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TQC DRYING TIME RECORDER

AB3600

IMPORTANT!

Before taking this instrument in use we strongly advise you to read this manual carefully.

User Guide

V1.2 0917

WARRANTY

TQC will grant a warranty for a period of 12 months for the TQC Drying Time Recorder and 12 months for all related equipment from the date of delivery in respect of any evidence of faulty workmanship and materials.

Should a delivered consignment prove to be contrary to contract upon inspection, the customer shall grant TQC the opportunity hereunder of removing the fault, or else the customer may demand replacement. Because of size and weight of the instrument TQC will strive to give remote support.
Should the supply or delivery of any improvement or replacement not prove possible, the customer may choose between having the purchase price reduced or in demanding the contract of sale to be rescinded (conversion). Damage resulting from natural wear and tear, mechanical or chemical damage, an act of God or non compliance with the operating instructions shall be excluded from the warranty as well as mechanical interference by the customer or by third parties with TQC Drying Time Recorder and related equipment without TQC's written permission. No liability will be accepted for defects, damage or injury caused due to use not carried out in accordance with the manufacturer's user instructions. To claim warranty, the rejected product has to be sent to TQC together with the original invoice, any exchange before the product has been returned to TQC is not possible. TQC reserve the right to repair, exchange or supply an equivalent substitute. TQC is not liable for handling or transport costs. Warranty on the purchase price is limited, all liability for consequential damages or changes in technology is expelled.

This product complies to
- Machinery Directive 2006/42 / EC
- Low Voltage Directive 2006/95 / EC
- EMC Directive 2004/108 / EC

This product is RoHS 2 compliant (2011/65/EU)

CONTENT

CONTENT

1 GENERAL

1.1 Importance of operating manual

This manual is written in order to become familiar with all the functions and possible applications of the instrument. It contains important instructions about how to use the instrument safely and economically; according to the purpose designated. Following these instructions is not only essential to avoid risks. It also reduces repair costs and down-time and increases the products reliability and service-life.
Anyone who works with the instrument should follow the instructions in this manual, particularly the safety related instructions. Additionally local rules and regulations relating to environmental safety and accident prevention should be observed.

1.2 User-responsibility

The user should

a) Only allow persons to work with the instrument who are familiar with the general instructions on how to work safely and to prevent accidents. The use of the instrument should have been instructed duly. The safety chapter and the warnings in this manual should have been read and understood; acknowledged as evidenced by their signature.
b) Regularly check the safety-awareness of personnel at work.

1.3 Responsibility of personnel

Before commencing work anyone appointed to work with the instrument should pay attention to the general regulations relating to working safety and accident prevention. The safety chapter and the warnings in this manual should have been read and understood; acknowledged as evidenced by their signature.

1.4 Dangers

This instrument has been designed and constructed in accordance with state-of-the-art technology and the acknowledged safety regulations. Nevertheless, working with the instrument may cause danger to the life and health of the operator or to others, or damage to the instrument or other property. Therefore the instrument should only be used for its designated purpose, and in a perfect technical condition. Any defect that could have a negative effect on safety should be repaired immediately.

1.5 Designated purpose

This Drying time recorder is designed to define the different stages of drying/curing of liquid paints on glass panels or test panels.
Other applications constitute improper use. TQC will not be held liable for damage resulting from improper use.

Designated purpose also includes properly observing all instructions in the operation manual, and adherence to inspection and maintenance schedules.

1.6 Copyright

1.7 Manufacturer's/Supplier's address

TQC
Molenbaan 19
2908 LL Capelle aan den IJssel

The Netherlands,
T +31(0)10-7900100,
F +31 (0)10-7900129

2 SAFETY INSTRUCTIONS

2.1 Meaning of Symbols

The following symbols for dangers are used in this instruction manual.

Symbol	Explanation	Warning
 *Danger*	Possible immediate danger to the life or health of personnel.	If this guideline is not noted it can lead to severe danger to health, up to fatal injury.
 *Warning*	A dangerous situation could be caused.	Non observance of this guideline can lead to injury or to damage to equipment.
NOTE	Special tips and particular information.	Guidelines to make optimal use of the instrument.

2.2 Availability of Safety Information

The instruction manual should be kept at the place where the instrument is operated.
In addition to the information contained in the instruction manual, general and local regulations for accident prevention and environmental protection shall be kept available and observed.
Always ensure all guidelines in respect of safety and dangers on the instrument are in readable condition.
In case of danger the instrument has to be switched off by means of the emergency-button on the front of the instrument. Then eliminate danger.

