

Instruction Manual

Hanatek (PIRA) Rub Tester



Model RT3 (Obsolete 2009)

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Replaced by: <http://www.hanatekinstruments.com/Rub-and-Abrasion-Tester.html>

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Inventory

Item	No
Rub Tester	1
Mains Lead	1
Set of 3 weights pre-mounted on a lifting spindle	1
Lower sample clamping ring	1
Small sample cutter (50 mm diameter)	1
Large sample cutter (115 mm diameter)	1
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Introduction

The Hanatek rub tester has been designed and manufactured in conjunction with Pira International for assessing the rotational rub resistance of printed materials. It meets the requirements of BS 3110, Method 2 – “Methods for Measuring the Rub Resistance of Print – Rotary Method”.

The instrument incorporates a number of features which provides convenience and ease of use, notably:

- automatic weight placement, with pre-selection of test pressure
- automatic weight lifting at the end of test
- “float” positioning of the upper platen to allow easy and accurate upper sample placement
- programmable digital counter with “last test” memory
- clear, simple, indicating push-button controls

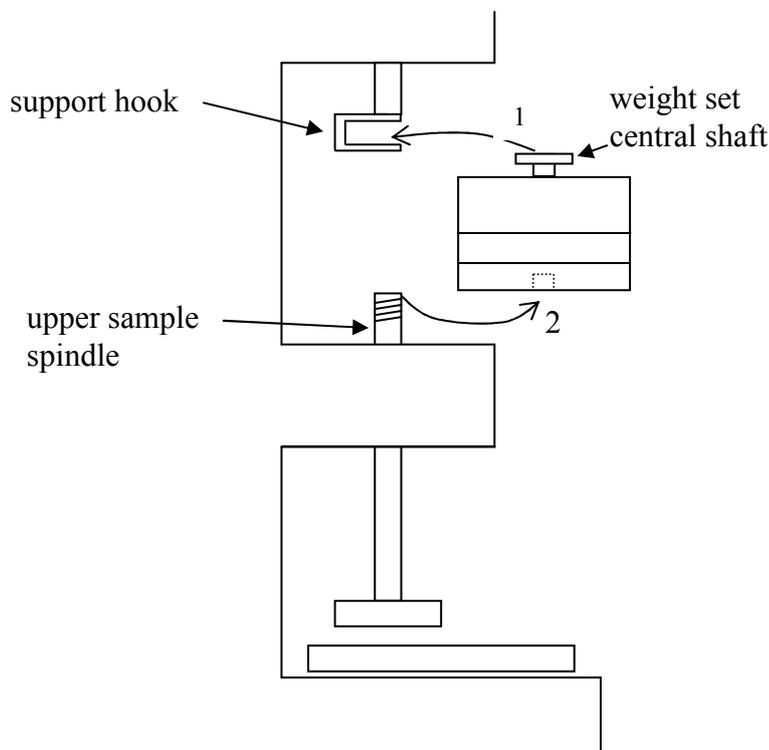
The weight set provided allows for 3 test pressures, 0.5, 1.0 and 2.0 pounds / inch² (p.s.i.) (3.45, 6.9 and 13.8 kPa).

The counter has a 6 digit memory, but normally would be used at 50,100,or 200 revolutions. The most commonly used test conditions are 0.5 and 1.0 p.s.i., and 50 and 100 revolutions.

Unpacking & Setting Up

The rub tester is heavy – two people are required to unpack and move the instrument. The tester is packed within protective cushioning fitments inside a corrugated case. It is recommended that the packaging is retained in case of future shipment.

The rub tester is shipped with the weight set separate to prevent damage to the upper spindle resulting from handling impacts. The weight set is located in the cushioning which protects the top of the rub-tester, and should be removed from the packaging first. The instrument should never be transported with the weight set attached.



Fitting the weight set – side view

To fit the weight set lift the central shaft within the weights and locate onto the support hook, turning the weights so that the flats on the shaft align with the entry gap in the hook. Next raise the upper sample spindle into the threaded hole underneath the weights, and screw the weight set to the spindle. The weights

should be screwed fully onto the spindle. Note that the thread is a reverse thread.

Once the instrument is unpacked and the weight set fitted the instrument is ready to use.

Operating The Rub Tester

Switching on

Connect the rub tester to the mains supply using the lead provided – this plugs into the rear of the instrument.

