Durst CLS 301

Operating Instructions

Durst

With the CLS 301 you have acquired a high-performance product of Durst AG, Bolzano, Italy, which offers top quality and utmost care in workmanship and quality control. This top-class unit with its convenient and reliable operation will serve you well in all colour enlarging work.

Successful operation however depends on carefully following the instructions. This operating manual explains systematically both the assembly and the handling of your mixing head.

Please take the trouble to read this manual thoroughly. The more familiar you become with all operations and controls, the more easily you avoid annoying errors or even damage.

Durst AG, Bolzano, Italy

Contents

1.0.0. General note

The Durst CLS 301 colour mixing head is equipped with infinitely variable dichroic filter controls and can be mounted on the Durst LABORATOR 138 S, LABORATOR G 139, LABORATOR SM 183, LABORATOR 184 and LABORATOR 1800 enlargers. For fitting on the LABORATOR 138 S, LABORATOR G 139 and LABORATOR SM 183, the CLS 301 can be ordered with the COLIMAN filter setting unit (COLIMANKIT 301 TRA, COLIMANKIT 301 EST) for easier operation, or equipped with this unit later. For mounting on the LABORATOR 184 and LABORATOR 1800 enlargers Durst supplies the CLS 301 only in the version with the COLIMAN 301. The cooling fan and built-in heat filters allow the use of two 300 watt tungsten-halogen lamps which provide the CLS 301 with the necessary light output. The cooling fan is supplied as a separate unit with the colour head for mounting it on the LACAP 138 adapter for the LABORATOR 138 S, G 139 and SM 183; for mounting the CLS 301 via the LACAP 184/301 adapter on the LABORATOR 184 and 1800 enlargers the fan is built-in.
The Durst CLS 301 colour mixing head is available in the following versions:

A) For mounting on the LABORATOR 138 S, G 139 and SM 183
COLIKIT 301, consisting of:

COLIS 138	Colour mixing head
LACAP 138	Spacer unit
LATIBOX 138	13 x 18 cm (5 x 7 in.) mixing box
LAFAN 301	Cooling fan
COLITRA 301	Transformer

COLIMANKIT 301 TRA, consisting of:

COLIS 301	Colour mixing head
COLIMAN 301	Rapid filter setting unit
LACAP 138	Spacer unit
LATIBOX 138	13 x 18 cm (5 x 7 in.) mixing box
LAFAN 301	Cooling fan
COLITRA 301	Transformer

COLIMANKIT 301 EST, consisting of:

COLIS 301	Colour mixing head
COLIMAN 301	Rapid filter setting unit
LACAP 138	Spacer unit
LATIBOX 138	13 x 18 cm (5 x 7 in.) mixing box
LAFAN 301	Cooling fan
COLISTA 301	Electronic voltage stabiliser

B) For mounting on the LABORATOR 184 and LABORATOR 1800
COLIMANKIT 184 TRA

COLIS 301	Colour mixing head
LACAP 184/301	Spacer unit
LACOBOX 100	20 x 25 cm (8 x 10 in.) mixing box
COLIMAN 301	Rapid filter setting unit
COLITRA 301	Transformer

COLIMANKIT 184 EST

COLIS 301	Colour mixing head
LACAP 184/301	Spacer unit
LACOBOX 100	20 x 25 cm (8 x 10 in.) mixing box
COLIMAN 301	Rapid filter setting unit
COLISTA 301	Electronic voltage stabiliser

2.0.0. Technical data

COLIS 301/COLIMAN 301:

Dimensions:	550 x 300 x 195 mm (21.7 x 11.8 x 7.7 in.)
Net weight:	Approx. 8.5 kg (18¾ lbs)
Lamps:	Projection lamps with diathermic reflector, e.g. G.E. type ELR, 120 volts, 300 watts
Durst code:	COLAMP 300
Mains supply voltage:	110/220/240 volts, 50-60 Hz
Current consumption:	Approx. 665 watts
Fan hose:	1 metre (3.3 feet) long
Cooling fan:	LAFAN 301: 60 watts, blowing rate 287 cu.m (10,000 cu.ft.) per hour

2.1.0. Checking out

The CLS 301 colour mixing head is shipped in a protective break-resistant packing. First check that all components are there. All parts supplied separately for assembly are in addition marked with an ●. Before assembly thoroughly clean all parts with a cloth.

2.2.0. Components and controls

2.2.1. CLS 301/COLIMAN 301

1. CLS 301 colour mixing head
2. CLS 301 colour mixing head with COLIMAN 301
3. Filter scales on CLS 301
4. Filter scales on COLIMAN 301
5. Scale lighting switch on CLS 301
6. Scale lighting switch on COLIMAN 301
7. Filter setting knobs on CLS 301

7a. Filter setting knobs on COLIMAN 301

● 8. Extension rods for filter adjustment

9. Lamphouse panel opening buttons
10. Lamp retaining brackets
11. Lamp fittings
12. Lamp holders

● 13. Lamp with reflector

14. Mounting plate
15. Ejector lever
16. Vent outlet for fan hose
17. Infrared absorbing filter
18. Horizontal mixing boxes
19. Dichroic colour filters

● 20. Filter drawer

21. Ultraviolet absorbing filter

● 23. Milled screws for securing the CLS 301
● 24. Front panel of CLS 301
● 25. Fixing screws for CLS 301 front panel

26. COLIMAN hood

● 27. Fixing screws for the COLIMAN hood

28. COLIMAN filter shafts with Allen screws
29. Scale lighting lead
30. COLITRA 301 transformer
31. COLISTA 301 electronic voltage stabiliser

● 32. Mains lead for connecting the COLITRA 301 or COLISTA 301

33. Socket for mains lead on COLITRA 301 or COLISTA 301
34. Socket for fan plug
35. Socket for colour mixing head
36. Earthed Schuko socket for mains lead to exposure timer
37. Earthed UL socket for mains lead to exposure timer

● 39. Exposure timer connecting lead

40. Socket to take connecting lead to exposure timer
41. Fuse holder
42. Voltage selector
43. Main switch on COLITRA 301 or COLISTA 301
44. Switch for lamp in colour mixing head (without or via exposure timer)
45. Signal lamp