2.3 Training of Personnel

- Anyone who operates the instrument should be trained properly.
- It has to be clear who has which responsibility regarding commissioning, set-up of maintenance and repairs, installation, and operation.
- Anyone who hasn't finished training should be supervised by an experienced person while working with the instrument.

2.4 Dangers from Electrical Energy

- Work on the electrical supply may only be done by a qualified electrician.
- The electrical equipment of the instrument must be checked regularly. Loose connections and cable damaged by heat must be corrected immediately.

- Always make sure the instrument's power is turned off while adjusting any electrical component.

Danger

Make sure that no paint or other liquids are spilled on the electronics

2.5 Modifications to the Equipment

- Any modifications or additions or alterations to the instrument may solely be made with permission from the manufacturer.
- All measures involving modifications require written confirmation of approval from TQC.
- Instruments which are not in fault-free condition must immediately be switched off.
- Only use replacement parts from the original supplier. Parts used from other sources aren't guaranteed to take the loading and meet the safety requirements.

3 TRANSPORT AND STORAGE

3.1 Packing

Please take note of pictorial symbols on the packing.

3.2 User: Check on Receipt

Check packing for damage
After unpacking check complete supply.

3.3 Reporting Transport Damage and Documentation

Any damage should be documented as accurately as possible (possibly photographed) and reported to the relevant insurers or, in the case of sales "delivered to customers works", to the supplier.

3.4 Storage and Protective Measures when not in use

The instrument must be stored in a dry (± 40%rH) place at a temperature between 10 to 40°C.
The storage period should not be longer than 3 months.
Store instrument in the original packing if possible.

4 INSTRUMENT DATA

4.1 Name / Article

AB3600 - TQC Drying Time Recorder complete with 6 needles, 65 g weights and two glass beds.

4.2 Spare parts and accessories

Spare parts		Quantity
AB3603	Spare weights 5g for TQC Drying Time Recorder	set of 12 pcs
AB3604	Spare needles TQC Drying Time Recorder	set of 12 pcs
AB3605	Glass beds for TQC Drying Time Recorder 350x100x3mm	set of 12 pcs

Accessories			Quantity
AB3602	Narrow glass beds for Drying Time Recorder 305x25x3mm		set of 12 pcs
AB3627*	Narrow glass bed adapter set (for use with narrow glass beds AB3602)		1
VF1590	TQC Triple Reservoir Film Applicator	gaps 90µm/150µm	1
AB3700	TQC Cube Applicator	gaps 38 & 76µm	1
AB3701	TQC Cube Applicator	gaps 50 & 100µm	1
AB3702	TQC Cube Applicator	gaps 75 & 150µm	1
AB3703	TQC Cube Applicator	gaps on request (µm)	1
AB3705	TQC Cube Applicator	gaps 1,5 & 3 mil	1
AB3706	TQC Cube Applicator	gaps 2 & 4 mil	1
AB3707	TQC Cube Applicator	gaps 3 & 6 mil	1
AB3708	TQC Cube Applicator	gaps on request (mil)	1

* One adapter fits 6 narrow glass beds.

4.3 Standards

This drying time recorder is designed to define the different stages of drying/curing of liquid paints, coatings and adhesives according the following standards:

- ASTM D5895
- ISO 9117-4:2012
- DIN EN 14022

4.4 Scope of Supply

- TQC Drying Time Recorder 230/115VAC
- 2x Glass Testpanels 350x100x3mm
- 6 needles
- 6 weights 5g /each
- 1,5mm Hexagon wrench
- Power cord + Adapter 24VDC

4.5 Technical Data

Operating temperature	:	-20°C to +70°C / -4°F to 158°F (non condensing)
Drying time range	:	1 min – 200 hours
Time accuracy	:	< 1% of set time
Maximum track length	:	300 mm
Maximum number of tracks	:	6
Force per needle	:	3.5 g / 0.03 N
Weight of additional weights	:	5 g
Diameter of needle	:	2 mm
Radius of needle	:	1 mm
Glass beds	:	2 x triple track 305 mm X 100 mm X 3 mm (supplied), or 6 x solo track 305 mm X 25 mm X 3 mm Narrow glass bed, or Custom bed, Max dimensions W 200mm x H 8mm x L 400mm*

* - Test surface is always 300 mm in length
- 400 mm length max. without extra support.

