PITSID

Polygraphische innovative
Technik Leipzig

Operating Manual

UV CURE CHECK

for checking the curing degree of UV print products

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EN

TABLE OF CONTENTS

EN

1. Field of application

UV inks are being used more and more. Contrary to conventional inks, which dry through oxidation or absorption of lower-viscous components by the paper, UV inks harden through UV radiation. If the exposure dosage is insufficient or incorrectly tuned to the ink, the ink will remain uncured, whereas conventionally drying inks will always be dry after a sufficient period of time.

Products with uncured UV inks often suffer from quality defects in the form of smudged colours during the finishing process or during transport. Uncured ink components may even be a health hazard to the final consumer of the product. Therefore, it is absolutely necessary to check the curing degree during the print run at the press.

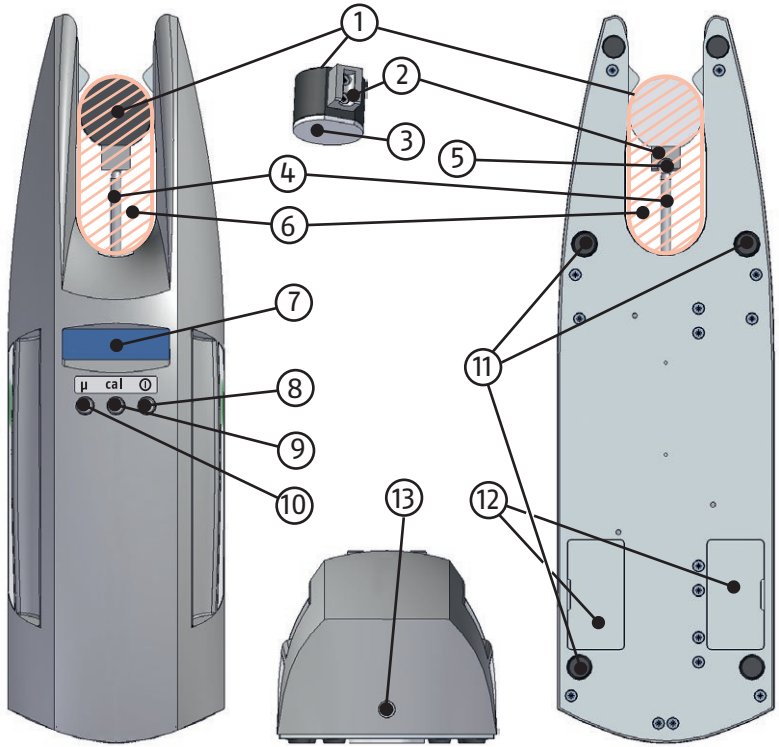
Simple (manual) curing tests are already being applied but they are by no means objective and do not offer the possibilities of quantitative measurement. These tests more or less only deliver the assertion "dry or not dry" or only offer vague subjective assessment grades. Being a hand-held measuring device, the UV CURE CHECK can be used directly at the printing press and delivers objective measured values.

2. Operating Principle

With the UV CURE CHECK, an object with a known friction is drawn over the ink or varnish layer to be checked. This determines the resultant coefficient of sliding friction which behaves inversely proportional to the curing degree of the ink or varnish layer.

In order to specify the curing condition of a print sample, the UV CURE CHECK calculates the degree of curing from the ratio of the coefficient of sliding friction of a completely cured sample and the sample of the identical ink/varnish and substrate combination to be checked.

3. Device Configuration



1	Friction object	8	On/Off key
2	Bearing socket	9	Calibration key
3	Felt	10	Measurement key
4	Guiding rod	11	Base feet
5	Ball joint	12	Battery compartments
6	Measuring area	13	Power supply socket
7	Display		

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4. Mounting and Unmounting the Friction Object

1. Turn on the UV CURE CHECK by pushing the **on/off button** (⏻) for at least 1 second.

   PITSID
   UV CURE CHECK
   ...
   Measurement
   start →M Button

2. Push the **measurement (µ) button** to draw out the guiding rod (4) from its end position.

   Measurement
   Quit →M Button

3. Stop its movement by pushing the **measurement (µ) button** a second time.

   Measurement stop
   Next →M Button

4. Now connect the friction object (1) with the guiding rod (4) by sliding the bearing socket (2) of the friction object (1) from above onto the ball joint (5) of the guiding rod (4).

