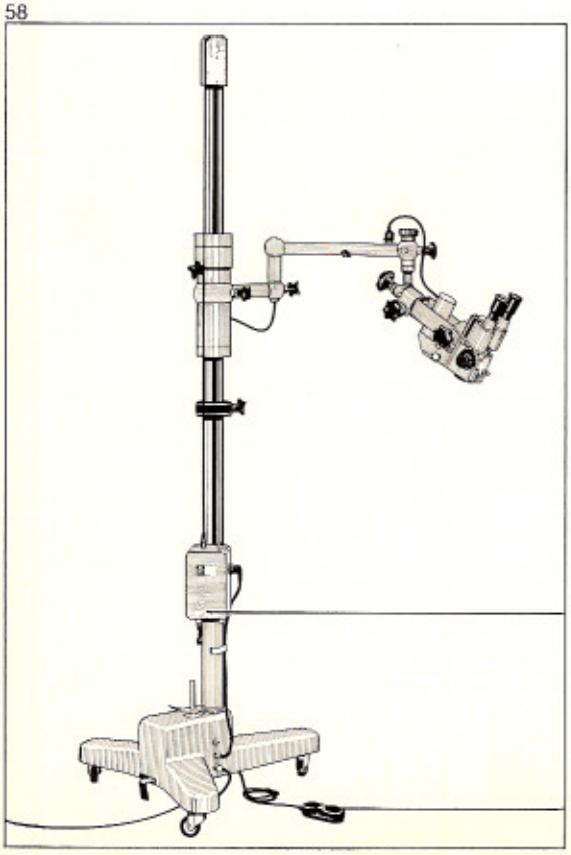


5.1 OPMI 1 on rollable floor stand

Motion of the stand can be locked by stepping on bolt (56) and the lock released with the clamp below it. Once the balance has been achieved with the two weights (28) according to Section 3.4, the upwards and downwards sliding microscope must rest in any desired position with the clamp on the stand carriage released.

All moving parts on the stand arms, couplings and microscope can be set for greater or lesser stiffness or locked with the corresponding star knobs; the downwards motion of the stand carriage can be limited by collar (55).

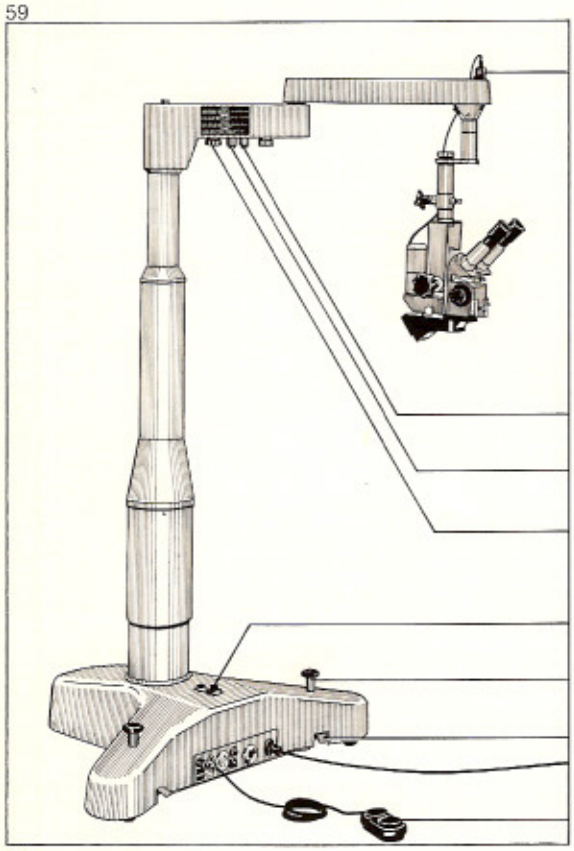
Illumination is switched on with foot switch (40). Left: off, center: normal load, right: overload.

After correctly setting the interocular distance and the eyepieces on the binocular tube (see Section 7.1), coarse adjustment of the microscope is made as follows: set center position of the focusing range and adjust instrument with arm, couplings and by shifting it so that the illuminated field is sharply defined on the object. Focus the object plane with maximum magnification so that focusing is superfluous when changing over to other magnifications with the magnification changer. If necessary, switch on daylight filter or green filter with the small rotary knobs below the focusing knobs (Fig. 1, H and J).

5.2 OPMI 1 on rollable floor stand with motor head

In principle, the aforementioned instructions, Section 5.1, apply here too. Fine focusing is however made with motor via the foot switch (14) or hand switch (Fig. 17). For this purpose, switch on toggle switch on power supply unit (50). With motorized height adjustment it is most important that the clamp of the stand carriage on the column is released.

59



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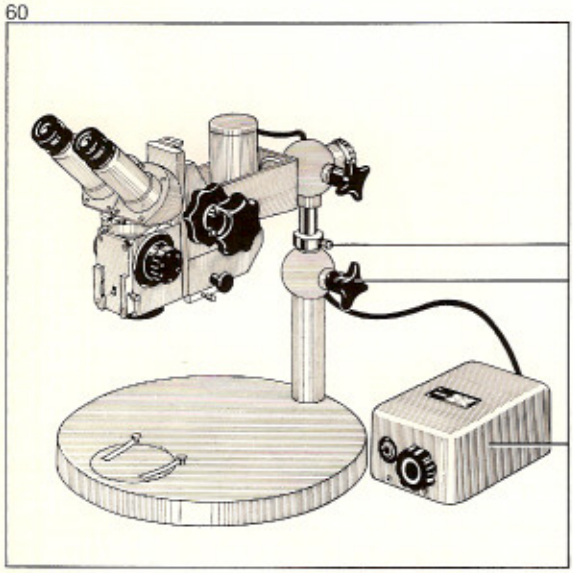


5.3 OPMI 1 on motorized rollable stand

Motion of the stand can be arrested with the two foot switches (57) and the lock released with the tongues (58) below them. With knob (10), the motorized stand is switched on.
The two pairs of jacks (54) are correlated to rotary switch (51) for operating the illuminators connected. With the rotary switch (51) in center position, both pairs of jacks are under voltage. (The second rotary switch has no functions at all with the OPMI 1).

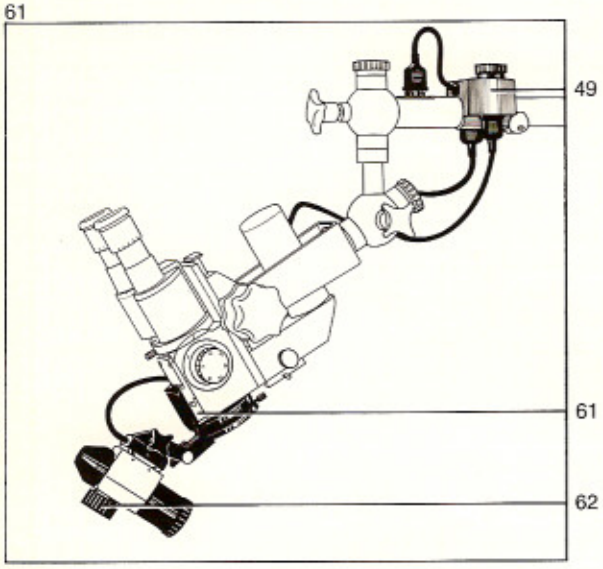
Upon depression of green knob (52) the illuminators will operate at rated voltage, upon depression of red knob (53) they will be overrun.
The socket on the left-hand side of the line socket in the motorized stand base serves to connect the electronic flash illuminator for photography.

5.4 OPMI 1 on table stand

The power supply unit (59) has an ON/OFF switch and a brightness control for illumination. After having placed the object on the glass plate or, in the case of smaller objects, fixed with the two spring-loaded clamps, the focusing range of the microscope should preferably be set to its center position and by releasing star knob (60) the microscope on stand so adjusted in height that the working distance corresponds roughly to the objective focal length. Secure this position with ring (47). See Section 7.1 for setting correct interocular distance on binocular tube and the eyepieces. For focusing on the object, select the maximum magnification on the changer. This ensures that the image remains optimally focused when changing over to other (smaller) magnifications.

