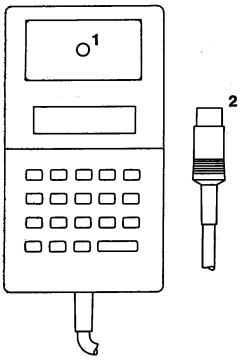
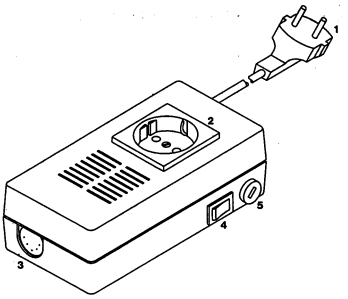
HAUCK trialux

Operating Instructions



Control panel

① Measuring aperture of 6 mm diam.
② Plug for connecting power pack

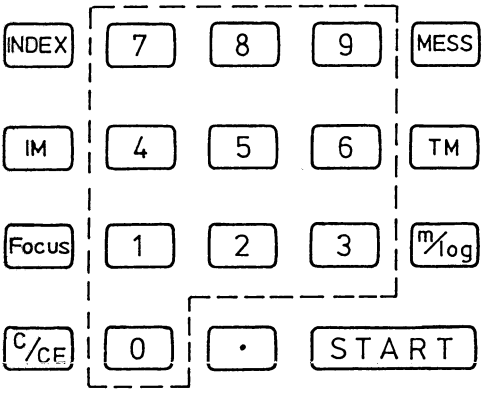


Power pack

① Power supply cable with plug
② Socket for enlarger plug
③ Socket for control instrument
④ ON/OFF switch
⑤ Fuse

Apparatus is switched on/off via toggle switch ④
After switching on, display will indicate 0.0°°
After switching off, the display and the illumination will extinguish.

Keyboard



Framed section (dotted line): numerical keyboard

INDEX	Storage and recall (interrogation) key for index number
IM	Determination of index number
FOCUS	Focusing light on/off
C/Ce	Cancelling and resetting key
MESS	Measuring key for exposure time and gradation
TM	Stores measured value
m/log	Computes average value
START	STOP/START key for exposure time

Using the trialux as an exposure timer

Switch on apparatus (display shows 0.0°°
Enter index. If the trialux is to function at all, it is necessary to enter an index number after switching on (even in the simple exposure timing mode). When operating for the first time, it is recommended that you enter the figure "5", since this index value covers the entire measuring range from 0.005 to 50 lux.
In actual practice, of course, you will enter the index number of the paper you are about to use.

Key	Display
	0.0°°
5	5.0°°
INDEX	0.0

The index is now stored, and it is possible to programme exposure times and also trigger these. The timing range is 0.1 to 999.9 sec. in increments of 0.1. sec.
Example: Exposure time of 6.5 sec.

Key	Display
	0,0
6 · 5	6.5
START	The time commences to count down in tenths of a sec. to zero and, on conclusion, the display will return again to 6.5, signifying that you may repeat this time again – as often as desired.

To alter the time to, say, 4 sec.
Simply press the key 4 and the previous exposure time will be cancelled; display now shows 4.0.

Interruption of the exposure time: Pressing the key START during an exposure has the effect of stopping the count down. Pressing it once again will continue the exposure.

Breaking off an exposure time: Press C/Ce once; count down will be aborted and the display returned to the original time entered.

Using the trialux as a laboratory photometer

First the apparatus is calibrated by entering the index number of the paper to be used.
The quality of the prints is dependent to a large extent on the care with which the trialux is calibrated. It is therefore worth taking extra trouble to calibrate the photocell precisely, i.e.,

to discover the exact index number for a specific batch of paper. The importance of this will be appreciated all the more when one realizes that, by virtue of the wide index range (4 decades) the trialux can register such high accuracy and reproduce it in the printing work.

You are recommended to take photographs of a positive grey step wedge and then to use the result as a master negative, resp., slide for the calibration procedure. If you do not have the facilities for this, it is important to select – at least – an original which exhibits a wide scale of differentiated tones.

Calibration procedure for multiple-spot measurement

You should first of all check whether – at the already programmed index of, e.g., 5.^{oo}, and at the preselected aperture – the potential measuring range of 0.005 to 50 lux can indeed be covered. Procede as follows:

Position the measuring aperture in the brightest area of image.

Key	Display
[MESS]	uuuu (blinking) = light level > 50 lux
or	
[MESS]	nnnn (blinking) = light level < 0.005 lux

Adjust aperture if necessary

Provided measurements are taken from both the darkest and the lightest parts of the image and numbers consequently displayed, the brightness range of the enlarger lies within the measuring scope of the trialux.

A test strip is now made on the basis of the optimum exposure time, e.g., 22 sec. Aperture, filtration and enlarger head height must not be altered further.

Now measure and store data as follows:

Position measuring aperture in the lightest part of image (with just sufficient definition).

Key [MESS]	Display e. g. 1.7 $\frac{1}{T}$ (blinking)
Key [TM]	Value is stored, 1.7 $\frac{1}{T}$ (steady)

Position measuring aperture in darkest part of image (just defined)

Key [MESS]	Display e.g. 60.6 $\frac{2}{T}$ (blinking)
Key [TM]	Value is stored, 60.6 $\frac{2}{T}$ (steady)

It is easy to find the darkest and lightest parts of an image with the digital display: the shorter the time, the brighter the spot measured; the longer the time displayed, the darker the area.

The next step is to take measurements in several important parts of the picture which appear of medium density.

Place measuring aperture in chosen spot.

Key [MESS]	Display e.g., 20.3 $\frac{3}{T}$ (blinking)
Key [TM]	Value is stored, 20.3 $\frac{3}{T}$ (steady)

The small figure above the letter "T" indicates the number of stored measurements so far. A total of five such measurements can be stored.