2.2.2. CLS 301 on the LABORATOR 138 S, G 139 and SM 183

● 46. LACAP 138 spacer unit

47. Crosshead screws for mounting the LACAP 138
48. Opening for mixing boxes
49. Mixing box guides
50. Guides in colour mixing head
51. Mixing box handle

● 52. LATIBOX 138 mixing box: 13 x 18 cm (5 x 7 inches)

54. LATIBOX 69 mixing box: 6.5 x 9 cm (2½ x 3½ inches)

● 55. LAFAN 138 fan
● 56. Flexible hose with fitting
● 57. Hose fitting

58. Fan outlet

59. Angle bracket
60. Bolts to secure angle bracket
61. Supporting bracket
62. Engagement holes in supporting bracket

2.2.3. COLIS 301 on the LABORATOR 184 and LABORATOR 1800

- 64. LACAP 184/301 spacer unit with built-in fan
65. Holes in LACAP 184/301
66. Crosshead screws for securing the LACAP 184/301
- 67. Flexible hose to CLS 301/COLIMAN 301
68. Vent outlet on LACAP 184/301
70. Opening for mixing boxes
71. Mixing box guides
73. LACOBOX 138 mixing box: 13 x 18 cm (5 x 7 inches)
74. Mixing box handle

3.0.0. Assembly

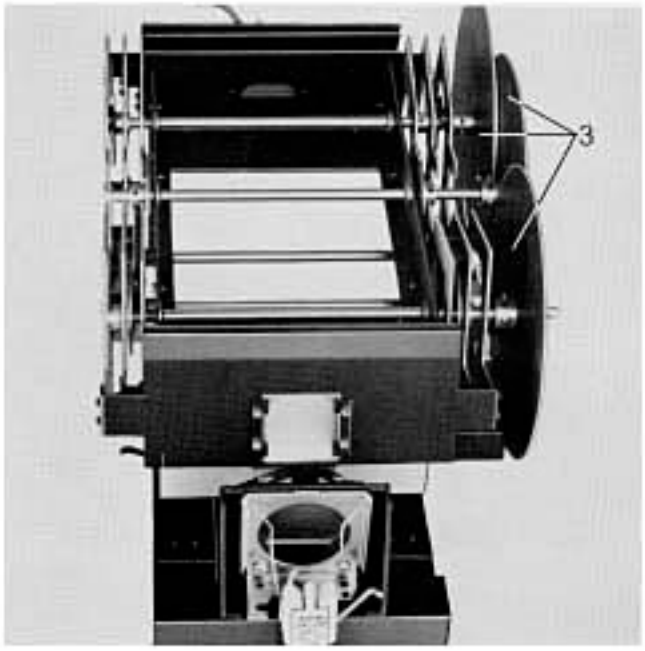
3.1.0. Mounting the COLIMAN 301 on the CLS 301

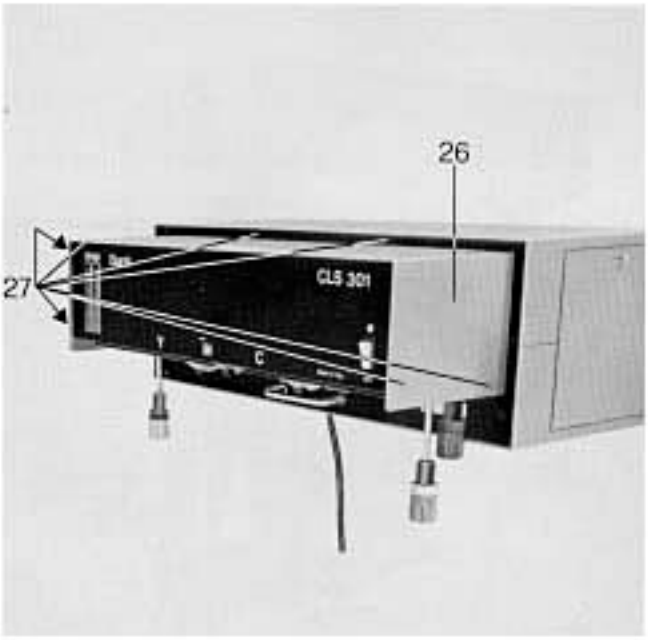
Where the CLS 301 colour mixing head (1) is to be fitted later with the COLIMAN 301 rapid filter setting unit, this must be done with the CLS 301 removed from the enlarger.

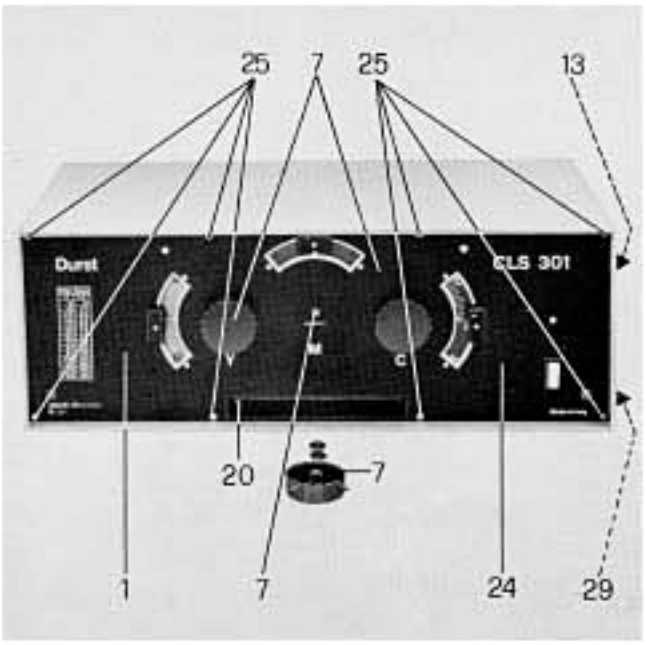
First pull the filter drawer out of the colour mixing head. Slack off the filter setting knobs (7) with an Allen key and pull them off the filter shafts of the COLIS 301. Release the scale lighting lead (29) from the front cable clamp underneath the right-hand lamp (13) (as seen from the front) and pull out.