6. Accessories

61



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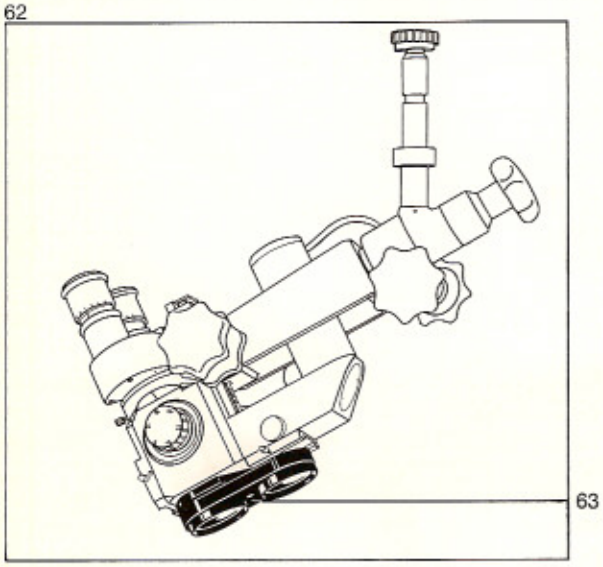

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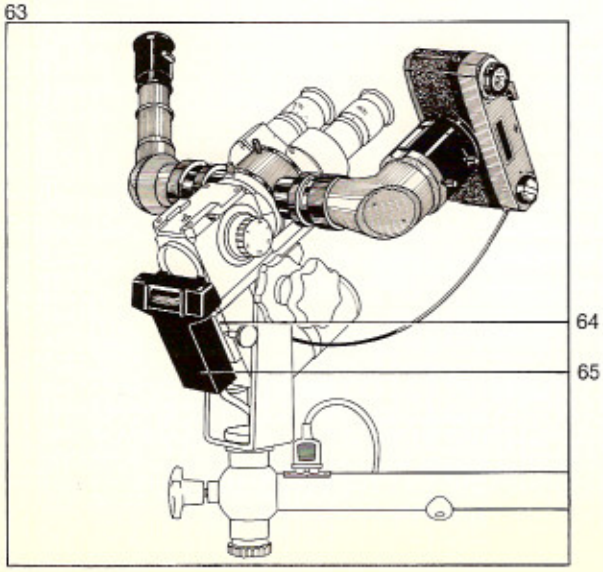


6.1
Focusing illuminator

At the front of the microscope body is a plate (61) with dovetail groove and clamp to which this additional illuminator (see also Fig. 31) with its holder is fixed. The focusing illuminator can be rotated about the optical axis of the microscope and can be adjusted to the working distance of the objective by tilting and focusing with knob (62).
This illuminator is especially useful with surfaces of poor structure as the inclined illumination results in contrasty image formation.
For alternative or simultaneous use of the coaxial illuminator in the microscope and the focusing illuminator, the reversing switch (49) is required; in this connection, please see Section 4.12.

6.2
Objective quick changer

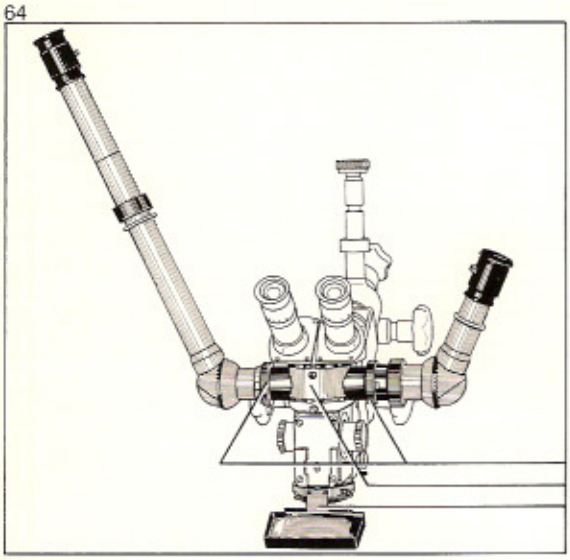
This changer (63) for two objectives (see also Fig. 9) is fixed to the objective thread of the microscope with its mounting ring. Every objective quick changer comes with operating instructions G-30-012. Each of the objectives in the changer can be swung into the beam path in next to no time whereupon it is automatically centered when it snaps into position.

6.3
Electronic flash illuminator

Plate (64) with dovetail groove at the bottom of the microscope body serves to hold the flash illuminator (65). The power supply unit 39 25 17 (see Fig. 35) required for the flash can be fixed on the stand column with two clamps 30 81 88 (see Fig. 28). (Remove base plate of power supply unit and screw on clamps beforehand). Connect flash illuminator cable to the power supply unit. — With the motorized stand, the flash cable is connected to the obviously appropriate socket beside the power cable connection in the stand base.

For photography please see Section 6.6.

64



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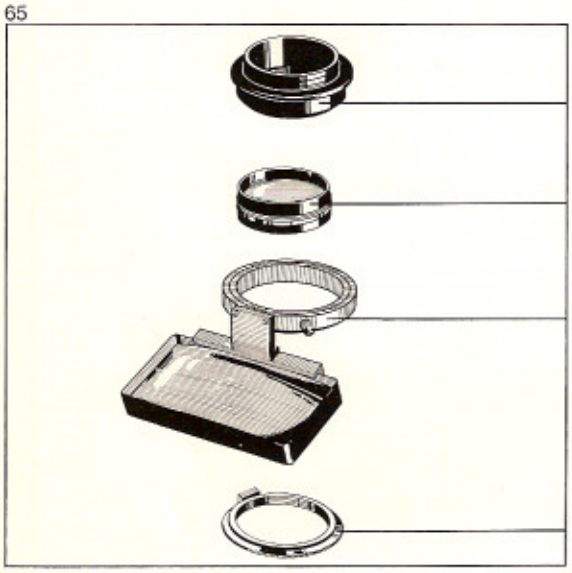
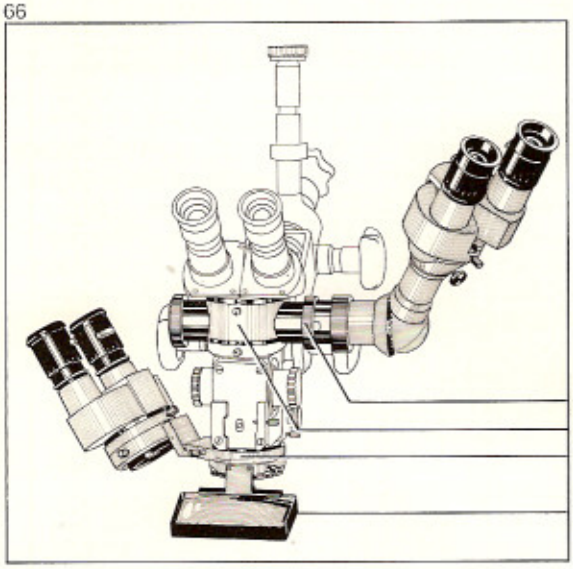


6.4
Co-observation tube (long), assistant's tube (short), 2x operating field magnifier

Remove the binocular tube before mounting the two monocular tubes. Attach small beam splitter (67) to microscope body and binocular tube to small beam splitter. If the covers are removed from the small beam splitter (after loosening retaining rings (66)) the additional tubes can be inserted in the openings and secured with retaining rings (66).

The 2x operating field magnifier is mounted as follows: Unscrew objective (69) from microscope body. Screw in mounting ring (68) in objective thread as far as it will go. Screw in objective (69) in mounting ring (68), slip holder (70) with magnifier onto the cylinder of mounting ring (68) and secure with retaining ring (71). The operating field magnifier can be rotated about the optical axis of the microscope and can be locked with knurled screw in any desired position.