Ensure that voltage selector switch on the rear of the instrument is set for the correct operating voltage – 115V or 230V

Switch on mains isolation switch on rear of instrument

Switch on the instrument using the mains switch on the front lower left. When the instrument switches on the following will happen:

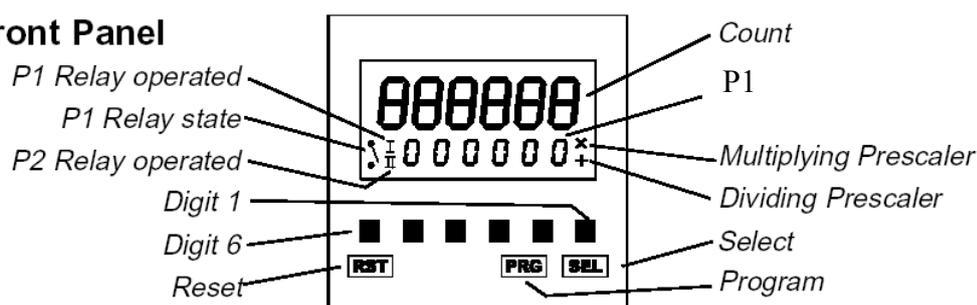
- the *on* switch will illuminate
- the counter display will come live and display the last settings used (from when the instrument was last switched off)
- the green *up* button will illuminate – this is the default start-up setting. If the weights and spindle are in a lower position they will automatically drive to the up position on switch on.

Selecting the test conditions

The test pressure is set using the three-position “Pressure” switch on the control panel (illustration on page 8). This switch position need only be changed when a change in test pressure is required.

The number of revolutions required is set on the counter.

The Front Panel



Press “*select*” once – the upper display will show “*P1*”.

Press digits 1 to 6 to set the required number of revolutions – the six digits will flash whilst they are in set mode.

Once the required count is set press “*select*” again to return to the normal display.

Sample Preparation

Two circular samples are cut, one with each sample cutter (to 50mm and 115mm diameter). Typically a printed sample is rubbed against a reference material; the printed sample is cut to 50mm diameter and the reference material to 115 mm diameter.

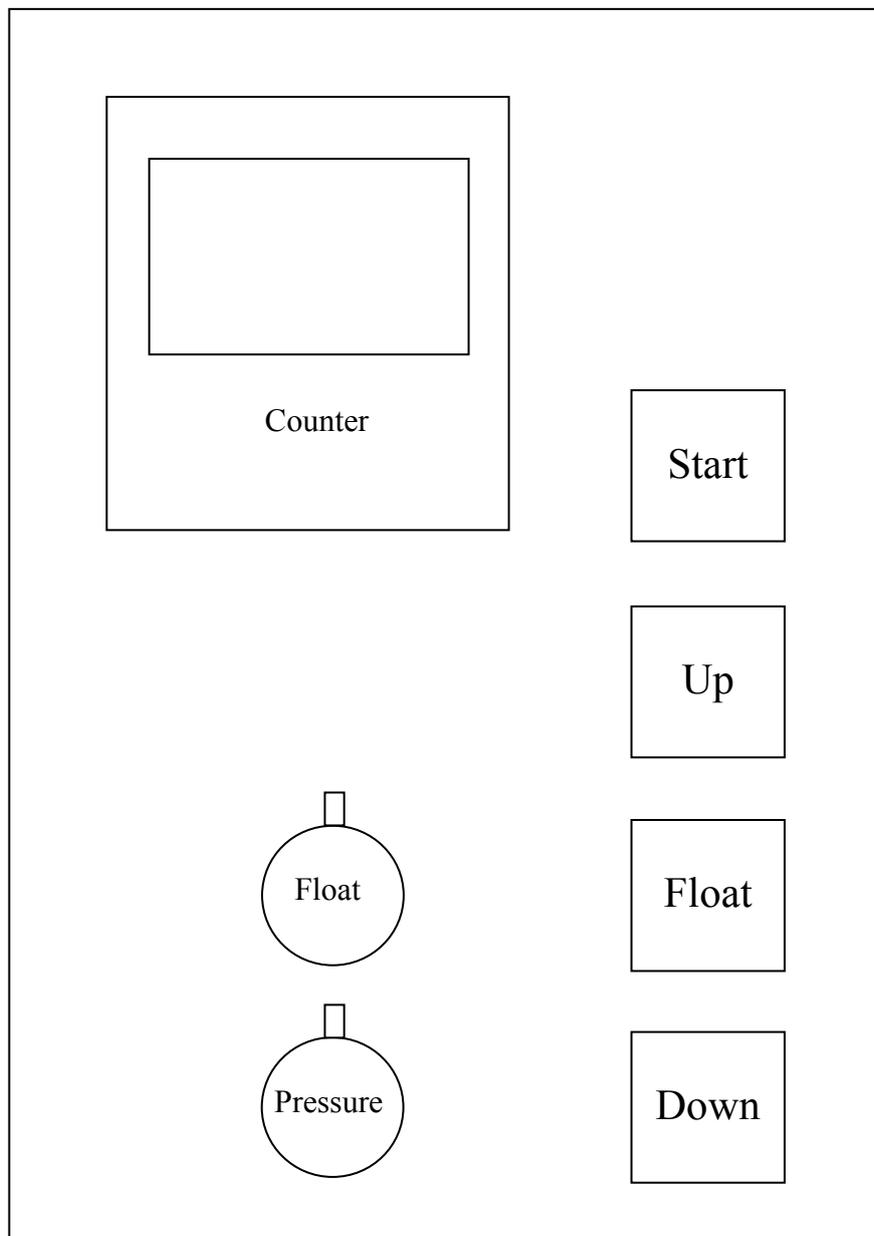
The large disc is placed on the lower platen (test face up) and the clamping ring placed over the sample. The small disc is placed, test face down, onto the large disc. The small disc should be placed towards the back of the large disc, but at this stage its exact position is not critical.