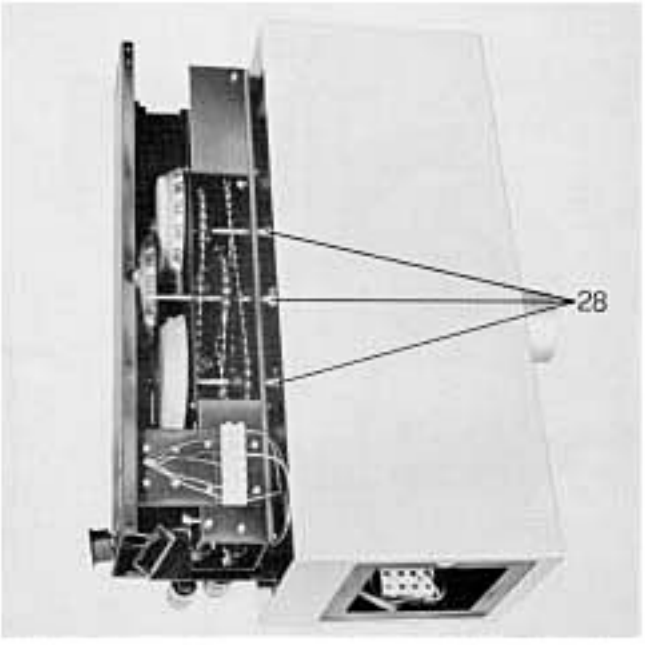
Unscrew the fixing screws (25) and remove the front panel (24) of the COLIS 301. Set the scale wheels (3) to zero and pull the felt washers off the shafts. Unscrew the fixing screws (27) of the COLIMAN and lift off the grey hood (26).

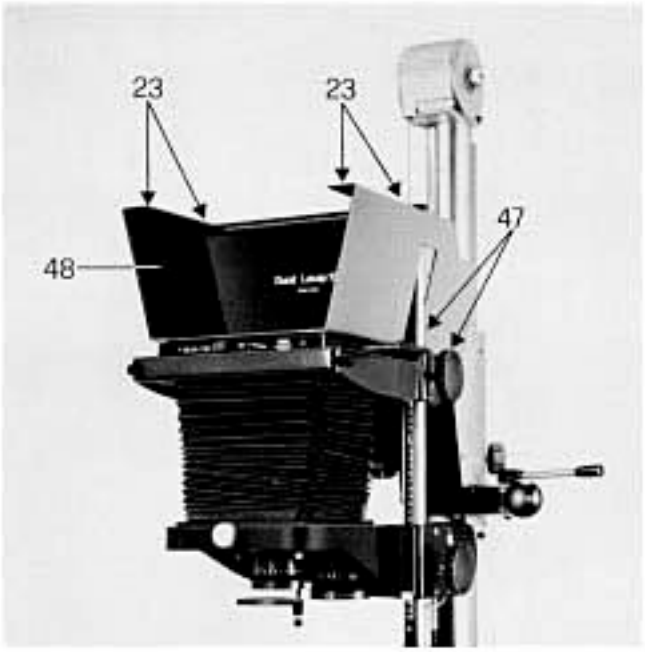
Unscrew the Allen screws of the COLIMAN filter shafts (28) and push the COLIMAN 301 onto the filter knob shafts (7) of the COLIS 301. Make sure that the filter shafts do not turn during this operation. Now tighten the Allen screws (two per shaft), refit the COLIMAN hood (26) and reconnect the scale lighting lead (29).