66



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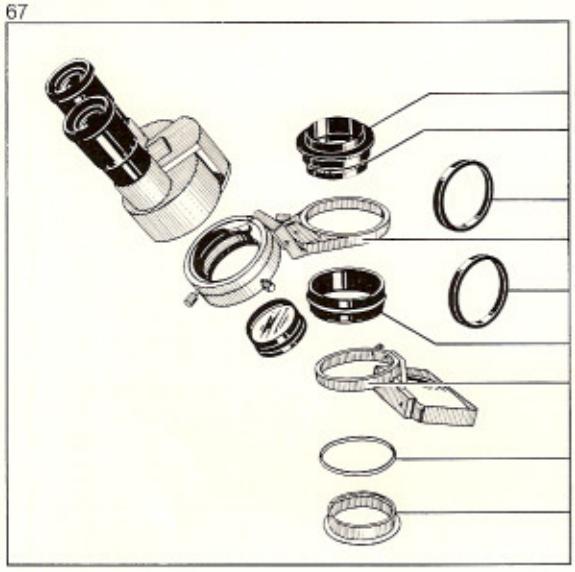
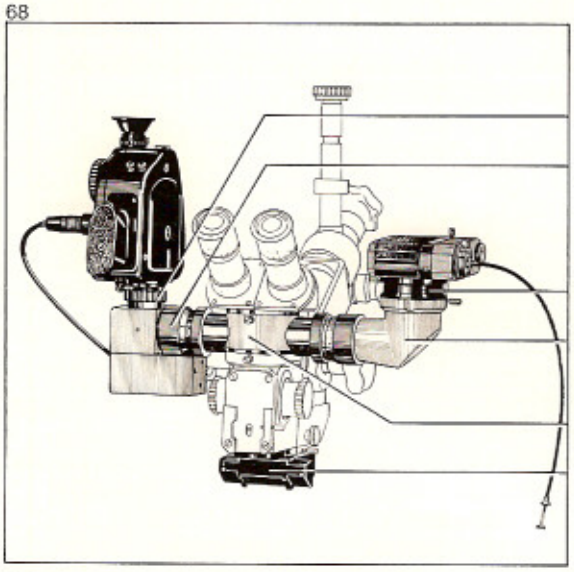


6.5
Assistant's stereo tube, assistant's microscope, 2x operating field magnifier

Instead of a monocular co-observation or assistant's tube (see Fig. 64), the assistant's stereo tube can be fixed on the small beam splitter (67) with retaining ring (66) as described in Section 6.4. Moreover, instead of the operating field magnifier (70) (see Fig. 64) assistant's microscope (72) **alone** can be fixed on the microscope body.

Mounting **both** assistant's microscope (72) **and** operating field magnifier (70): Remove objective (69) from microscope body and screw it in mounting ring (68). Screw in mounting ring (68) with objective in microscope. After having removed the slotted head screws, push spacer rings (73 and 74) out of the holders for assistant's microscope (72) and operating field magnifier (70). The diameter of the holders will then match that of double mounting ring (75). Slip the operating field magnifier (70) onto the threaded side of the mounting ring and secure with retaining ring (76). Also attach holder (72) to (75). Slip this assembly onto mounting ring (68) and fix it to the microscope with knurled ring (77). Attach the binocular tube to holder (72) and screw in objective.

68



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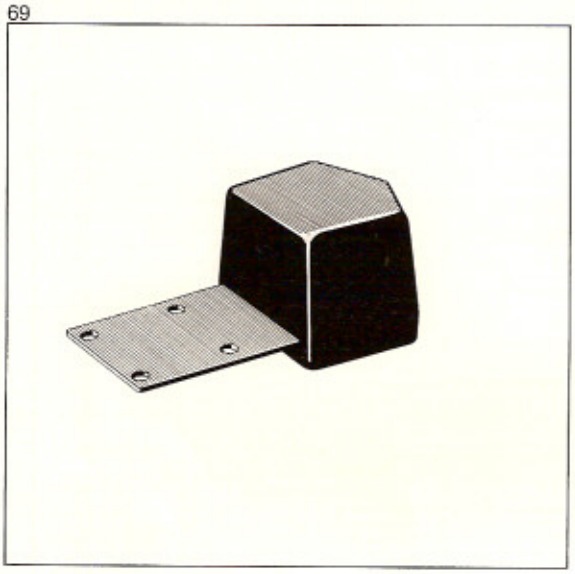


6.6
50 W filament lamp, photo adapter, cine adapter

For change of filament lamp, please see Section 7.2. The supply units of 80 VA and over built into the stand are normally sufficient for the 50 W filament lamp. If for special reasons and short duration much light is required (e. g. for cinematography), the power supply unit 100 VA, Cat. No. 30 99 61 (see Fig. 27) has to be used as only this unit allows additional overload to 9 V. This power supply unit can be fixed to the stand column with two clamps 30 81 88 (see Fig. 28). (Remove base plate of power supply unit and screw on clamps beforehand. With base plate removed, the voltage set can be checked or corrected with the voltage selector).

Photo adapter (78) and cine adapter (80) are connected to the small beam splitter (67) described in Section 6.4. The camera body is connected to photo adapter (78) with ring (79). An auxiliary 2x objective can be attached between photo adapter and camera body. The cine camera is connected to cine adapter (80) with C-threaded ring (81). We supply two Beaulieu cine camera models for our cine adapter which are specially designed for use with our operation microscopes, namely the Beaulieu 4008-OPMI "Super 8" and the Beaulieu-OPMI "R 16". In principle, both cameras can be attached to the right as well as left side of the microscope. For reasons of convenience, attach the "Super 8" on the left (see Fig. 68) and the "R 16" on the right.

6.7
Lead weights 30 52 71-8002 (Fig. 69)

These serve to increase the stability of the rollable floor stand and are mounted in the stand base. To do this, unscrew the wheels from the base and replace them together with the weights.

7. Special hints

7.1
Adjusting interocular distance on binocular tube and adjusting eyepieces

With a straight tube, the interocular distance is set by pulling the two tube halves apart or pressing them together. With an inclined tube, grasp the eyepiece sleeves as far as possible at their top and pull them apart or press them together (the center of rotation of the inclined tube is at the bottom of the prism housing).

Eyepiece adjustment:

The index lines are provided for eyesight adjustment. First of all, it is important to slide the eyepieces back into the sleeves of the binocular tubes as far as they will go. Observers without glasses should turn up the rubber eyecups and set the eyepieces to "0". Ametropes using their glasses for work should fold down the rubber eyecups and set the eyepieces to "0" as well. Ametropes **not using their glasses** should set their refractive error on the diopter scale (= eyeglass prescription for distance) and turn up the rubber eyecups of the eyepieces.

To assure that the correct eyepiece adjustment remains unchanged, the eyepieces for spectacle wearers have a locking device controlled by a small spring-loaded lever. For adjusting the eyepieces, press the locking lever so that the mount can be rotated together with the diopter scale.

The socalled simple eyepieces 12.5x can be used only by ametropes as there is no diopter scale. Moreover, micrometer disks cannot be built into these eyepieces.

When looking through the crosshair eyepiece, the double lines must be seen clearly separated. This is particularly important if the photo or cine adapter is used. First unscrew the eyepiece fully in the "+" direction. Then look through the eyepiece with perfectly relaxed accomodation and smoothly screw the eyepiece down until the crosshair is seen sharply defined. It is advisable to repeat eyepiece adjustment several times and to set an average value on the diopter scale. The object and the crosshair must be sharply defined at the instant of exposure.

7.2
Exchanging lamp

Disengage the lamp socket by counterclockwise rotation and pull it out of the lamphouse. Slightly press the lamp down, turn it counterclockwise and remove it. Introduce the centering disk of the new lamp into the socket, exert slight pressure on the lamp and turn it fully clockwise. Insert the lamp socket in the microscope so that the dot on the socket is opposite that of the instrument; then turn it clockwise until it snaps into position.