Testing

The control panel (illustrated below) comprises the counter, four press buttons (***Start***, ***Up***, ***Float***, ***Down***), one rotary control (***Float***) and one rotary switch (***Pressure***).

Up, ***Float*** and ***Down*** illuminate to indicate status, and can be pressed in any sequence. When the instrument is switched on the instrument defaults to the ***Up*** position.

The ***Start*** button will only work when the ***Down*** position is selected.



Control Panel

Set the pressure, counter, and prepare and position the samples as described in the previous two sections.

Press ***Float***. The weight set and upper sample spindle will drive down to a resting position just above the lower platen. This resting position can be adjusted for personal preference by rotating the ***Float*** rotary control. The float position allows for fine positioning of the small sample by sliding it so it is exactly underneath the upper platen.

Press ***Down***. The weight set and upper spindle will drive down to a pre-set position according to the pressure selected. The weights corresponding to the selected pressure will rest on the upper spindle, such that their weight is transferred to the samples. The other weights will be suspended on the support hook.

The fan nozzle should now be moved to blow onto the lower sample, ensuring that it will not foul the movement of the parts, including the return of the upper spindle at the end of the test. The fan is turned on and off using the small push button to the right of the mains on/off switch.

Press ***Start*** and the test will progress.

On completion of the test (after the test has progressed to the number of revolutions set in the counter) the rotational drive will stop, and the instrument will automatically revert to the ***Up*** setting. The weight set will drive up and the ***Up*** button will illuminate.

The samples can be removed for inspection, and visual or other assessment against reference standards.

Terminating / interrupting a Test

Press “**Up**” to raise the upper test spindle and the rotation will be interrupted. However the counter will remain in an “active” state retaining the progression of the last test in memory.

To resume the test, press “**float**” and adjust the foot position using the *float rotary control*. This is to ensure that the test will resume with the foot correctly positioned over the sample

Rotation will resume as soon as “**Down**” is selected and the test will continue for the remainder of cycles as indicated on the display unless interrupted again.

Electrical Safety

The instrument contains mains wiring within the stabilised power supply. All other electrical circuits within the instrument are powered by DC voltage at no more than 24V.

The instrument contains no user serviceable parts, and it is recommended that the user should not open the instrument. In any event the instrument should only be opened by a qualified electrician, and with the mains lead removed. The guarantee does not cover any work or adjustment needed as a result of user intervention or misuse.

Counter Configuration

The counter is programmable, and has a number of pre-set configurations which are critical to the correct operation of the instrument. The counter retains these settings in memory, and in normal use these will not need to be changed.