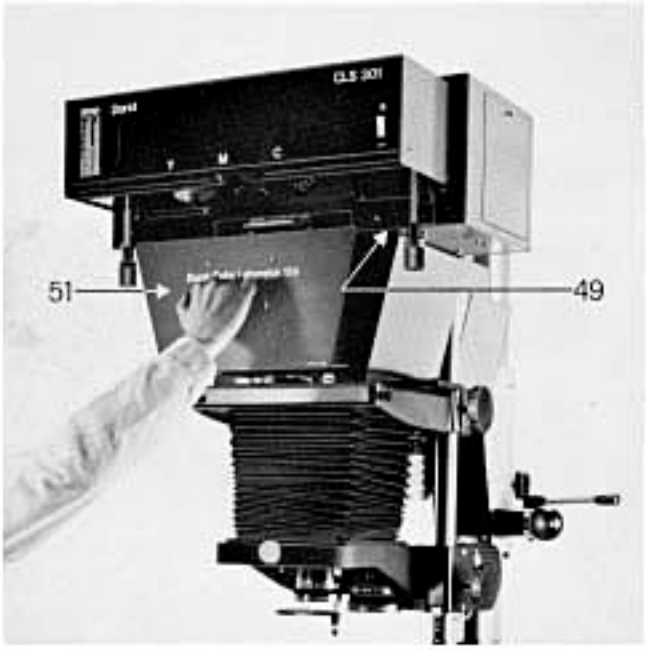


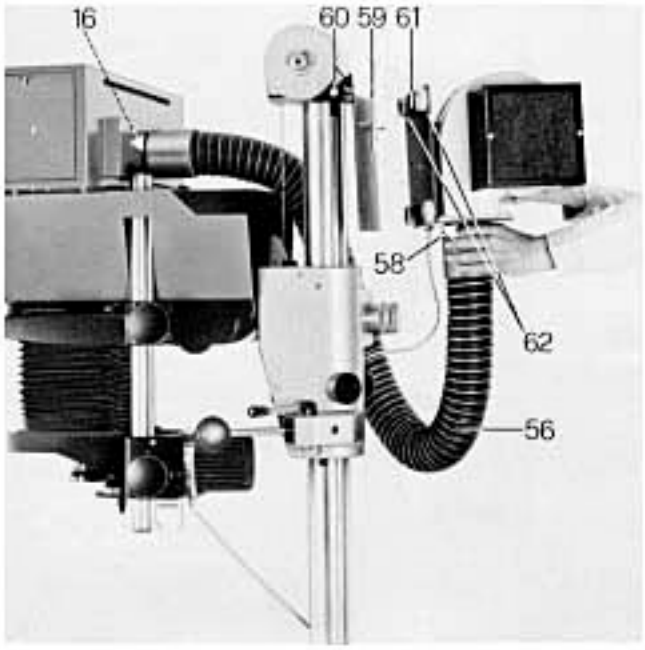












3.2.0. Mounting the CLS 301 on the LABORATOR 138 S, G 139 and SM 183

If the CLS 301 colour mixing head is ordered together with the enlarger, the Durst LABORATOR 138 S or LABORATOR G 139 and also the SM 183 are supplied already without condenser housing to permit direct mounting of the CLS 301 colour mixing head. If on the other hand the CLS 301 colour mixing head is to be mounted on the enlarger at a later time, the original lamphouse must be removed by unscrewing the four crosshead screws (47).
Place the LACAP 138 spacer unit on the negative carrier standard with the wider side on top. Screw the LACAP 138 to the enlarger with the four screws (47). Then mount the CLS 301 colour mixing head on top of the LACAP 138 with the four milled screws (23).

3.2.1. Mixing boxes

The standard outfit of the CLS 301 includes a mixing box (52) for 13 x 18 cm or 5 x 7 inch negatives. LATIBOX 450 (for 10 x 12.7 cm or 4 x 5 inch negatives) and LATIBOX 69 (for 6.5 x 9 cm or $2^1/_2$ x $3^1/_2$ inch negatives) mixing boxes are available as accessories. The LATIBOX mixing boxes are inserted in the opening (48) provided for the purpose. Check that the mixing box guides (49) engage the guides of the colour mixing head (50).

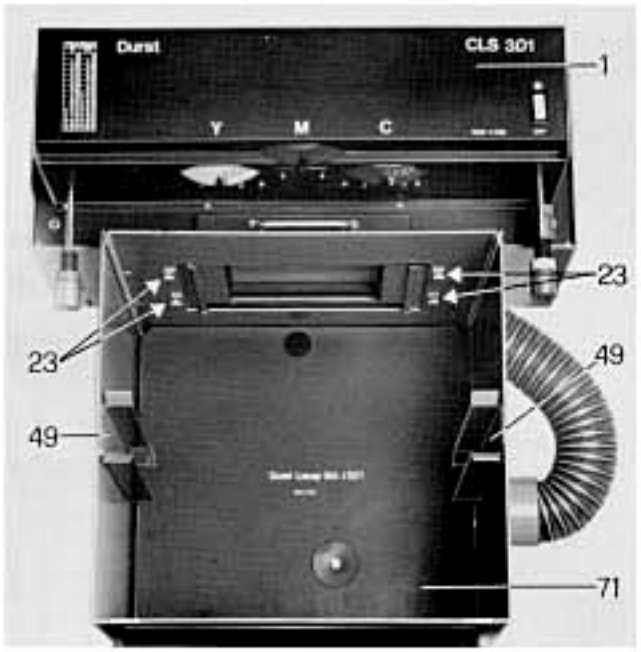
3.2.2. Connecting the fan

The rear of the CLS 301 colour mixing head carries a vent outlet (16) for the fan hose. Introduce the flexible hose (56) of the fan over the outlet (16) and secure with the fitting. Attach the other end of the hose in the same way to te fan outlet (58). The fan is normally supplied complete with an angle bracket (59) for mounting on the LABORATOR 138 S. Fix this angle bracket (59) with the two bolts (60) on the column hood of the LABORATOR 138 G, G 139 or SM 183. The supporting bracket (61) has two engagement holes (62) for supporting the fan.

3.3.0. Mounting the CLS 301 on the LABORATOR 184 and LABORATOR 1800

If the enlarger is supplied already without condenser housing, the CLS 301 colour mixing head even in the COLIMAN-KIT 184 TRA/EST versions can be mounted directly on the enlarger. Otherwise first remove the condenser housing after unscrewing the four crosshead screws (47).

Then fit the LACAP 184/301 (64) complete with cooling fan housing, making sure that the four studs fit into the holes (65) of the negative carrier standard. Then secure the LACAP 184/301 with the four screws (66). Finally mount the CLS 301 colour mixing head (1) on the LACAP 184/301 (64) with the four milled screws (23).

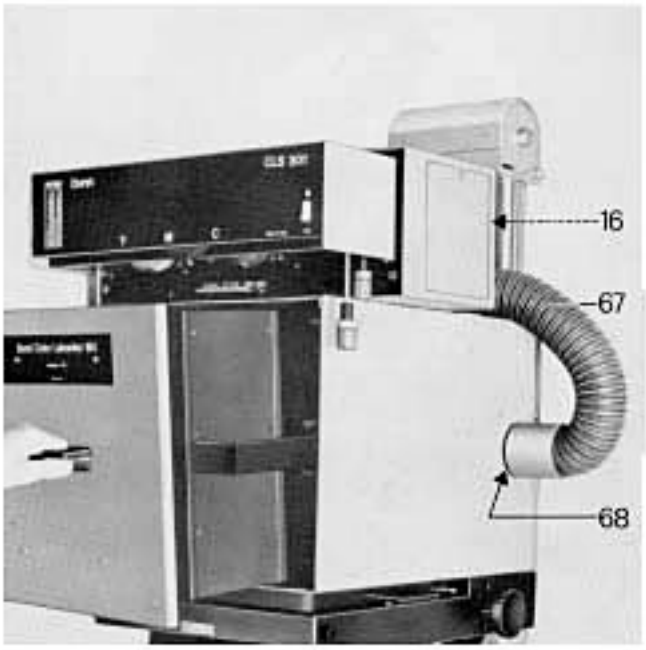


3.3.1. Mixing boxes

The standard outfit of the CLS 301 colour mixing head includes a LACOBOX 100 mixing box for negatives up to 25 x 25 cm or 10 x 10 inches. An alternative LACOBOX 138 mixing box is available for negatives up to 13 x 18 cm or 5 x 7 inches. The LACOBOX mixing boxes are pushed into the opening (70) provided for the purpose. When fitting the mixing box check that its guide (71) engages the guides of the colour mixing head (50).

