

# user guide



## **DEC** ● ● **SCANNER**

non-destructive  
roof moisture scanner

## TABLE OF CONTENTS

Introduction.....	2
How the Dec Scanner Works.....	2
Assembly Instructions.....	2
Operating Instructions.....	3
• Using the control panel.....	3
• Range selection.....	4
• Calibration setting.....	4
Conducting a roof survey.....	4
Tracing a leak.....	5
Types of roofing structure and their more common problems.....	5
Maintenance of the instrument.....	6
Limitations.....	6
Calibration.....	6
Warranty.....	6
Product Development.....	7
Safety.....	7
Technical data.....	7

## INTRODUCTION

Thank you for selecting the Dec Scanner instrument from Tramex.

The Tramex Dec Scanner is a non-destructive impedance moisture scanner designed for detecting and evaluating moisture conditions in roofing and waterproofing systems. The Dec Scanner has 3 ranges of sensitivity to enable the surveying of a variety of roof types and roofing depths, and is equipped to detect moisture in the majority of roofing and waterproofing systems.

To get the maximum benefit from your Tramex Dec Scanner, it is suggested that you read this manual to familiarize yourself with the instrument and its capabilities, before undertaking any roof investigations.

### WHY SHOULD TESTING BE DONE ?

Excess moisture in a roofing and waterproofing system can affect its performance, reducing thermal resistance values and energy efficiency, raising energy costs, and eventually causing structural damage and system failure.

### WHEN SHOULD TESTING BE DONE ?

Testing and surveying of roofing systems needs to be carried out at various stages of the lifetime of the roofing and waterproofing system:

- at installation to ensure roofing quality;
- regularly as part of an ongoing maintenance program, in order to monitor and take remedial action in plenty of time to prevent major and expensive stripping and re-roofing;
- prior to reparation or re-roofing in order to determine the cause and extent of damage.

## IMPORTANT NOTE

The signals from this instrument will not penetrate certain types of rubber roofing material such as some black E.P.D.M and some Butyl Rubber. The Dec Scanner is not suitable for any roofing with electrically conductive or metal-faced membranes.

## HOW THE 'DEC SCANNER' WORKS

The Dec Scanner detects and evaluates the moisture conditions within roofing and waterproofing systems by non-destructively measuring the electrical impedance. This is a method that is very well suited to obtaining comparative moisture content readings in the many different types of materials used in the roofing assembly.

The Dec Scanner is a battery powered, electronic instrument, that generates a low frequency electronic signal. This signal is transmitted into the material under test via one of the two electrodes incorporated in the rubber electrode mat, which is draped on the underside of the instrument. The other electrode receives the signal that is transmitted through the material under test. The strength of this signal varies in proportion to the amount of moisture in the material under test. The Dec Scanner determines the strength of the current and converts this to a comparative moisture value. By moving the Dec Scanner across a roofing surface in a regular pattern, a continuous reading is obtained, and any areas that contain moisture can be readily identified.

## ASSEMBLY INSTRUCTIONS

1. Remove the Base Unit from the carry case using the grab handles.
2. Check the tightness of the 8 electrode mat retaining screw fasteners.
3. To insert the telescopic handle: fully open the flip lock mechanism, extend the lower part of the handle, insert the threaded end into the Base Unit and turn clockwise until tight and secure.
4. Extend the telescopic handle to the desired height. Position the meter bracket to the front, ensuring the arrow is pointing directly down the handle for optimal infrared communication between Base Unit and Control Panel Meter. Close and lock the flip lock.
5. Adjust the hand piece to the desired position.
6. Remove the Control Panel Meter from the carry case and clip it onto the meter bracket.
7. Also included is a folder containing survey sheets and the warranty card. (This should be completed and returned to Tramex Ltd, Ireland.)

## OPERATING INSTRUCTIONS



- |   |                                     |
|---|-------------------------------------|
| ① | Infrared window                     |
| ② | Screw fastener for electrode mat    |
| ③ | ON / OFF - Base Unit                |
| ④ | ON / OFF - Control Panel            |
| ⑤ | Range Button                        |
| ⑥ | LED Range indicators                |
| ⑦ | HOLD function / AUDIO signal button |
| ⑧ | SET POINT calibration knob          |

## USING THE CONTROL PANEL METER

- POWER ON:** Press to power on both the Base Unit and the Control Panel Meter.
- LED Indicators:**
  - Base Unit LED and one of the Range LEDs will both flash when in infrared communication
  - OR**
  - Base Unit LED is solid when Control Panel Meter is OFF.
  - Control Panel Meter LED is solid when Base Unit is OFF.
  - Control Panel Meter LED will show the last used Range.