5. Push the **measurement (µ) button** again.

   Moving to end pos
   Please wait

   The guiding rod (4) moves back to its end position with the friction object (1) in place. You can now measure or carry out calibrations as described in the following sections.

6. To disconnect the friction object (1), proceed in the same way as steps 2 and 3, lift the friction object (1) with the bearing socket (2) vertically off from the ball joint (5) of the guiding rod (4) and proceed as described in step 5.

Attention!

- Always transport the UV CURE CHECK in the carrying case with the friction object disconnected and the guiding rod in its end position. In this way, you will avoid mechanical damage inside the device.

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5. Measurement

With the UV CURE CHECK, you determine the coefficient of sliding friction of the ink or varnish layer on the substrate. The smaller the coefficient of sliding friction, the better the curing degree of the ink or varnish layer.

An area on the printed sheet with high ink coverage is recommended for the measurement. An ideal case would be overprinted solids or halftone areas of up to 400% total area coverage. In practice, however, it is possible to measure in an image or in design elements with as much ink coverage as possible.

To make the measured values comparable, all measurements should be carried out in the exact same area of the printed image.

1. Position the UV CURE CHECK measuring area (6) on the spot on the sheet to be checked. Make sure that the sheet is placed on a flat and smooth surface. All 6 feet (11) of the device should be in contact with the printed sheet.

   The spot on the sheet to be checked must not slip or get creased. The four feet (11) surrounding the measuring area (6) can be used for this.

2. Initiate a measurement with the **measurement (µ) button**.

   

   During the measurement, the friction object (1) moves back and forth over the measuring area (6).

3. After the measurement, the display (7) will indicate the coefficient of sliding friction (CSF) and the curing degree.

   

4. For further measurements, repeat steps 1 through 3.

Attention!

- The curing degree always relates to the coefficient of sliding friction for a completely cured sample (µ100) momentarily stored in the device.
- To calculate the correct curing degree, it is first necessary to determine and store the value µ100 by calibrating the device on a completely cured sample (see Section 6).
- The momentarily stored value µ100 is indicated in the second line of the display when you keep the **calibration (cal) button** pushed down.

  

- The device is delivered with no stored value for the µ100 reference coefficient of friction. Therefore, no curing degree will be indicated before you have calibrated the device.

6. Calibration

In order to determine the curing condition of a sample, which you can use to compare to different ink, varnish and substrate combinations with each other, the UV CURE CHECK calculates the curing degree. This results from the ratio of the coefficients of sliding friction of a completely cured sample (µ100) and the sample (µ) of the same ink/varnish and substrate combination being tested.

$$\text{Curing degree} = \frac{\mu_{100}}{\mu} * 100\%$$

Samples with curing degrees equal or near to 100 % have sufficiently cured. Samples with curing degrees below 85 % have insufficiently cured.

With the calibration, you determine the reference coefficient of friction µ100 and store it in the device. For this, you need a reference sheet with identical substrate, ink and ink density with the samples to be tested and on which the ink(s) or the varnish have completely cured. To achieve this, you should print sheets using the maximum UV lamp output and at the lowest possible machine speed.

The calibration must be carried out at exactly the same spot of the printed image where you want to test your samples.

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This is how to calibrate the UV CURE CHECK:

1. Turn the UV CURE CHECK on by pressing and holding the **calibration (cal) button**.

   UV CURE CHECK
   Calibration mode

   ...

   Calibration
   start →M Button

2. Position the UV CURE CHECK measuring area (6) on the spot on the sheet to be checked. Make sure that the sheet is placed on a flat and smooth surface. All 6 feet (11) of the device should be in contact with the printed sheet.

   The spot on the sheet to be checked must not slip or get creased. The four feet (11) surrounding the measuring area (6) can be used for this.

3. Initiate a reference measurement with the **measurement (µ) button**.

   Calibration runs
   Quit →M Button

   During the measurement, the friction object (1) moves back and forth over the measuring area (6).

4. After the reference measurement has been made, the coefficient of sliding friction just determined is indicated on the display (7).