Note:
Heavily decentered lamps can cause a loss of light. If a lamp is decentered, check the fit of the lamp socket in the house and the lamp centering in the socket (insert repeatedly). Use spare lamp if necessary. The functioning of the illumination device is checked by holding a piece of transparent paper in front of the main objective. The enlarged image of the filament has to be symmetrically in the illuminating prism.

7.3
Asepsis

We supply rubber caps for the control elements of the instrument and rubber sleeves for the eyepieces. These rubber parts can be sterilized with hot air or hot vapor, boiled in water or simply disinfected. In the interest of a long service life, sterilization at 120° (1.2 kg/mm²) in an autoclave should not exceed 20 minutes. The duration of disinfection depends on the times prescribed by the manufacturer of the disinfectant.

7.4
Maintenance of the instrument

To protect the microscope against dust, always cover it when not using it; keep objectives, eyepieces and tubes in dustfree cases when not required.
Normally only the outer surfaces of objectives and eyepieces are cleaned. Remove dust with an air blower or a greasefree brush. Fingerprints and similar marks may be removed with a cotton wad wrapped around a wooden stick and slightly moistened with acetone.
Enameled surfaces should only be cleaned with a clean, soft brush or cloth. If necessary, use a little naphtha. Do not use acetone or ether.

Preparation of the Microscope

Fine Focus in the Middle of Range

OPMI 6:

Match the black dot or line on the microscope head with the corresponding black dot or line on focusing gear box. On some OPMI models, the black dot or line on the body is replaced with a silver-colored pin.

OPMI 1:

The head is placed in the mid-point of the fine-focus range manually.

Heavy Motorized Stand

The mid-point of the height adjustment range is when the black line is visible on the inner colur

Eyepiece Setting

If you do not require corrective lenses (glasses) set the eyepiece at "0".
If you are wearing corrective lenses set the eyepieces at "0".
If you require corrective lenses but are not wearing them, set the eyepieces for your personal correction.
After setting eyepieces, then focus microscope.

Focusing the Microscope

OPMI 6:

Zoom to highest magnification - focus the object - zoom down to working area.
Microscope will be in focus for entire zoom range.

OPMI 1:

Same procedure but it is done with the magnification changer instead of motorized zoom.

X-Y Coupling

Press the yellow button on top of the X-Y coupling and the coupling automatically returns to th central position.

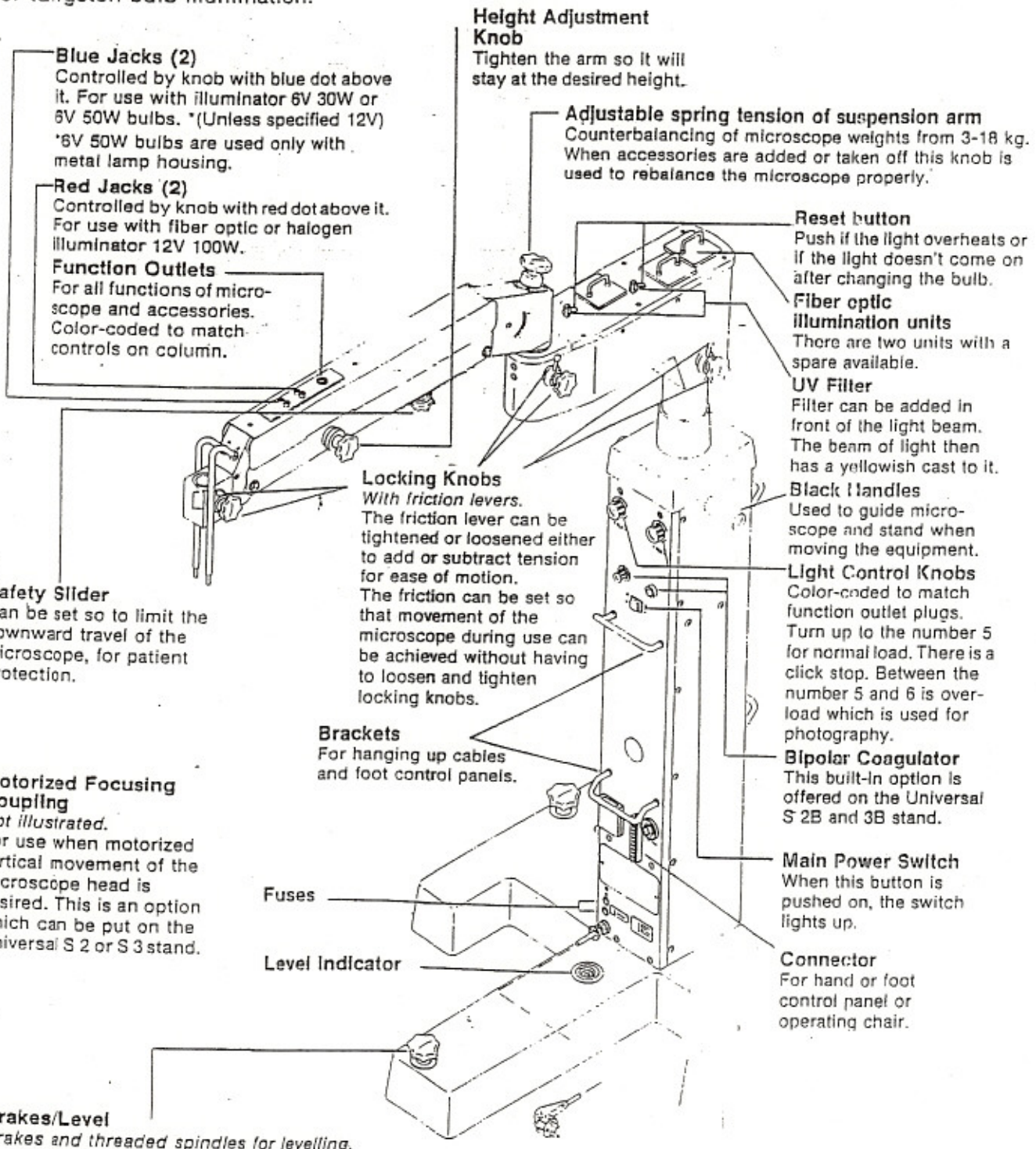
Hints for Care and Use of the Microscope

- Always keep the microscope as dust free as possible. Cover the whole microscope when not in use. If the inner workings of the microscope are exposed at any time, this opening should be covered with a dust cap. If the inner workings become dirty, *DO NOT TRY TO CLEAN INSIDE THE PART.* More problems can be caused than prevented.
- Cleaning the objective and/or eyepieces is done with water and lens paper. Never clean the surface without a solution. If no water is available, breathe on the surface (our breath is equivalent to distilled water and always available!), then wipe the surface with lens paper.
- If the lens is quite dirty or smudged, a cheesecloth moistened with mild soap and water will take care of this. A lens cleaner may also be used. *Never* soak optical elements in water or solvent.
- Wipe the body of the microscope and the stand arm with a damp cloth.
- The rubber eyecups can be screwed off the eyepiece, washed in soap and water, then returned to the eyepiece.

Universal Stands

Universal S 2 Stand

For OPMI 1. Can have fiber optic, halogen or tungsten bulb illumination.



Blue Jacks (2)
Controlled by knob with blue dot above it. For use with illuminator 6V 30W or 6V 50W bulbs. *(Unless specified 12V)
*6V 50W bulbs are used only with metal lamp housing.

Red Jacks (2)
Controlled by knob with red dot above it. For use with fiber optic or halogen illuminator 12V 100W.

Function Outlets
For all functions of microscope and accessories. Color-coded to match controls on column.

Height Adjustment Knob
Tighten the arm so it will stay at the desired height.

Adjustable spring tension of suspension arm
Counterbalancing of microscope weights from 3-18 kg. When accessories are added or taken off this knob is used to rebalance the microscope properly.