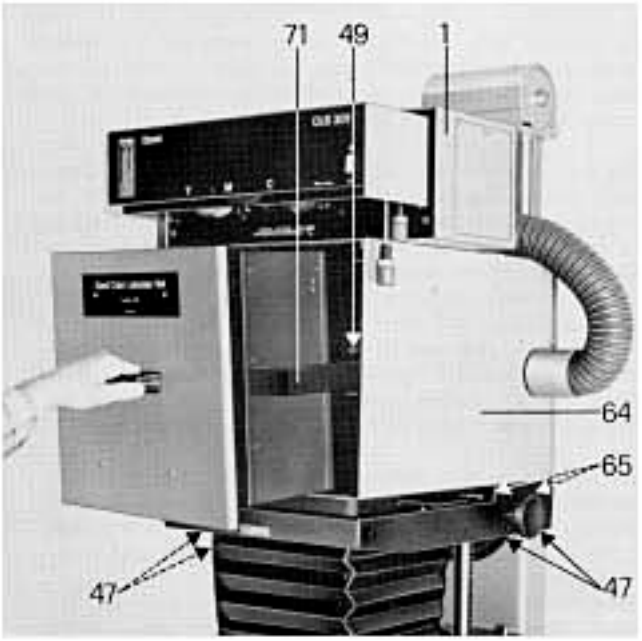
3.3.2. Connecting the built-in fan

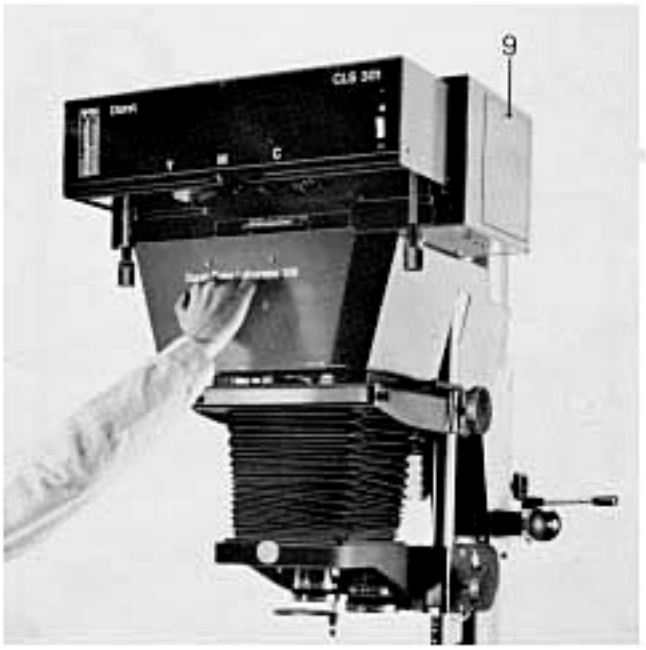
Connect the vent outlet (68) of the LACAP 184/301 (64) with the vent (16) on the colour mixing head via the short flexible hose (67). Plug the fan lead into the socket (34) on the TRA 301 (30) or the EST 301 (31).