In the unlikely event of failure of the counter memory the settings are:

type	counter
dec pt	0
pscale	divide 900
input	high
reset	0
inhib	all
auto	off
rel type	latch
rel safe	set
lcd bl	on

Appendix 1 Counter Instructions

Specification

Display

Black on green STN LCD, with yellow/green LED backlight

Program Storage

Erase/write cycles: 1,000,000

Life: 40 years min

Count Range

-99999 to 999999

Count Pre-scaler

Multiplier 0.00250 to 9.99999

Divider 1 to 99999

External Reset response time

Max 2ms

Count Inputs

High Speed: 10kHz max (electronic)

(Dividing prescaler: 7kHz max)

Duty cycle: 60:40 max

Low Speed: 30Hz max (contact closure)

Relay Contacts

5A resistive load 100,000 operations

2A resistive load 1,000,000 operations

Reaction time: <20ms

P1 Relay: UL Ratings

AC 250V max, DC 125V max

250VAC 1/6 HP

30VDC 5A

P1 Relay: General ratings

AC 1250VA max 300V AC

250Vac (cosφ = 1): 5A

250Vac (cosφ = 0.4): 3A

DC 150W max 220V DC

30Vdc: 5A

P2 Relay: UL Ratings

AC 250V max, DC 125V max

250VAC 1/6 HP

30VDC 5A

P2 Relay: General ratings

AC 2000VA max 300V AC

250Vac (cosφ = 1): 8A

250Vac (cosφ = 0.4): 3A

DC 150W max 220V DC

30Vdc: 5A

Supply (see Connections)

94 to 240V AC ± 10% 50/60Hz

VA Rating 3VA

or 12 to 24VDC ± 10%

typical current 100mA DC (max)

Installation Category (IEC 664)

Overvoltage category II

(Pollution degree 2)

Operating temperature

-10°C to +60°C

Storage temperature

-20°C to +70°C

Environmental protection

IP65 (panel mounting) using the sealing gasket

supplied (without screw-fixed bezel). If the seal is

removed, it must be replaced with a new one.

See page 39 for cut-out dimensions

Altitude

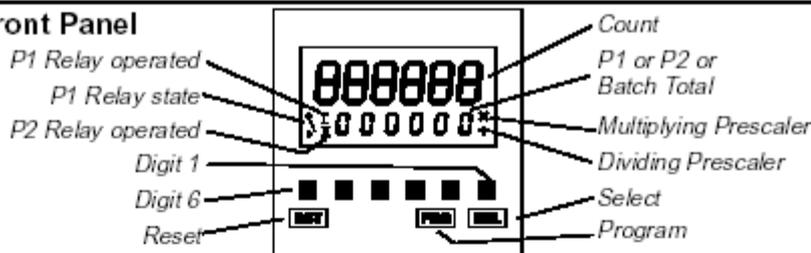
Up to 2000m

Relative Humidity

80% max up to 31°C, decreasing to 50% max at

40°C

The Front Panel



The front panel buttons are used to program the counter and to display and set the P1 and P2 presets. All the buttons can be disabled by the Keyboard Inhibit input. (see Programming, page 6).

Auto Reset (see 1 and 2 on page 35)

When Auto Reset is on, the counter will be automatically reset as follows:

In Reset to Zero mode, the counter will reset to zero when P1 is reached.

In Reset to P1 mode, the counter will reset to P1 when zero is reached.

Front Panel Reset and External Reset (RST / Ext. Reset)

A Reset can be caused by pressing the RST button or by applying a signal to the

External Reset input. Any active relay will be returned to its normal condition.

If the operation of the External Reset is safety critical, it is recommended that the External

Reset signal is derived from an independent power supply which will remain stable if the

7921's supply is interrupted.

P1 and P2 Presets

The minimum value possible for P1 and P2 is 000001, except in Dual Preset

2 mode, when P2 can be set to zero. P1 and P2 must be greater than any

multiplying prescaler value, or the unit may not operate correctly.

The P1 preset can be set at any time.

In Reset to Zero mode, the change will be accepted immediately.

In Reset to P1 mode, the change will not be accepted until after a Reset.

The P2 preset can be set as shown below.

The change will be accepted immediately.