Reset button
Push if the light overheats or if the light doesn't come on after changing the bulb.

Fiber optic illumination units
There are two units with a spare available.

UV Filter
Filter can be added in front of the light beam. The beam of light then has a yellowish cast to it.

Black Handles
Used to guide microscope and stand when moving the equipment.

Light Control Knobs
Color-coded to match function outlet plugs. Turn up to the number 5 for normal load. There is a click stop. Between the number 5 and 6 is overload which is used for photography.

Bipolar Coagulator
This built-in option is offered on the Universal S 2B and 3B stand.

Main Power Switch
When this button is pushed on, the switch lights up.

Connector
For hand or foot control panel or operating chair.

Locking Knobs
With friction levers.
The friction lever can be tightened or loosened either to add or subtract tension for ease of motion.
The friction can be set so that movement of the microscope during use can be achieved without having to loosen and tighten locking knobs.

Safety Slider
Can be set so to limit the downward travel of the microscope, for patient protection.

Brackets
For hanging up cables and foot control panels.

Motorized Focusing Coupling
Not illustrated.
For use when motorized vertical movement of the microscope head is desired. This is an option which can be put on the Universal S 2 or S 3 stand.

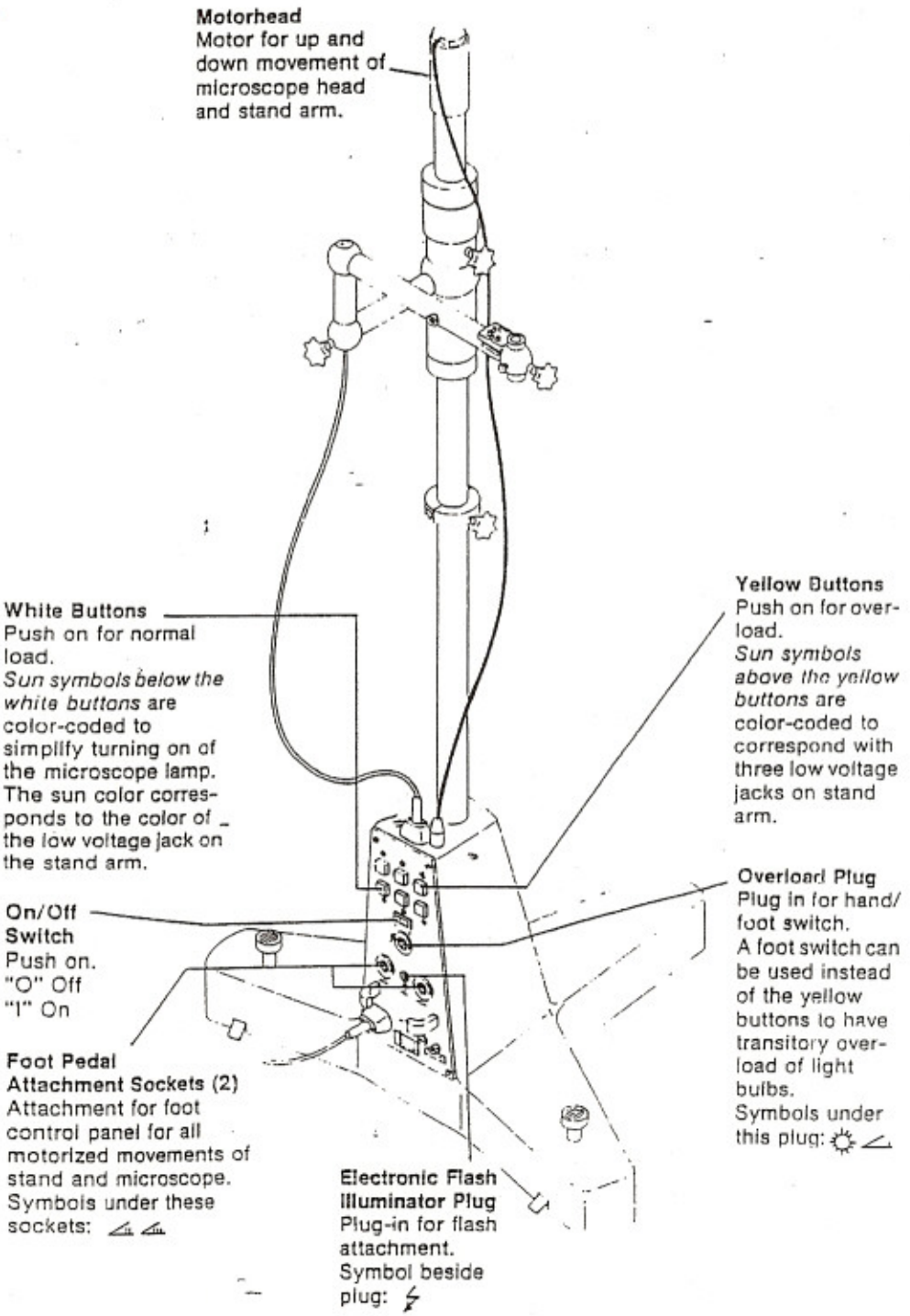
Fuses

Level Indicator

Brakes/Level
Brakes and threaded spindles for levelling.
To put brakes on and level the whole unit, turn these three knobs until the bubble inside the level is in the centre. The brakes are then on and the unit is level.

Universal Stand With Standard II Base

Mechanical elements similar to standard stand.