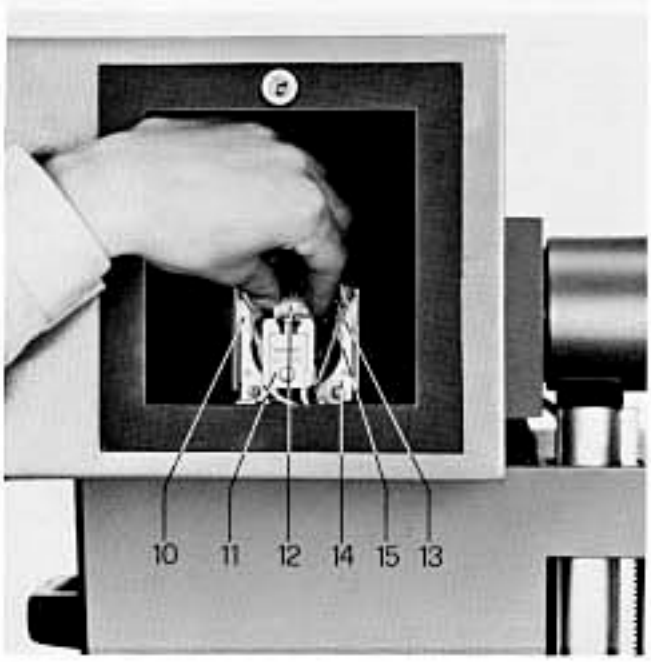


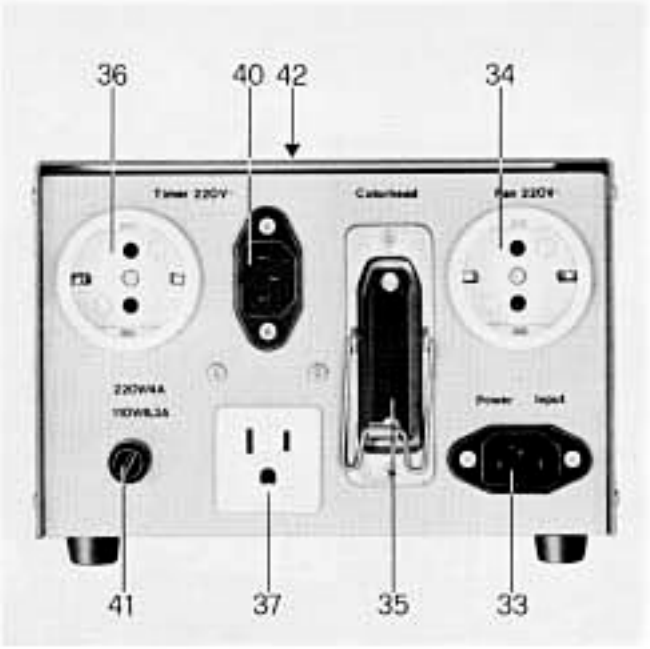
3.4.0. Fitting the lamps in the CLS 301

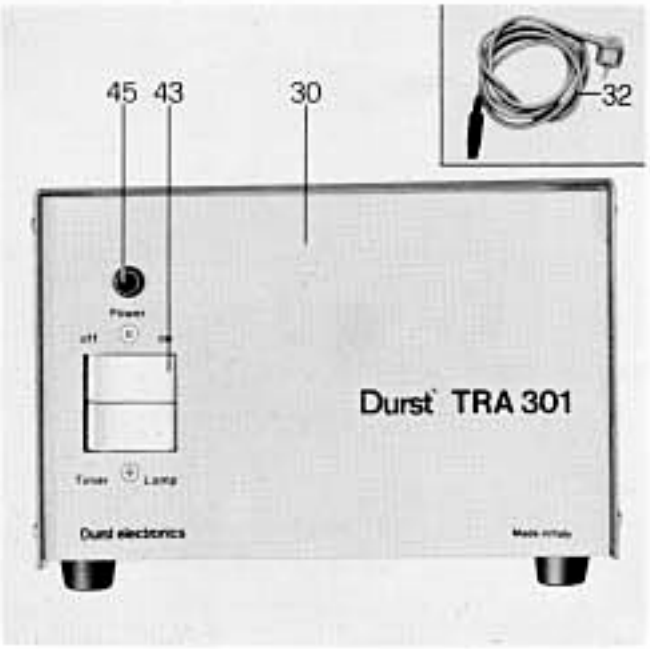
Two panels in the left and right sides of the CLS 301 colour mixing head provide access to the lamphouse. The panels can be removed on pressing the buttons (9).











Inside the lamphouse a retaining bracket (10) and a lamp fitting (11) are visible on each side. Push the lamps (13) between the mounting plate (14) and the pressure spring from above so that the pins engage in the lamp holder (12).

The ejector lever (15) must point towards the mounting plate. These lamps are available either from Durst (Order code: COLAMP 300) or from electrical dealers.

The designation of the appropriate lamp from General Electric Co. is ELH 300 watts, 120 volts. Similar lamps are also produced by other manufacturers. Always check that the pins of the lamp are fully pushed into the lamp holder.

3.5.0. Connection to the TRA 301 transformer

Plug the cable from the CLS 301 colour mixing head into the appropriate socket (35), marked "Color head", at the back of the transformer. Plug the cable from the fan into the socket (34) also in the back of the transformer. The transformer is normally supplied set to 220 volts as shown inside on the voltage selector (42). To connect the transformer to a different supply voltage, turn the voltage selector with a screw driver or a coin until it shows the correct voltage. The transformer can be set to 110, 220 or 240 volts. The fuse holder (41) contains a 4 amp fuse.

This is the correct fuse for running the transformer from a 220 or 240 volts mains supply. Where the TRA 301 is to be used on a 110 volt mains supply, fit the 6.3 amp fuse supplied into the fuse holder (41). The TRA 301 transformer is supplied complete with one set of spare fuses for 110, 220 and 240 volts. Then plug the female plug of the mains lead (32) into the socket (33) of the transformer and plug the other end of the lead into a mains supply socket.

The front of the transformer carries the main on/off switch (43) and a signal lamp (45). The main switch switches on the transformer; the signal lamp (45) lights up to show that the unit is operational.

The version with the TRA 301 transformer does not provide automatic voltage stabilisation with the CLS 301 colour mixing head. The unit must thus either be connected to a constant-voltage mains supply or to a separate voltage stabiliser (31). That is essential for consistent colour enlargement quality.

3.6.0. Connection to the EST 301 voltage stabiliser

The EST 301 is an electronic voltage stabiliser with built-in transformer. The EST 301 keeps the light intensity constant within ± 1.5% and compensates voltage fluctuations up to ± 15% with a response time of 1/200 second.

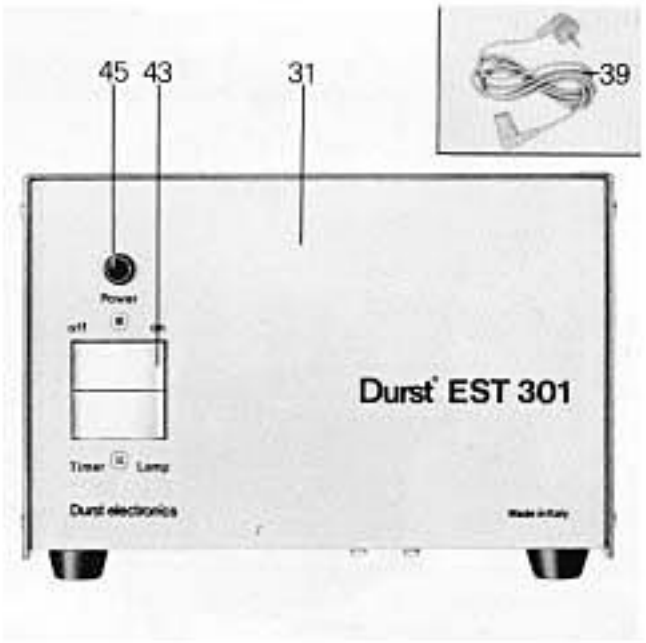
Plug the lead from the colour mixing head into the appropriate socket (35) marked "Color head" in the rear of the voltage stabiliser. The voltage stabiliser is normally supplied set to an input voltage of 220 volts, as shown on the voltage selector (42). If the voltage stabiliser is to be used with a different voltage, turn the voltage selector to bring the required voltage into view. The unit can be set to 110, 220 and 240 volts. The fuse holder (41) contains a 4 amp fuse which is suitable for running the voltage stabiliser from a 220 or 240 volts mains supply. If the EST 301 is to be fed from a 110 volt mains, fit the 6.3 amp fuse in the fuse holder.

The EST 301 voltage stabiliser is supplied complete with one set of spare fuses for 110, 220 and 240 volts. Plug the female plug of the EST 301 mains lead (32) into the socket (33) of the voltage stabiliser and connect the other end to a mains supply socket.
The front of the voltage stabiliser carries a main on/off switch (43) and a signal lamp (45). The main switch switches

on the voltage stabiliser; the signal lamp (45) lights up to show that the unit is operational.