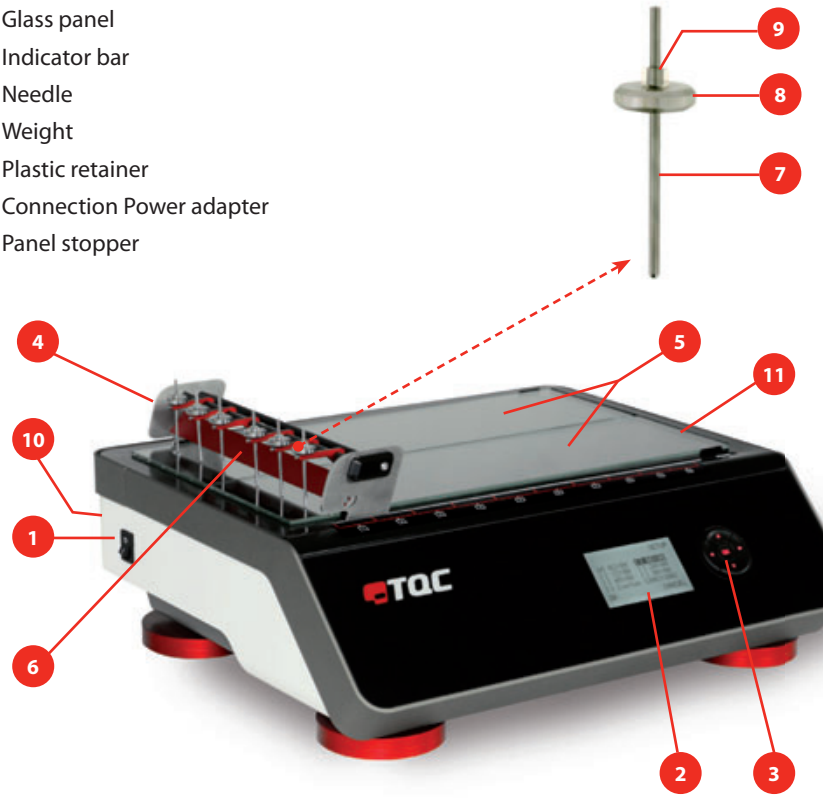
4.6 Dimensions and Weight

Depth	:	335 mm
Width	:	400 mm
Height	:	190 mm
Net weight	:	9.5 kg

4.7 Basic Unit (picture 1)

Material	:	Stainless steel, powdercoated steel, anodised aluminium, nylon, glass
Power supply	:	Universal 24 V DC power adapter
Power consumption	:	Max. 40 Watt
Display	:	128 x 64 pixels graphical LCD, 70 mm x 40 mm, white illuminated, heated
Menu language	:	English
User input method	:	Illuminated tactile navigation button with Triple **I** function

1. On / Off switch
2. Display
3. 5-key navigation switch
4. Needle carrier
5. Glass panel
6. Indicator bar
7. Needle
8. Weight
9. Plastic retainer
10. Connection Power adapter
11. Panel stopper



Picture 1

5 POSITIONING THE DRYING TIME RECORDER

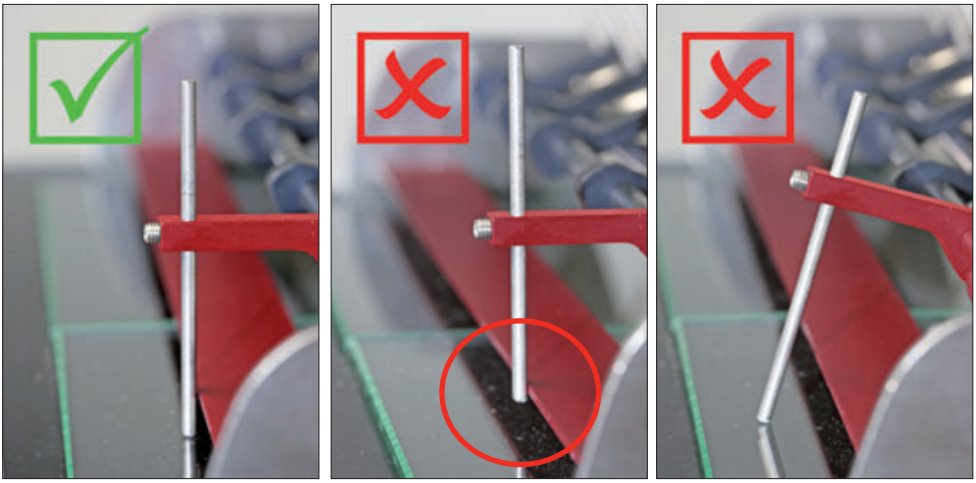
Place the drying-time recorder at a horizontal surface that is sturdy and free from movements and vibrations.