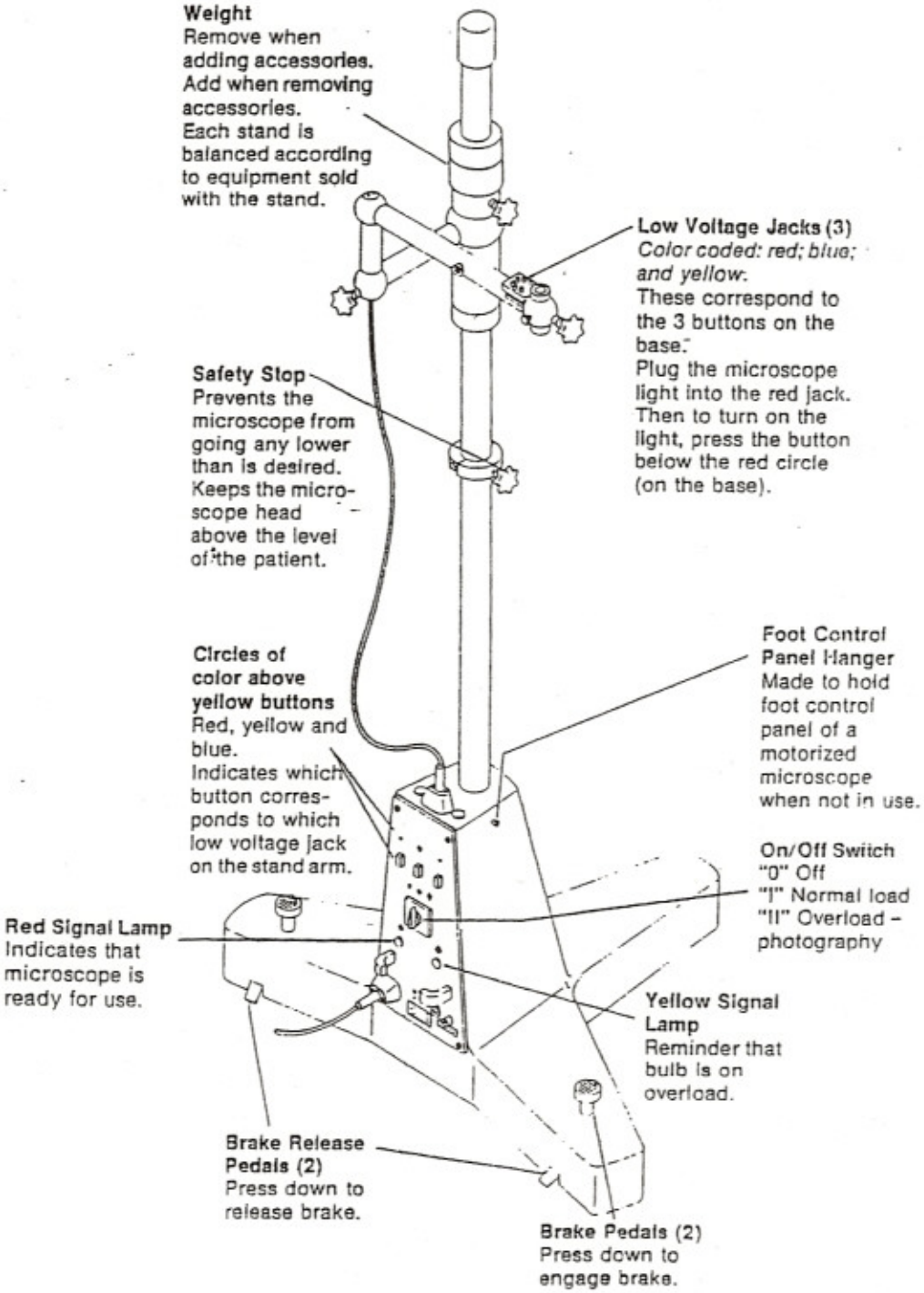


☼ Indicates a normal load on the light bulb.
☼ Indicates that the bulb is on overload.

Universal Stands

Universal Stand With Standard 1 Base

Mechanical elements similar to standard stand.
Larger, heavier base.

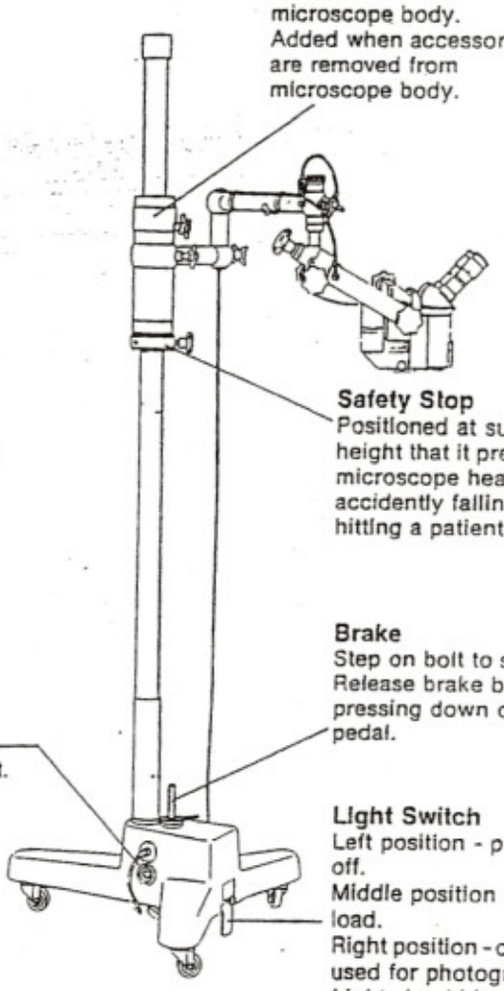


☼ Indicates a normal load on the light bulb.
☼ Indicates that the bulb is on overload.

Rollable Stands

Rollable Standard Stand

Stands are weighted individually for microscope head and accessories.



Weights
Removed when accessories added to microscope body.
Added when accessories are removed from microscope body.

Safety Stop
Positioned at such a height that it prevents the microscope head from accidently falling and hitting a patient.

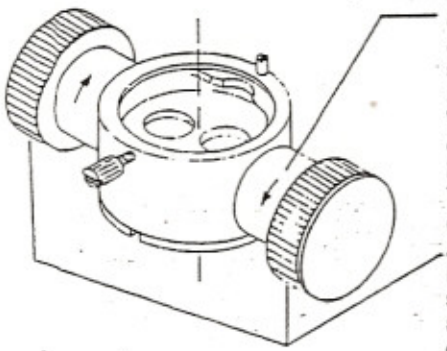
Brake
Step on bolt to set brake.
Release brake by pressing down on brake pedal.

Photography jack
Jack for flash attachment.

Light Switch
Left position - power is off.
Middle position - normal load.
Right position - overload - used for photography.
Light should be left in middle position. Each time it is turned to overload, the life of the bulb is rapidly shortened.

Positioning the microscope
For stability, the microscope body must always be positioned over the long foot or in the opposite direction as shown above.

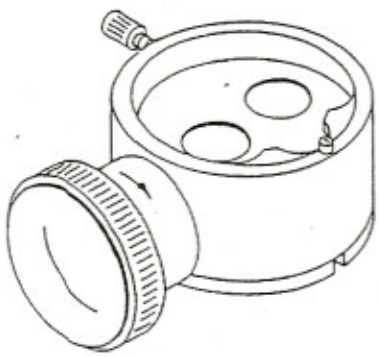
Moving or storing the microscope.
Fold the arms and position the microscope body over the long foot on the base.
Never attempt to move the stand with the stand arm extended or with the microscope body positioned between the feet of the base due to the danger of the entire unit toppling over.
When moving the microscope have one hand on the stand and the other on the microscope head.



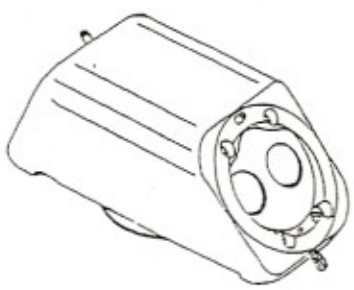
Small Beam Splitter

50/50
Splits the light so that 50% goes to the main operator and 50% to the left and right observer tubes and/or camera equipment.
Follow the directional arrows on the beam splitter when adding or removing an accessory. When putting on a plastic dust cap, it is important to have it just *finger tight.* These caps can become crossthreaded easily.
Retaining ring. This remains on the beam splitter when accessories are added or removed or changed. Considerable damage can occur if pliers, etc. are used to loosen or remove this ring.

70/30
This splits the light so that 30% goes to the main operator and 70% to the camera, thus providing more light for photography. This is used when photography demands more light than usual.

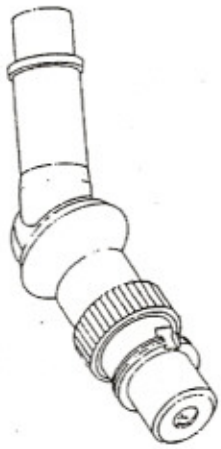


Single Beam Splitter
Used on an OPMI 6D and 7D when an observer or camera equipment is needed. 50% of the light goes to the two binocular heads and 50% to the observer and/or camera equipment. Also available 70/30.



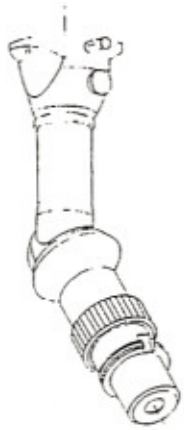
Large Stereo Beam Splitter
Used on OPMI 6D and 7D for accommodation of two binocular tubes.
Both surgeons have the same field of view.
Surgeons operate facing each other.

Short Observation Tube
Monocular observation to observe and assist surgeon.
Sleeve is lifted to change angle of view so that the observation tube can be moved to a comfortable position for the observer.
Image rotation prism ring, silver colored knurled ring rotates the prism inside so that the observer can see the same view as the surgeon from any angle.



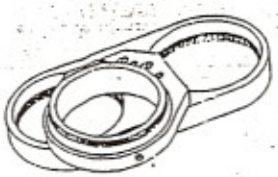
Long Observation Tube
Same features as the short observation tube.
Used when the observer is further away from the operative field.
Only for observation, not for assisting the surgeon.

Stereo Observation Tube
Sleeve and image rotation prism ring are the same as on the above tubes.
Combines with any binocular tube and gives the assistant a stereoscopic view.
For observation or assisting the surgeon.