3.7.0. Connecting an exposure timer

The TRA 301 (30) and EST 301 (31) are supplied with a connecting lead (39) to an exposure timer. To connect the timer, plug the connecting lead (39) into the socket (40) at the rear of the transformer or voltage stabiliser. Plug the other end of the lead into the timer. Plug the mains lead of the timer either into the socket (36) or (37) of the transformer or voltage stabiliser or directly into a mains supply socket.



4.0.0. Operation

4.1.0. Filter settings

If the CLS 301 colour mixing head was ordered in the COLIKIT 301 version, the filters are set by three control knobs (7) on the front of the colour mixing head.

The alternative versions of the 301 colour mixing head incorporate a system for simpler filter operation by turning the three knobs (7a). The controls permit infinitely variable adjustment of densitometric filter values from 0 to 130.

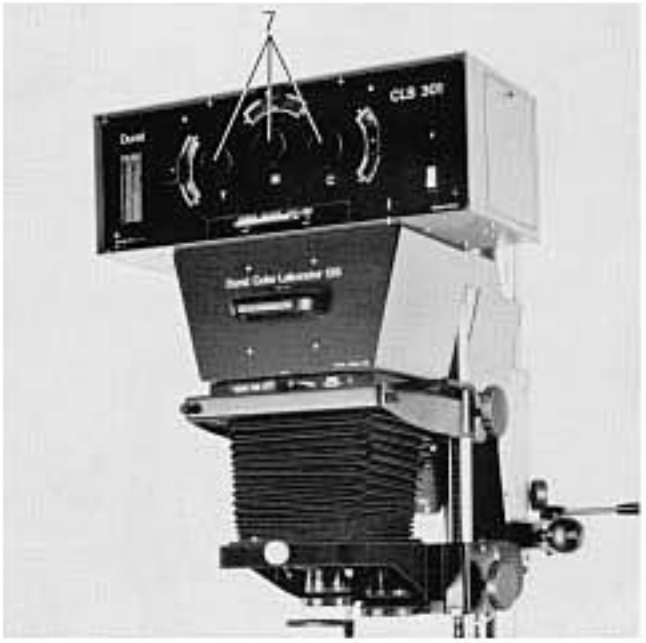
If you are used to working with colour heads calibrated in CC or CP filter values, you will note that the CLS 301 filters are stronger and reach appreciably higher density values.

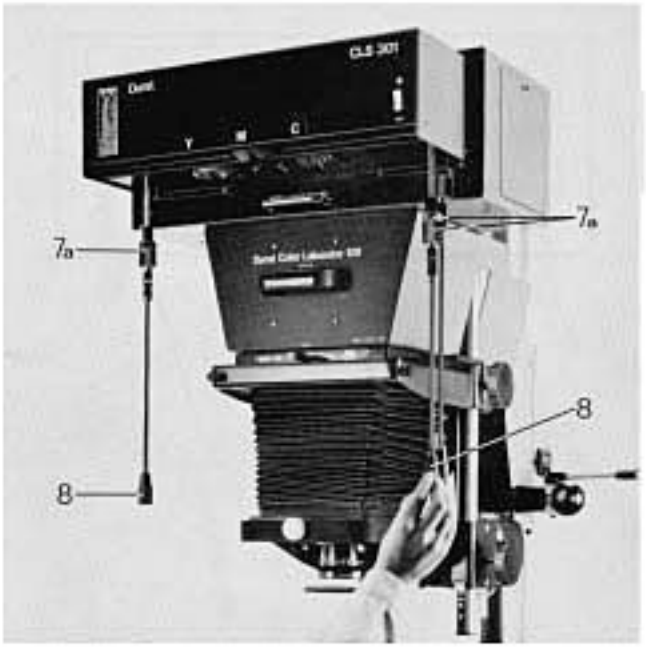
Use the following conversion table for switching over:

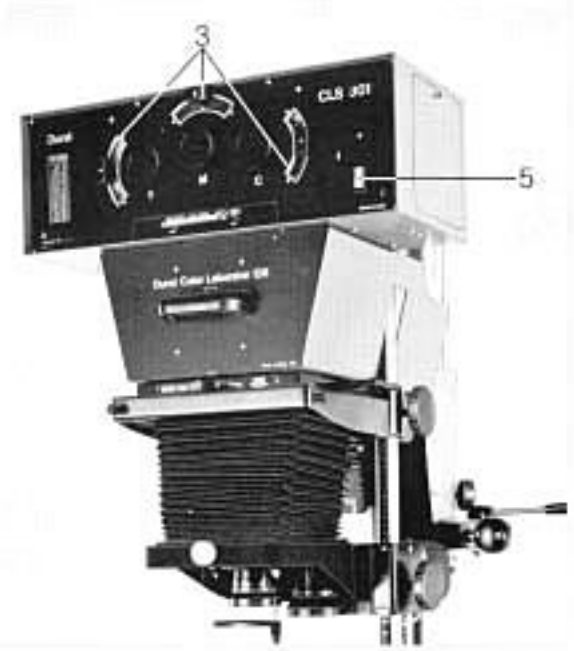
Filter values	
Durst	CC and CP
0	0
10	15
20	30
30	45
40	60
50	75
60	90
70	105
80	120
90	135
100	150
110	165
120	180
130	195

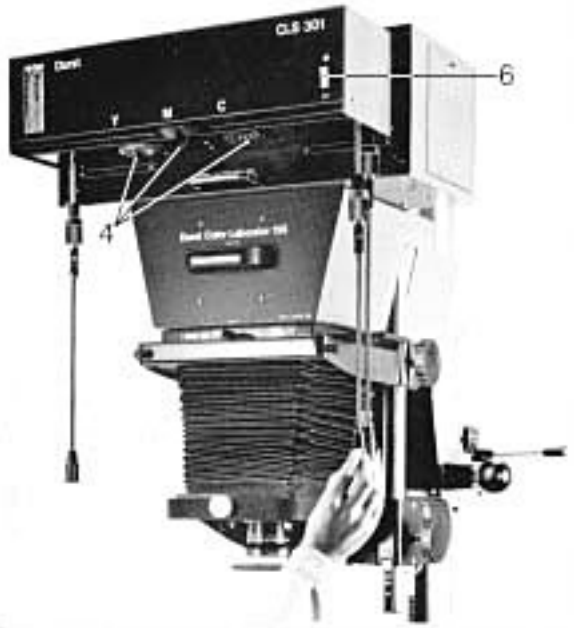
The maximum filter density available on the CLS 301 colour mixing head is thus equivalent to a CC or CP filter density of approx. 195. Extension rods (8) for the filter controls are supplied with the COLIMANKIT 301 EST, COLIMANKIT 301 TRA, COLIMANKIT 184 TRA and COLIMANKIT 184 EST.