Obviously climatic circumstances like temperature, humidity but also direct (sun) light will affect the outcome of the test. Therefore the position of the drying time recorder is important and climatic parameters should be monitored during the entire test. Stabile climatic conditions are key to generate reproducible results.

6 BASIC PREPARATIONS OF THE DRYING TIME RECORDER

6.1 Mounting Needles

Make sure the needles are clean and mounted in the correct position (picture 2).The needles should be perpendicular to the glass plate / testpanel when in lower position and rest on the surface. See also paragraph 9.2.



Picture 2

6.2 Mounting Weights

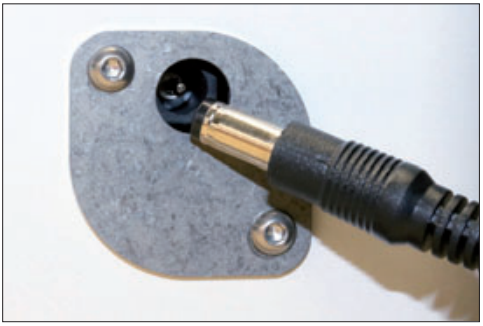
The pressure on the needles can be increased by applying a weight (5 g each) on the needle.

If needed place one or more weights on the upper section of the needles (picture 3). See also paragraph 9.3.

Picture 3

6.3 Connecting to the mains

Connect the machine to the mains using the power adapter that comes with the drying time recorder. Plug in the female plug in the socket on the rear of the housing (picture 4). The ON/OFF Switch is located at the left hand side near the end of the instrument.



Picture 4

7 OPERATING THE DRYING TIME RECORDER

7.1 Navigation

The drying time recorder is quite simple to operate by means of the menu in the display and the 5-key navigation switch. Use the 5-key navigation switch to highlight the function of choice in the menu and confirm by pressing the "OK" button.

The 5-key navigation switch is equipped with the unique Triple-**I** function (**I**ntelligent **I**llumination **I**ndicator). Triple-**I** enhances the intuitive operation of the drying time recorder by illuminating just those keys that are active in combination with the position in the operating menu (picture 5).
Once the drying-time test is stopped the lights will pulsate in order to alert the operator the test is ended and action (evaluation) is required.

Picture 5

7.2 Starting the machine

- Switch on the machine using the on/off button at the left-hand side of the machine.
- Press "OK" to start-up the machine. (Machine will perform an internal calibration).

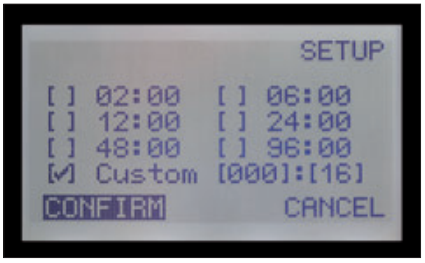
The display shows the current set test duration (picture 6). In this example 1 hour.

Picture 6

7.3 Setting test duration

- To alter the set duration navigate with the arrow key to "SETUP" and press "OK".

- Navigate to one of the pre-set or the custom test durations and press "OK", then navigate to "CONFIRM" and press "OK" (picture 7). To change the custom time move the cursor to the right to the desired digit [HHH:MM] and change that digit using the "UP" and "DOWN" keys and confirm using the "OK' button.
  When all digits are set correctly, move the cursor to function "CONFIRM" and press the "OK" button.

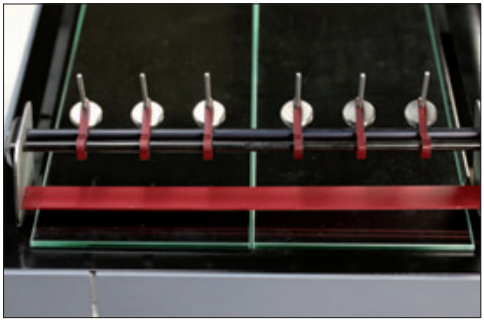


Picture 7

NOTE **With very short tests the end point may deviate a few sec. from the set time.**

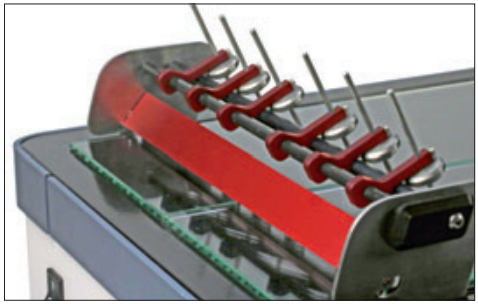
7.4 Preparing tools

- Move the needles in the upper position (picture 8 and 9).