**If communication between the Base Unit and the Control Panel Meter is interrupted, LEDs on both units will remain solid. The reading is memorized until communication is restored.**

- BATTERY LOW** indication: When powered on the battery voltage in the Base Unit and the Control Panel Unit is measured. If battery level is low:
  - Base Unit LED will flash for 7 seconds for Base Unit battery.
  - Control Panel Unit LEDs 1, 2 and 3 will flash alternately for 5 seconds for Control Panel battery.

**These signals indicate that the battery requires replacement.**

- RANGE** selection: Press to select the desired Range 1, 2, or 3. The selected range LED will flash. (See below for Range Selection information.)
- Adjust 'Set Point' knob, over a known dry area, to read just above zero to engage meter reading sensitivity. If the audio signal is ON it will beep. (see Audio Signal below)
- HOLD** function: Press while reading to select the HOLD function when you need to record a comparative reading. The needle freezes on the analog dial. The Base Unit LED remains solid while the Control Panel Range LED flashes.
- Press again to release the HOLD function. The Base Unit LED and the Control Panel Range LED both flash.
- AUDIO SIGNAL:** Press two times in quick succession to turn on/off the audio signal. When on, this will beep to indicate readings of over 5 on the comparative dial. The audio signal will beep increasingly fast as the moisture readings increase

9. **AUTOMATIC POWER OFF:** To conserve battery life the units will automatically power off after 20 minutes in the following situations:

- If infrared communication is interrupted (e.g. if the Control Panel Unit is removed from its bracket.)
- If either of the units are turned off, the other unit will timeout.

**You may now begin your roof survey. Please read on for information about Range Selection and further Operating Instructions.**

## RANGE SELECTION

The Dec Scanner has an integrated and adjustable calibration ability allowing for accurate comparative readings. There are 3 Ranges, and they should be selected as best suits the surface under test, for example:

- Range 1- Most suitable for single-ply and thin roof coverings such as PVC, Hypalon and other smooth surfaces where insulation is wet and moisture is close to the surface.
- Range 2 – Most suitable for multi-ply built-up and modified systems, mineral surfaced felts, and other smooth or gravel surfaces where insulation is less wet and moisture is below the surface.
- Range 3 – Most suitable for thicker roof coverings such as mastic asphalt, thick gravel and stone surfaced roofing.

## CALIBRATION SETTING

A known acceptably dry area should always serve as a reference location for the set up of the instrument.

- **On a known acceptably dry area** of the roofing system, where the surface and sub-surface insulation and components are dry, choose the most appropriate range. Using the 'Set Point' knob, set the reference point to just above zero to engage sensitivity.
- **If a known acceptably dry area can not be identified,** position the Dec Scanner over what you consider to be an acceptably dry area. Adjust the 'Set Point' knob until the needle points to mid-scale (50) to allow for readings of potentially drier areas. Move the instrument around the roof, following the direction of the lower readings until the area with the lowest reading is found. Now set the reference point to just above zero to engage sensitivity.
- In these situations the use of a pin type resistance meter with insulated pins can help determine moisture conditions and depth.

## CONDUCTING A ROOF SURVEY

When conducting a survey it is important to verify the composition of the roofing assembly, acquire any historical data as regards its age and performance record, and a roofing plan drawing. Ensure that surface is clean of debris and dry of rain or dew etc. Aggregate should be dry and of uniform thickness.

### Information Check List:

Recording the following information will assist you in completing a comprehensive roof survey.

- Building Name and Number
- Date of Survey
- Name of Surveyor
- Visual Inspection of all Roof Flashings
- Visual Inspection of Roof Lights & Openings
- Visual Inspection of Vents, Chimneys and other Protrusions
- Visual defects and anomalies

The Roof Survey should be conducted using accessories and tools as suggested and in accordance with the roofing or waterproofing system manufacturer's recommendations or National Roofing Contractors Association Repair Manual for Low-slope Roof Systems.