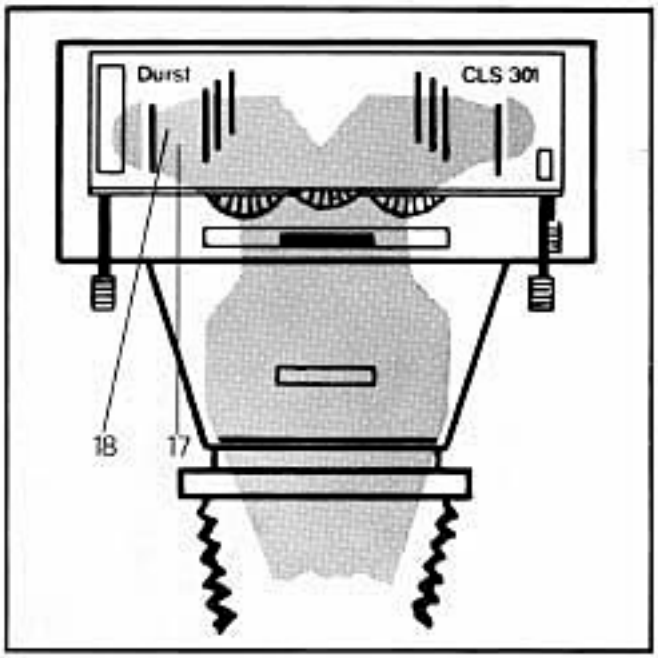
These extension rods are simply pushed into the filter control knobs (7a). They are particularly useful for convenient filter adjustment at high magnifications.











4.2.0. Filter scales

In the COLIKIT 301 version the filter values for yellow, magenta and cyan appear on three scales (3); in the COLIMANKIT 301 EST, COLIMANKIT 301 TRA, COLIMANKIT 184 TRA and COLIMANKIT 184 EST they can be read off on the inclined scales (4). The filter scales are illuminated for easier reading.

This scale lighting can be switched off by the switch (5) on the COLIKIT 301 and by the switch (6) on the COLIMANKIT 301 EST, COLIMANKIT 301 TRA, COLIMANKIT 184 EST and COLIMANKIT 184 TRA.

4.3.0. Tungsten-halogen lamps

The 300 watt 120 volt tungsten-halogen lamps (Order Code: COLAMP 300) on the CLS 301 colour mixing head have an approximate burning life of 50 hours. Change the lamps as described in section 2.5.0.

4.4.0. The cooling fan

Switching on the lamp at the same time starts the cooling fan. Both the TRA 301 and the EST 301 incorporate a run-on relay which keeps the cooling fan running until the temperature in the colour head has dropped to a minimum value.

4.5.0. Changing the mixing boxes

When switching negative sizes, the mixing boxes should also be changed to increase the light intensity and improve the evenness of illumination. When fitting a mixing box push it fully into the opening of the enlarger head by the handle (51)/(74). Check that the guides (49)/(71) of the mixing box engage the guides (50) of the colour mixing head.

4.6.0. Infrared and ultraviolet absorbing filters

The CLS 301 colour mixing head is equipped with both an infrared (17) and an ultraviolet absorbing filter (21) — see sketch. These filters are essential for enlarging on current colour printing materials. The two infrared filters are mounted in the horizontal mixing boxes (18) in front of the filters; the ultraviolet absorbing filter is located in the filter drawer (20).

4.7.0. The supplementary filter drawer

Supplementary 16 x 16 cm (6.3 x 6.3 inch) filters can be placed in the filter drawer (20) of the CLS 301 for special effects or for additional filtration with unmasked negatives.

4.8.0. Horizontal projection

The LABORATOR 138 S, G 139, SM 183, LABORATOR 183 and LABORATOR 1800 used with the CLS 301 are eminently suitable also for horizontal projection.

4.9.0. Exposure factors for different filter settings

Filter value	Yellow	Magenta	Cyan
00	1.00	1.00	1.00
05	1.02	1.08	1.06
10	1.04	1.15	1.11
15	1.06	1.21	1.16
20	1.08	1.26	1.20
25	1.10	1.31	1.24
30	1.11	1.36	1.28
35	1.12	1.40	1.31
40	1.13	1.44	1.34
45	1.14	1.48	1.37
50	1.15	1.52	1.40
55	1.16	1.56	1.43
60	1.17	1.60	1.46
65	1.17	1.64	1.49
70	1.18	1.68	1.52
75	1.18	1.72	1.54
80	1.18	1.76	1.56
85	1.19	1.80	1.58
90	1.19	1.84	1.60
95	1.19	1.88	1.62
100	1.20	1.92	1.64
105	1.20	1.96	1.66
110	1.20	2.00	1.68
115	1.21	2.04	1.70
120	1.21	2.06	1.72
125	1.21	2.10	1.74
130	1.21	2.14	1.76

5.0.0. Maintenance

Clean the colour filters from time to time with a wad of cotton wool moistened in alcohol. Also clean the glass plates of the filter drawer (20) and the diffuser of the colour mixing head in the same way.
A heat filter is located in front of each projection lamp. This again should be cleaned periodically with a wad of cotton wool moistened in alcohol.

Durst products are being constantly developed to the latest state of the art. Illustrations and descriptions are therefore subject to change.