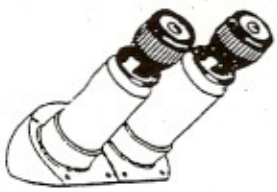


Optics

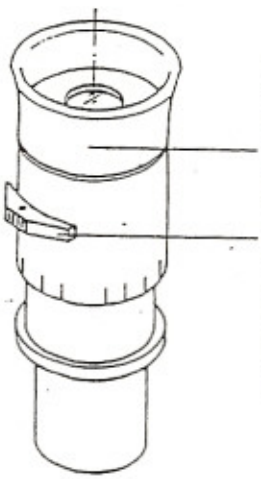
Objective
f = focal distance or working distance. The distance from the objective to the operative field. Screw mounted for ease in changing.
Inserting the objective: Screw the objective counter-clockwise until the threads catch. There will be a "clicking" sound. Then screw the objective clockwise until none of the threads are seen. This prevents cross-threading of the fine threads on the objective.



Objective changer
Contains two lenses.
Saves changing lenses repeatedly. (Not recommended for fiberoptic microscopes.)



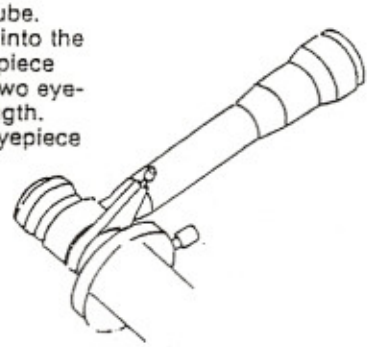
Eyepieces
Magnification 12.5X and 20X.
Can have personal correction put in the eyepiece but there is no locking device.
There is ±8 diopters for correction.



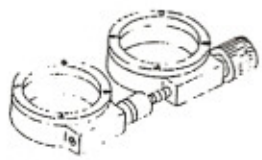
High-Eyepoint Eyepieces
Magnification 10X, 12.5X, 16X and 20X.
Rubber eyecups. Protect eyepiece lens and users spectacles from damage.
Diopter lock (orange). Press this to release and set in personal correction ±8 diopters. Release and correction will not change even if eyepiece is accidently touched since the correction is now locked in.

High-Eyepoint Eyepieces, Screw Mounted
Magnification 12.5X and 20X.
Same features as other high-eyepoint eyepieces but are screw mounted and used on the 0° - 60° binocular tube.
Shorter in length.
Not interchangeable with any other eyepiece.

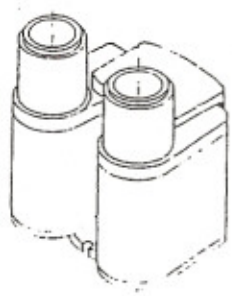
Auxiliary Eyepiece
Earlier type of observer tube.
Fits into binocular tube - into the other sleeve a longer eyepiece must be used - then the two eyepieces are matched in length.
The image through this eyepiece is inverted.



Pupil Distance Adjuster
P.D. = interpupillary distance. Distance between pupil centres of a pair of eyes.
P.D. can be adjusted two ways:
1. Moving eyepieces until one image or circle of light is seen.
2. Using a P.D. adjuster, turn the knurled silver-colored screw until one image or circle of light is visualized. (Accessory for inclined binocular tube.)



Straight Binocular Tubes
f = 125mm and f = 160mm
Used mainly for ENT and Neuro.



Inclined Binocular Tubes
f = 125mm and f = 160mm
Used mainly for Ophthalmology. Plastics and Gynecology.

Tiltable Binocular Tubes
0° - 60°
f = 160mm
Available for all disciplines as it can be used as a straight or inclined tube to accommodate different user heights.
Eliminates frequent changes of binocular tubes.

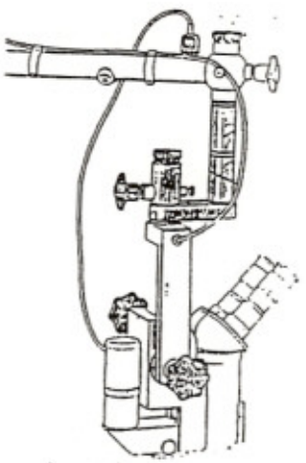
Couplings

Many couplings have been developed so that the microscope can be brought into different positions for specific applications.

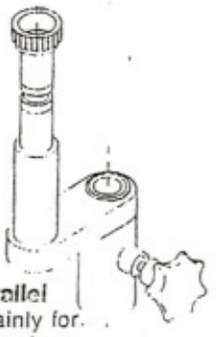
Type	Inclination	Length
KO/Parallel	0°	162 mm
KO/120 mm	0°	120 mm
KO/235 mm	0°	235 mm
K90°/60 mm	90°	60 mm
K90°/260 mm	90°	260 mm
K120°/76 mm	120°	76 mm
K120°/76 mm with gear mechanism	120°	76 mm
X - Y coupling		

To Change a Coupling:

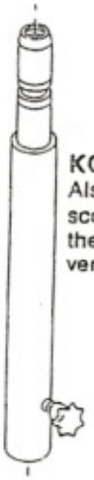
1. Lock ARM on stand.
2. Hold the microscope head with one hand.
3. Unscrew the knurled silver-colored knob.
4. Loosen the locking knob (black star knob) on the coupling.
5. Pull out the smooth silver-colored pin and pull down on the microscope head and/or coupling being removed.



KO/Parallel Coupling in Correct Position.

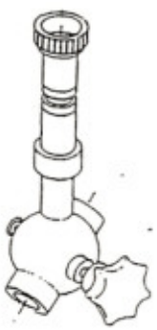


KO/Parallel
Used mainly for Ophthalmology.
The black locking knob on the coupling should be left TIGHT. This enables the microscope head to be rotated during surgery, without losing the field of view.

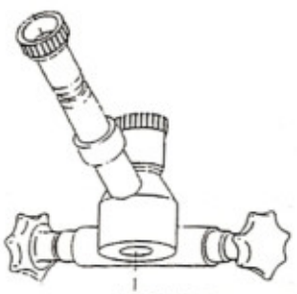


KO/235 mm
Also used for colposcopes and to extend the stand arm vertically.

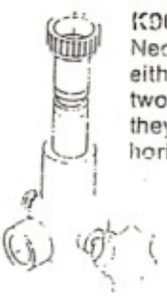
KO/120 mm
Used for colposcopes.



K120/76 mm
An ENT coupling. Necessary to tilt the microscope on an additional axis. Especially important in ear and laryngeal surgery.

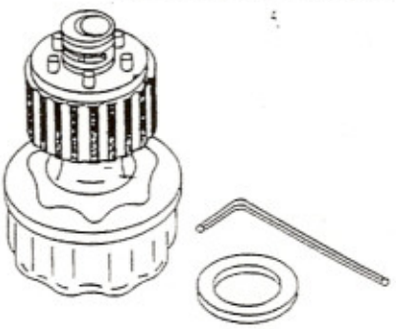


K120/76 mm with Gear Mechanism
As above but only tiltable by geared knob.
Effective when there are one-sided and heavy accessories. The gear prevents the microscope from turning by itself and damaging any of the parts.



K90/60 mm
Necessary with either of the above two couplings, if they are used horizontally.

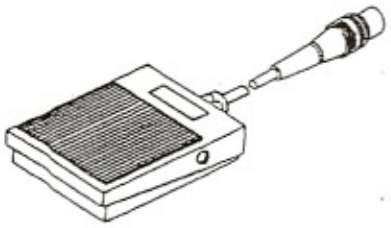
K90/260 mm
This coupling has both the added length and the necessary right angle.