Picture 8

- Move the Indicator-bar in the upper position. (picture 9)



Picture 9

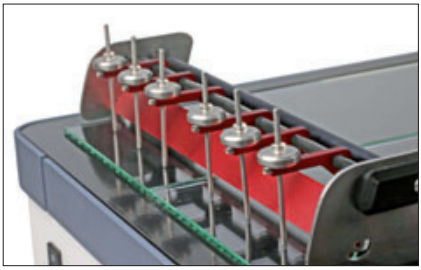
7.5 Preparing test specimens

- Place glass panels or other test-specimens such as a metal panel or a test chart with the correct thickness of paint film on the machine. (when using other panels than the standard glass panels make sure the size of the panel is compatible with the dimensions of the drying time recorder). Make sure the panels are positioned against the panel stopper at the right hand side. See also paragraph 9.1.

- Make sure the needle tips are clean and free of dirt or mechanical damage.

7.6 Starting the test

- Place the needles in the lower position (picture 10).
- Activate "START" with the "OK" button. The machine is running now.

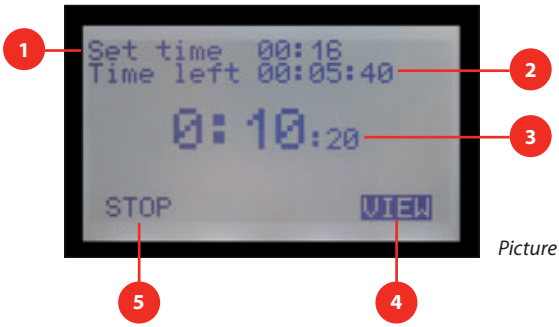


Picture 10

7.7 Display during test (picture 11)

1. This is the set time of the complete test.
2. This indicates how much time is still left in the test.
3. This indicates the elapsed time
4. Activate this function to evaluate the results without interrupting the test.
5. Activate this function to stop the test*.

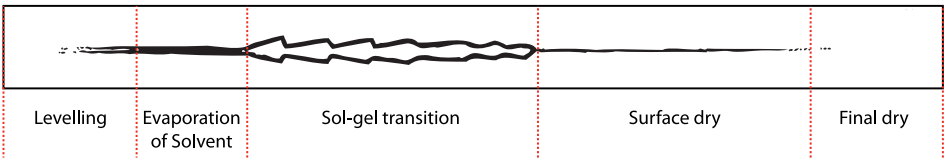
NOTE Once stopped and confirmed the test cannot be restarted.
A new test has to be done.



Picture 11

8 EVALUATING A DRYING TIME TEST

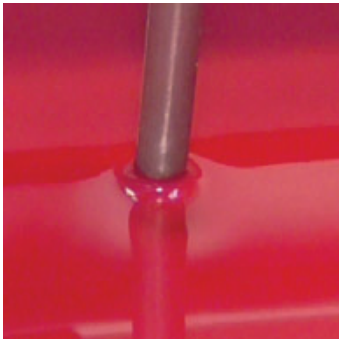
8.1 Drying time stages



Picture 12

There are 5 stages in (picture 12) the drying process, which can be defined by assessing the drying time test :

Stage 1
Start / Levelling
(picture 13)

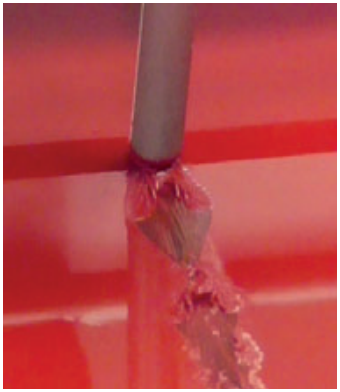


Picture 13

Stage 2
Set-to-touch time / evaporation of solvent
(picture 14)

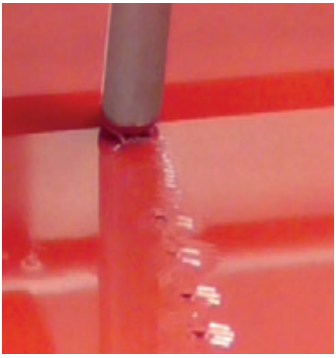
Picture 14

Stage 3
Track-free time/ sol-gel transition
(picture 15)



Picture 15

Stage 4
Hard-dry time / surface-dry
(picture 16)



Picture 16

Stage 5
Through dry time / final dry
(picture 17)

Picture 17

8.2 Evaluating the test results

A) View: Evaluation during the test without interrupting the process.
B) Final evaluation: at the end of a test-period or when the test is manually stopped.