   CSF: 0,39
   End →cal Button

5. Now you can carry out further reference measurements, e.g. on other reference sheets, by repeating steps 2 through 4. All measured values will be averaged. Be aware that only the last measured value is shown on the display.

6. If the last measured value should not be included in the average, you can cancel this value by pressing the **measurement (µ) button**

   Calibration runs
   Quit →M Button

   and immediately stopping the reference measurement now begun by pushing the **measurement (µ) button** once more.

   Value cancelled
   Next →M Button

   Pushing the **measurement (µ) button** again moves the friction object (1) back to its end position

   Moving to end pos
   Please wait

   and you can carry out further reference measurements.

7. You can end the calibration procedure by pushing the **calibration (cal) button**.

   Storing values
   Please wait

   ...

   Values stored
   End cal mode

   The reference coefficient of friction is now stored. Until the device is once again calibrated, this reference value is used to determine the coefficient of friction for each following measurement and indicated as the curing degree.

8. If you want to leave the calibration mode without storing values, just shut off the UV CURE CHECK.

7. Changing the Friction Felt

The felt (3) surface of the friction object (1) changes over the course of many measurements. On one hand, abrasion shortens the fibres and the felt layer becomes thinner. On the other hand, the felt (3) gets dirty. Especially when checking non-cured inks or varnishes, individual felt fibres may get stuck to each other. Consequently, the frictional behaviour on the ink or varnish layers may change, too.

Therefore, depending on the degree of dirtiness and wear, the felt (3) should be changed after approx. 500 measurements at the latest.

Proceed as follows to do so:

1. If not yet disconnected from the device, remove the friction object (1) as described in Section 4.
2. Pull the worn felt (3) off the friction object. Use a flat tool or a blunt knife to avoid injuries. Remove possible adhesive remnants from the friction object (1).
3. Apply the new felt (3) by centring and pressing its self-adhesive side to the underside of the friction object (1).

8. Proper Handling Instructions

- Transport the UV CURE CHECK only in the provided carrying case and with the friction object (1) disconnected.
- Handle the device cautiously and do not subject it to strong impacts, even when carried in its case. There are highly sensitive internal mechanical parts which otherwise may be damaged.
- If possible, avoid measuring completely uncured inks or varnishes that have not yet been exposed to any UV radiation. You will only needlessly contaminate the felt of the friction object (1) and will not obtain any meaningful measured values.

9. Changing Batteries, External Power Supply

"Change batteries" will flash on the display when the batteries are almost empty. The device cannot be turned on when the batteries are insufficiently charged.

There are two battery compartments (12) underneath the device, each taking three AA ("Mignon") batteries. The lids of the battery compartments (12) are equipped with a magnetic lock. Make sure the batteries are positioned correctly when they are changed. Used batteries must be removed from the device and disposed of properly.

It is possible to electrically power the device using the supplied power supply and the power supply socket (13). When connecting the device with the power supply, the system will automatically change from battery power to electrical power.

The device will automatically shut off after 10 minutes without any input during battery operation.

10. Repair, Service

Repairs and service are only to be carried out exclusively by the manufacturer.

11. Technical Data

Measurement range	Coefficient of friction μ: 0 ... 2 Curing degree: 0 ... 100 %
Resolution	Coefficient of friction μ: 0.01 Curing degree: 1 %
Relative measurment error	Coefficient of friction μ: ± 8 % Curing degree: ± 10 %
Display	Two-line
Size of measuring area	35 x 80 mm
Measurement time	Approx. 5 s
Display size	52 x 15 mm
Power supply	9V DC (6 x 1.5 V, type Mignon (AA) or supplied power supply unit)
Dimensions	350 x 105 x 90 mm
Total weight	Approx. 1.4 kg with friction object and batteries, approx. 2.4 kg with case and accessories
Operating temperature	15 to 30° C
Automatic shut-off	After 10 min without input during battery operation
Scope of delivery	Device with friction object, 6 type AA batteries, power supply unit (9 V DC, 6 VA), 10 spare friction pads, carrying case
Manufacturer	PITSID – Polygraphische innovative Technik Leipzig GmbH

Subject to changes without notice.

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