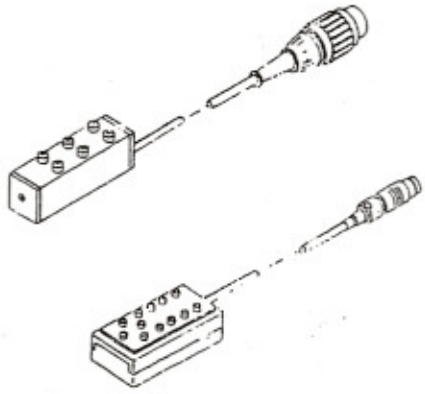
Coupling Brake
This is used on a coupling when accessories are added. It provides a brake while still allowing the coupling movement. This works with friction rather than with a gear as does the K120/76 with gear mechanism.

X - Y Coupling
Allows ± 25 mm horizontal movement from the centre of the microscope in all directions. Pushing the button on the top of this accessory will automatically return it to the centre position. Earlier models didn't have this button.

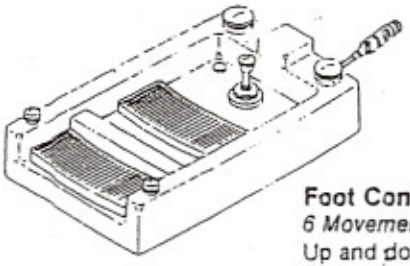
Controls



Foot Switch
1 Movement
Used with Contraves to release magnets for balancing of microscope and stand or to activate overload.

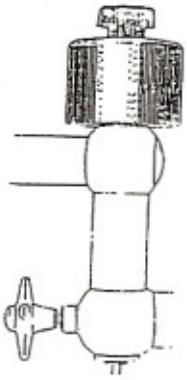


Hand Control Panel
6 movement and 12 movement models.
Same functions as the foot control panels.



Foot Control Panel
6 Movements.
Up and down of column.
Focus - up and down.
Zoom - up and down.

12 Movements.
Up and down of column.
Focus - up and down.
Zoom - up and down.
X - Y coupling - right and left (4 movements, back and forth)
Motorized slit lamp - left and right.



Reostat/Voltage Regulator
Mounted on the stand arm.
Controls the intensity of brightness of the light bulb.

Foot Switch
2 Movements.
Push one circle for up movement and other circle for downward movement. For use with motor head or zoom of second microscope with OPMI 8.

1. **Focus Knobs**
If the two opposite knobs are turned towards each other, the focusing motion tension is increased or reduced depending upon which direction the knobs are turned.

2. **Light Fading**
Voltage control or rheostat may have been moved. This is mounted on the stand arm. It may have been adjusted by mistake. With the light on, turn the rheostat to obtain the intensity required.

3. **Image is sideways or upside down** through observation tube. Turn the large knurled silver-colored ring on the short, long and stereoscopic tubes until your image is facing the correct direction for you. Eg. 12 o'clock for the surgeon is 12 o clock for you.

4. **Plastic covers on beam splitter openings are stuck.**
These have been screwed on too tight; when putting the caps in, check the arrow on the beam splitter for the correct direction in which to tighten the locking ring. When tightening the locking ring, *only have it finger tight.* It is easy to cross thread this plastic cap so take care when putting in on the beam splitter.

5. **Can't remember** which way to turn something?
Most things are *"RIGHTY, TIGHTY. LEFTY, LOOSEY."*

6. **Light Bulbs**
If a blue shadow is in the field of view, the light bulb isn't seated in the lamp housing properly. Reinsert the light bulb making sure that the grooves are seated properly in the lamp housing. Also ensure that the lamp housing is seated properly.

7. **Lamp housing plugged in and no illumination**
If your microscope has a stand with a choice of plug-ins, the plug-in jack and the button on the stand base are color-coded. If the blue jack is used, press the button with the blue circle above it, etc.

8. **Bulbs blowing frequently**
May be using them on overload instead of normal load. Light plugged into the 12V jack instead of 6V. The 12V jack is for halogen illumination and should be labelled 12V.

Sterilization Methods

Gas (ETO) Sterilization*

Standard ETO is acceptable for use with Kraton® thermoplastic rubber based compounds. The ETO gas will penetrate the Kraton, plasticize it and relieve molded in stresses or imposed stresses on the part.

Aeration time is greatly dependent on the size of the master carton and its permeability. One week is the minimum requirement to bring the ETO residuals below 1 PPM, as tested by the standard liquid extraction method. If the product is heated to 125-135 F in an aeration chamber with high airflow, the time can be accelerated to as little as four days.

Gamma Sterilization*

Kraton thermoplastic rubber can be sterilized using gamma radiation without suffering a large loss in physical properties even after extended storage.

Kraton G-2705 rubber was exposed to Cobalt 60 radiation doses of 3, 6, and 12 Mrads. The table below shows the effect of the radiation on the tensile properties of the material after being aged for 21 months.

Property	Original	0 Mrads	3 Mrads	6 Mrads	12 Mrads
Hardness, Shore A	55	50	48	48	43
Tensile Strength, psi	1200	+8%	+12%	-3%	-15%
300% Modulus, psi	350	+3%	-4%	-10%	-15%
Elongation, %	700	+3%	+10%	+8%	+12%

Steam Sterilization*

GLS Corporation can suggest the following maximum autoclave cycles for selected materials**

250 F for 17 minutes

240 F for 27 minutes.

There will be some slippage or creep with any Kraton thermoplastic rubber based products at these temperatures because of the relieving of molded in stress and the relaxation of imposed stresses. To minimize these effects, parts should be molded at the suggested processing conditions, and not autoclaved while being subjected to outside mechanical stresses.

* Information pertains only to Kraton G-based compounds
** Information pertains only to Kraton G-2705 compound.

Disposables

Spare Bulbs

Endure Number		
90-1200	Zeiss 6V 30W Bt58Z	390158
90-1201	Zeiss 6V 50W Bt86Z	390186
90-1202	Zeiss 12V 100W HLX #64626	380075 1020
90-1203	EFR Housing #900	
90-1204	Zeiss 15V 150W EFR	310198
90-1205	Zeiss 12V 100W HLX #64627	380079 9040
90-1206	Zeiss Superlux 40	
90-1207	Zeiss Superlux 175	
90-1208	Zeiss Superlux 300 with Cartridge	
90-1209	Zeiss Superlux 300 Bulb Only - No Housing or Meter	
90-1302	ELS 150 21V 150W EKE	
90-1400	ELS 250 24V 250W ELC	
90-1403	ELS 24 60V 24W Metal Halide	
90-1402	ILO 300W with Cartridge	

Sterilizable Knob Covers

91-0100	Zeiss Knob Cover, MD Zoom	302602 0203
91-0101	Zeiss Knob Cover, 0-60 PD Adjustment	303418 0000
91-0102	Zeiss Knob Cover, Small, 0-180 PD Adjustment	305810 0000
91-0103	Zeiss Knob Cover, Medium,	305807 0000
91-0104	Zeiss Knob Cover, Magnification Changer	303673 0000
91-0105	Zeiss Knob Cover, Large	305803 0000
91-0106	Zeiss Knob Cover, Extra Large	303674 0000
91-0110	Zeiss Handle Cover, CS/MD Short	302501 9060
91-0111	Zeiss Handle Cover, CS/MD Long	302627 9001
91-0112	Zeiss Handle Cover, F-Cover	305808 0000
91-0113	Zeiss Handle Cover, Pro Magis	
91-0114	Zeiss Hande Cover for MDU Post	305809 0000

Dust Covers

92-0010	Dust Cover, Large

Foot Control Covers

92-0200	Endure Poncho Disposable Foot Control Cover, 20 per Case

Drapes

93-8222	Sterile Drape, 50/180cm, 20/70", Zeiss 48mm, Zeiss OPMI 1/OPMI 6 w/o Side Observer, 20 per Case
93-8214	Sterile Drape, 115/180cm, 45/70", Zeiss 48mm, Zeiss OPMI 1/OPMI 6 w/Side Observer, 20 per Case
93-8296	Sterile Drape, 115/300cm, 45/118", Zeiss 65mm, MD/CS/11/111/ORL/Pro Magis/Neuro/ VISU 150/VISU 200, 20 per Case