8.2.1 View

During a drying time test activate the "View" option with the "OK" button (picture 18).

Picture 18

A scale and cursor appear in the display. The time scale correlates with the scale located at the upper front of the machine (picture 19).

With the "left" and "right" keys the cursor can be moved along the scale and the "time position" of the cursor is indicated just above the scale thus allowing the operator to link the visual indications of the drying time process with its associated time.

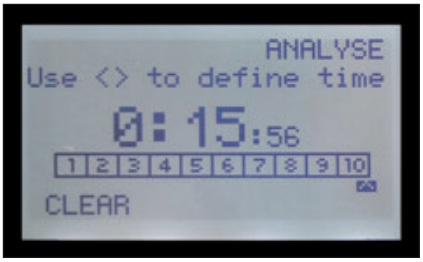
Picture 19

NOTE The steps the cursor makes are linked to the set time of the process. A long set time will generate large steps.

Select Proceed and press the OK button to return to the current test display.

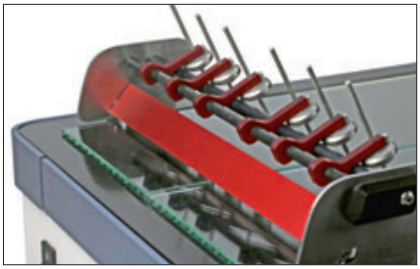
8.2.2 Final evaluation

At the end of the set time of each test the machine will stop automatically, or the operator has the choice to activate the "STOP" button during the process.
In both situations the display shows the scale and cursor (picture 20). Evaluation is done in the same way as described in '8.2.1 View' with two exceptions.



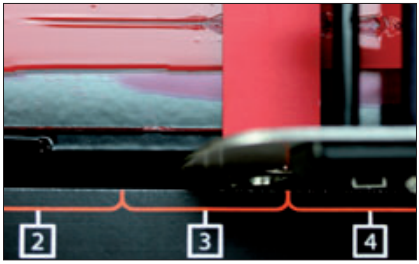
Picture 20

1. The needle carrier will move physically over the test panel. Therefore it is important the needles are placed in the upper position!
   (picture 21).



Picture 21

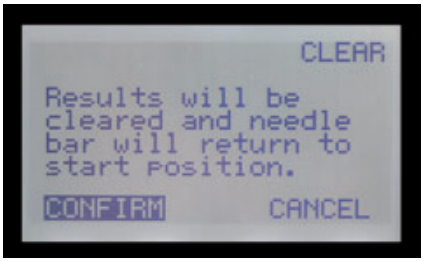
For a more precise indication the red indicator bar can be moved in the lower position. .
(picture 22)



Picture 22

2. The test cannot be continued. Once stopped the results have to be evaluated and then cleared by activating the "clear" option (picture 23).

NOTE Once the clear option is confirmed the needle bar will move automatically to its start-position.



Picture 23

9 ADVANCED PREPARATIONS

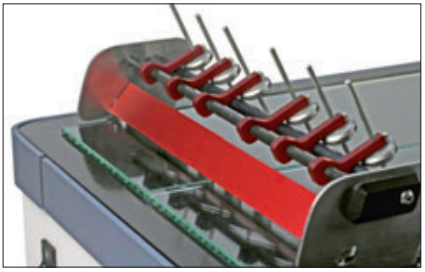
9.1 Preparing the sample

In order to obtain the most accurate results the paint sample should be applied on a smooth and flat surface. Ideally use the glass sample plates supplied with the machine which can hold either one wide sample of approx. 90 mm. width or three narrow samples of approx. 20 mm. width. The paint sample should be prepared with great care using the right type of applicator. Since the film thickness is of great influence to the drying characteristics ideally the film samples are prepared utilizing an automatic film applicator to guarantee a correct and reproducible sample of known thickness (See page 29 for TQC automatic film applicators).

Once the paint is applied place the sample plate on the drying time recorder and start the test immediately. If there is much time between the applicators and the start of the test that time should be noted and added to the total time of the test (add to start point).

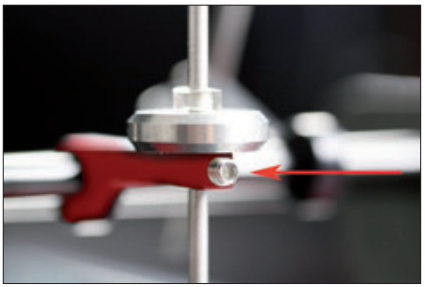
9.2 How to adjust or replace a needle

- Move the needle-arm in the upper position (picture 24).