The mean value of the readings is obtained thus:

Press key [m/log] Display shows 12.7

The optimum time of 22 sec. obtained on the basis of the test strip is now entered by overwriting:

Key	Display
	12.7
[2] [2]	22.0
[IM] (index)	8.6^{81} (The index number is 8.681 and is now written down on the box of paper for future use)
[INDEX] = index No. is stored. Display reads	0.0

The trialux is now calibrated for multiple-spot measurements. Printing can start.

Exceeding the upper/lower limits of index range of 100 to 0.01

Overshooting:

Key	Display
[IM]	nnnn (blinking) = determined index > 100

Solution: the stored index No. (current working index) must be reduced, say, by half.

Halving or doubling the index number in the trialux corresponds to adjusting the aperture setting one f/number.

Example:

Key	Display
[INDEX]	60.^{oo}

Through overwriting, the index No. is changed to 30 and this value stored.

Key	Display
[3] [0]	30.^{oo}
[INDEX]	0.0

Falling below:

Key	Display
[IM]	uuuu (blinking) = determined index < 0.01

Solution: the index No. (current working index) in the store must be increased, say, by doubling.

Following a change of working index it will also be necessary to find out the new paper index number as described above. It is not necessary to make a new test strip. It should be noted, furthermore, that as a consequence of altering the index the measured values appearing in the display will be quite different, too.

Multiple-spot measurement, deter-mination of exposure time and exposure

The procedure is the same as described for calibration:

Key [MESS]	Place probe in brightest part
Key [TM]	first measured value now stored
Key [MESS]	Place probe in darkest part
Key [TM]	second value now stored

Next, measure and store the values for several spots in the medium density zone and determine the mean value by pressing the key [m/log].

The figure displayed represents the logarithmic average value of all those points measured and stored. It can be triggered by means of the key [START] and repeated as often as desired.

Single-spot measurement

Naturally, it is also perfectly possible to get along with a single measurement when working with the trialux. The index number and exposure time are obtained in the same way as for the multiple-spot mode, only a reading is now taken from a single area, either the darkest or brightest place with residual definition.

It is important to realize, however, that you may only carry out measurements in practice according to the mode for which the apparatus was calibrated in the first place – EITHER multiple-spot OR single spot.

The following essential remarks should be noted:
The single-spot measuring mode may appear the simplest way of determining exposure, but it does not exploit the potential of the trialux. The correct reference point for the optimal exposure time is neither the darkest nor the brightest part of the image which just shows some definition – but a portion which corresponds to an average tone of the whole original in question. It is not easy, however, to recognize which area of the image is actually of medium density. On the other hand, if you measure the – obviously – darkest and brightest parts of the image and, in addition, a few parts of varying intermediate density, you are bound to arrive very close to the ideal value of mean grey.

Interrogating the stored index number

Key	Display
[INDEX]	43^{28} = at the moment the trialux is calibrated for paper with an index of 43.28.

Entering a new index number

You now want to print using a paper for which the index number 15.61 is noted on the packet

Key	Display
	$43.^{28}$
[1] [5] [.] [6] [1]	$15.^{61}$
[INDEX]	0.0 index No. 15.61 is now stored, calibrated for paper to be used.

Determination of gradation

1. Measure the lightest, still important part of image.

Key	Display
[MESS]	$4.8\,\frac{1}{T}$ (blinking)
[TM]	$4.8\,\frac{1}{T}$ (steady) value of measured bright spot stored

2. Measure darkest shadow with detail

Key	Display (e.g.)
[MESS]	$38.0\,\frac{32}{PT}$

As long as the MESS key ist kept pressed, the figure above the letter "P" will continue to show the gradation number "3" of the scale 0 to 5.

	density difference
5 extra hard	up to 0.4
4 hard	0.4-0.6
3 normal	0.6-0.9
2 special	0.9-1.2
1 soft	1.2-1.5
0 extra soft	1.5-1.7

Please note that this table represents a compromise based on the gradation scales of several paper manufacturers. For more specific values, consult the data sheets supplied by each paper manufacturer.

Determination of illumination intensity

In the case of the trialux, the index number is not just a random figure but is related to a definite photographic factor. It represents, namely, the light sensitivity of the paper in lux seconds = "exposure value H". The latter is the product of the illuminance E (measured in lux) and the exposure time (measured in sec.). The formula is as follows:

Logically, $H = E \times t$
$E = H : t$

Example: displayed index is 10^{00}
displayed exp. time is 20.0 10 lux sec. : 20 sec. = 0,5 lux

Hence, the illumination intensity at the point measured is 0.5 lux. Of course, the values will not always be so easy to divide as in the above example, and a pocket calculator will be needed.
The following general restriction should be born in mind: An absolutely accurate lux measurement can only be carried out at a known colour temperature of 2856 °K. Since the colour temperature of enlarger light sources tends to vary, it is only possible to arrive at approximate values in these cases.

Technical specification

Timing range	0,1 to 999,9 sec.
Measuring range	0,1 to 999,9 sec., resp. 0.005-50 lux (The entire range is only covered at index setting of 5.0)
Index range	0.01-100 lux sec.
Mean value measured values	logarithmic, on basis of (max) 5
Measuring diode	blue-cell silicon photodiode with colour-corrected, linear characteristics over entire measuring range. The photodiode requires no adaptation time and is not influenced by daylight.
Display	LCD
Display illumination	Via LEDs with narrow-band emission of 590 nm to which even high-speed colour papers are largely unsensitive.
Switching capacity	max. 1000 VA
Fuse	8 Amp, slow-acting
Power cable	lenght 150 cm
Dimensions	Power pack: 157 x 77 x 49 mm Control unit: 142 x 78 x 22 mm