Count Modes (see page 35)

The diagrams show how the P1 and P2 Relays are controlled by the Count, by Batch Total and by Reset.

The diagrams show how the Count is reset to zero or P1 by Auto Reset. In all modes, the Count can be reset at any time by a RST/Ext. Reset.

The counter can count up to 999999, and or down to -99999. Beyond these limits, the counter will continue to count internally, but the display will flash 999999 or -999999 until either the count returns to below the limit, or the counter is reset by RST/Ext. Reset.

Dual Preset Mode

In Dual Preset mode, P1 and P2 are used independently to control the operation of the counter and the relays.



Press SEL, then use the Digit buttons to change P1. The display will flash. Press SEL again to accept the new P1 value, then use the Digit buttons to change P2. Press SEL again to accept the new P2 value. If SEL is not pressed within 30 seconds of the last change to either P1 and P2, they will revert to their original values.

1 Dual Preset with Auto Reset on

Note: P1 Relay cannot be set to Latched.

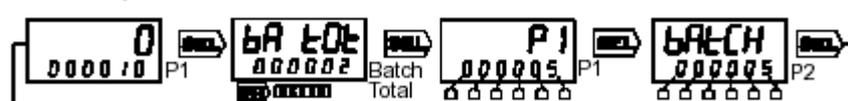
Note: If P2 Relay is set to Latched, it will return to normal at the same time as P1 Relay.

2 Dual Preset with Auto Reset off

Note: If P1 or P2 Relays are set to Latched, they will return to normal at RST/Ext. Reset.

Batch Mode

In Batch mode, P1 and P2 are used in combination to control the operation of the counter and the relays.



Set P1 and P2, as shown above for Dual Preset mode.

When the Batch Total is displayed, the RST button can be used to reset it to zero.

Note: P2 relay cannot be set to Pulsed.

Note: The P2 Relay operates when the Batch Total reaches P2. It will return to normal when the Batch Total is reset to zero.

3 Batch Mode with Auto Reset on

Note: P1 relay cannot be set to Latched.

Note: The Batch Total increments at Auto Reset.

4 Batch Mode with Auto Reset off

Note: If P1 is set to Latched, it will return to normal at RST/Ext. Reset.

Note: The Batch Total increments at the first RST/Ext. Reset after P1 has been reached.

Programming

- Press and hold PGM for 3 seconds to enter Programming mode.
- Press Digit 1 to cycle through the menus, or PGM to exit Programming mode.
- Press SEL to select a menu, then Digit 1 to cycle through the options.
- Press SEL to select an option, or PGM to exit the menu without change.
- Press the Digit buttons to adjust a numerical setting, eg. pulse time.
- Press SEL to accept the setting, or PGM to exit the setting without change.
- Press PGM once or twice to exit Programming mode.

Main menu	
DEC Pt	Decimal Point menu
PSCALE	Prescaling menu
INPUL	Input Mode menu
BATCH	Batch Mode menu
RESET	Reset Mode menu
INHIB	Inhibit menu
ARLO	Auto Reset menu
r1COND	P1 Relay Condition menu
r1TYPE	P1 Relay Type menu
r1SAFE	P1 Relay Safe State menu
r2COND	P2 Relay Condition menu
r2TYPE	P2 Relay Type menu
r2SAFE	P2 Relay Safe State menu
LCD BL	LCD Backlight menu
EXIT	Exit Programming mode

If the Prescaler or the Reset Mode or the Batch Mode are changed, the new configuration will not be fully effective until after exit from Program mode, AND THEN AFTER a Reset.

Decimal Point

The decimal point can be in one of three positions, or off.

Prescaling

A multiplying or dividing factor can be used. If a multiplying prescaler of n is used, the counter will count: 0, n, 2n, 3n etc. If a dividing prescaler of n is used, the counter will increment or decrement on every nth input pulse.

Input Mode

See Input Modes.

Batch Mode

See Count Modes.

Reset Mode

See Auto Reset and Count Modes

Inhibit

See Front Panel.

Auto Reset

See Auto Reset and Count Modes

P1 and P2 Relays

See Relays

* Auto Reset On and P1 Relay Latched cannot be set together.

** In Batch mode, P2 Relay cannot be set to Pulsed.

LCD Backlight:

can be on, off, or turn on for 30 seconds when a button is pressed.