Picture 24

- Untighten the small Allen-screw to loosen the needle (picture 25). If the needle needs to be replaced remove the plastic retainer and the weight from the old needle. Remove the old needle. Place the new needle. Replace weight and retainer on to the new needle.

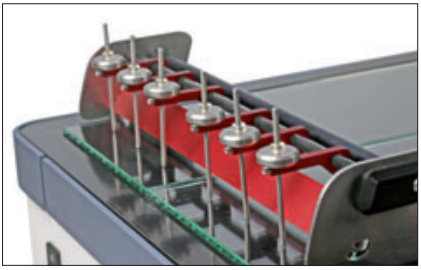


Picture 25

- Now move the needle-arm in the lower position and make sure the needle is in an approximately 90° angle with the glass panel or the surface/ panel to be tested.
- Now tighten the small Allen-screw.

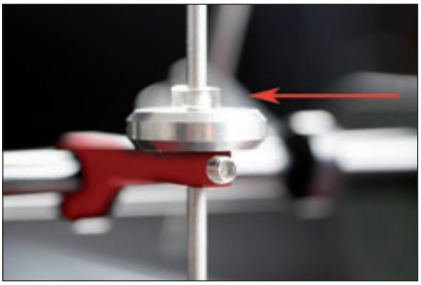
9.3 How to change weight on the needles

Move the needle-arm in the lower position (picture 26).



Picture 26

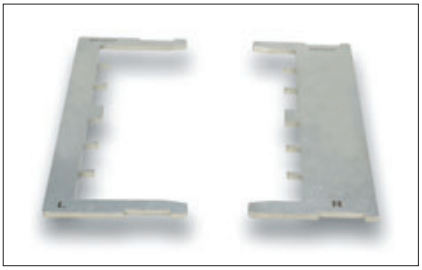
Carefully remove (with your nail or the tip of a knife) the transparent plastic retainer that secures the weight in position (picture 27). Remove weight or add more weight to the needle and replace retainer ring to secure weight in position.



Picture 27

9.4 How to use the Narrow glass bed adapter

For use with Narrow glass beds (Art. No. AB3602) the Narrow glass bed adapter (AB3602) is essential. The adapter consists of a left part marked with the letter L, and a right part marked with the letter R (picture 28).

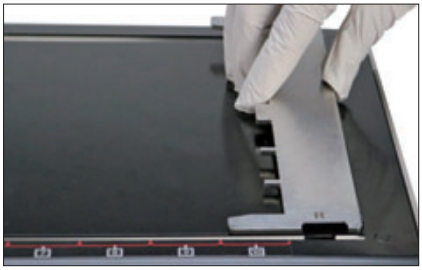


Picture 28

Place the left part of the adapter under the needle carrier. The shape of the adapter ensures that it is fully fixated, when placed correctly. (picture 29)

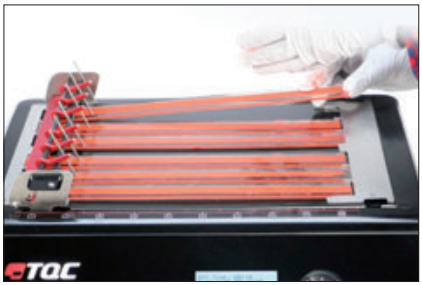
Picture 29

Place the right part of the adapter left from the panel stopper. (picture 30). When placed correctly the adapter should be fully fixated



Picture 30

Carefully place the narrow glass beds in the adapter (picture 31). The adapter fits a maximum of 6 narrow glass beds.



Picture 31

10 CARE AND MAINTENANCE

10.1 Care, Maintenance, Repairs

- Though robust in design, this instrument is sensitive. Never drop it or knock it over. For the most accurate and reproducible results, do not operate the machine in direct sunlight or strong overhead lighting.
- Avoid using the machine outside specified conditions.
- Please take note that relative humidity will influence the results obtained by the machine.
- Do not store the machine in high relative humidity environments to prevent corrosion.
- Always make sure the instrument is connected to a grounded mains outlet.
- Maintenance and inspection should be carried out at the correct intervals.
- Operating personnel should be informed before starting with maintenance or repair work .
- Always make sure the instruments power is turned off and the instrument is not connected to a socket while adjusting any electrical component whenever maintenance, inspection or repair work is done.
- Do not open the instrument. In case of malfunction always consult the manufacturer.
- Never touch electronics or circuit boards when not ESD secured.
- The drying time recorder is subject to some natural wear and must be inspected from time to time to ensure that it is in fault-free condition.

10.2 Cleaning of the Instrument and Disposal of Materials

When in use it is not always possible to avoid some spill of paint on the work surface. Try to keep the instrument as clean as possible to prevent distortions of functions. Always clean the instrument thoroughly after use.

- To clean the instrument properly use a suitable solvent to dispose remains of paint or ink.
- Never use aggressive solvents such as MEK or Acetone as this might damage the coating of the machine.
- Never clean the instrument by any mechanical means such as a wire brush or abrasive paper. This may cause, just like the use of aggressive cleaning agents, permanent damage.
- Wear gloves during cleaning; Don't spill an overdose of solvent during cleaning.
- Cleaning materials must always be used and disposed of correctly.

10.3 Disposal of Materials

Disposal of materials used in the operation of the instrument or for auxiliary functions and ex- changed items should be dealt with safely and in a manner that will not harm the environment. Follow the local regulations.

10.4 Customer Service

When requesting service always include Model No. and Serial No. from device tag on rear of machine. Customer service is provided on request by:

TQC
Molenbaan 19
2908 LL Capelle aan den IJssel The Netherlands,
T +31 (0)10 7900100
F +31 (0)10 7900129
Email: info@tqc.eu

11 DISCLAIMER

The right of technical modifications is reserved.

The information given in this manual is not intended to be exhaustive and any person using the product for any purpose other than that specifically recommended in this manual without first obtaining written confirmation from us as to the suitability of the product for the intended purpose does so at his own risk. Whilst we endeavour to ensure that all advice we give about the product (whether in this manual or otherwise) is correct we have no control over either the quality or condition of the product or the many factors affecting the use and application of the product. Therefore, unless we specifically agree in writing to do so, we do not accept any liability whatsoever or howsoever arising for the performance of the product or for any loss or damage (other than death or personal injury resulting from our negligence) arising out of the use of the product. The information contained in this manual is liable to modification from time to time in the light of experience and our policy of continuous product development.

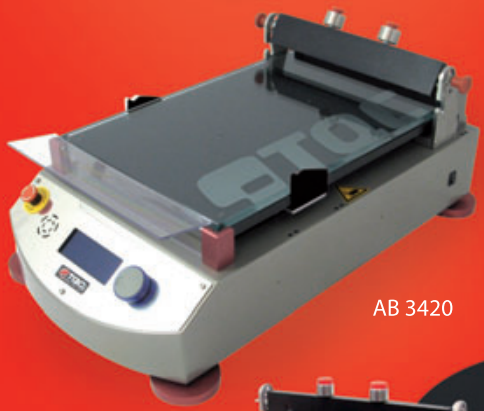
TQC

Vision on quality
www.tqc.eu

TQC Automatic film applicator
Compact

AB 3650

TQC Automatic film applicator
Glass bed



AB 3420

TQC Automatic film applicator
Perforated vacuum bed

AB 3425

For more models and accessories, please visit www.tqc.eu

TQC

Vision on quality
www.tqc.eu

Developers and manufacturers of paint test equipment

Vision on quality
www.tqc.eu

TQC B.V.

Molenbaan 19
2908 LL Capelle aan den IJssel
The Netherlands

+31(0)10 - 79 00 100
+31(0)10 - 79 00 129
info@tqc.eu
www.tqc.eu

TQC UK

Po Box 977A
Surbiton, KT1 9XL - England

+44 208 255 0143
janet@tqc.eu
www.tqc.eu

TQC GmbH

Nikolaus-Otto-Strasse 2
D-40721 Hilden - Germany

+49 (0)2103-25326-0
+49 (0)2103-25326-29
info.de@tqc.eu
www.tqc.eu

TQC-USA Inc.

4053 S. Lapeer Road - Suite H
Metamora, MI. 48455 - USA

+1 810 678 2400
+1 810 678 2422
Joel@tqc-usa.com
www.tqc-usa.com

TQC ITALIA S.R.L.

Via Cesare Cantu'26
20831 Seregno (MB) - ITALY

+39 0362 1822230
+39 0362 1822234
info@tqcitaly.it
www.tqc.eu

TQC Norge AS

Øvre Langgate 26
3110 Tønsberg - Norway

+47 33310220
+47 33310221
info@tqc.no
www.tqc.no