### Complementary Tramex equipment:

- The Tramex RWS is a handheld roof scanner for non-destructive moisture evaluation within the insulation and thickness of the roof. Working on the same ranges as the Dec Scanner it can be used in conjunction, allowing for additional readings at edges, near penetrations, equipment curbs and flashings, and for readings from underneath the roof when possible.
- The Tramex CMEX II is a handheld digital meter designed for the non-destructive measurement of moisture conditions in concrete decks, with applications for the measurement of moisture conditions in wood decks, as well as ambient relative humidity and dew-point conditions.
- The Tramex Infrared Surface Thermometer will permit accurate temperature readings of the roof.

## Procedure:

- Make a sketch of the roof, indicating openings and protrusions etc.
- Select a convenient grid span i.e. 5ft (1,5m) and on the North/South perimeter, mark 1, 2, 3 etc. while on the East/West perimeter mark A, B, C etc. Transfer these grid systems markings to your roof sketch. (Fig 4)
- Ambient Relative Humidity, Temperature and Dew-point readings should be noted before, midway through and at the end of the survey.
- Proceed by moving the Dec Scanner along the imaginary line A and mark location on the sketch graph paper and roof surface if desired, when moisture is indicated. N.B In this mock up test, position A4 is the first point of moisture contact (Figure 4).

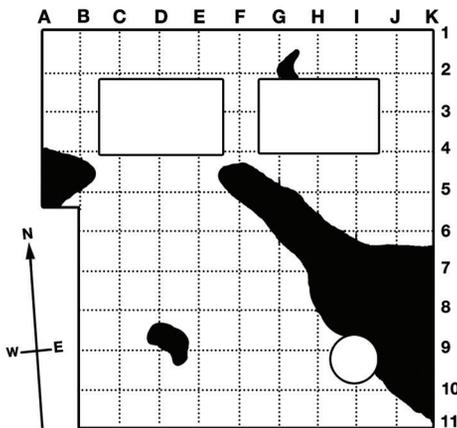


Figure 4. Grid system markings

- As the survey continues, a moisture profile will build up, indicating areas which require attention. On single ply roofing, particular attention must be paid to laps and seams.
- Take additional readings, near penetrations, equipment curbs and flashings, at edges, as well as other roof areas commonly identified as areas of possible moisture ingress.
- The location and depth of extra-depth insulation, such as in an over-laid system or tapered insulation, should be confirmed with a pin-probe resistance type meter.
- Should a precise percentage of moisture be required, a sample can be removed from the site, sealed in a plastic bag and checked in a laboratory, by weighing, drying and reweighing, to calculate the exact amount of moisture present. It is important to also examine the plies of the roofing felt after taking the test cut, as moisture may be present between the plies or within the fibre of the felt.

## TRACING A LEAK

As moisture penetration into the building can be a considerable way from the original point of entry through the punctured membrane, the Dec Scanner will be found useful in tracing a leak to its source. (A sloping roof is more likely to suffer from extended leaks than a flat one).

- Calibrate on a known dry area as detailed previously, using the scale most appropriate to the type of roof.
- Take the instrument to the general area above the internal leak.
- Scan the area in an ever widening pattern, until the source of the leak is located (Fig.5)

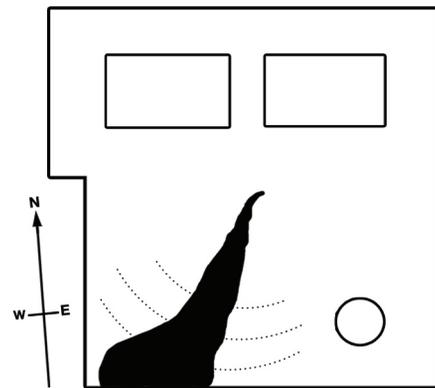


Figure 5.

## TYPES OF ROOFING STRUCTURE AND THEIR MORE COMMON PROBLEMS.

1. Built-up-Roofing Systems (BURs): Comprising of 3 or 4 layers of roofing felt, with bitumen adhesive between each layer. ( Fig.6 ). Problems include:
  - Mechanical damage from maintenance personnel.
  - Fissures or cracks in the membrane, caused by building settlement or expansion and contraction.
  - Blistering caused by moisture trapped in the roof system during construction.
2. Modified Bitumen Systems: This type of material is either adhesive or heat applied as a single layer system, or with a base layer of bituminous felt. Sometimes problems occur on the laps and upstands if material is not fully sealed during construction.
3. Single Ply Roofing: Usually applied in welded sheet form, direct to the insulation. Problems usually occur from mechanical damage and maintenance personnel, pin-holes, bird damage and faulty seams during construction.

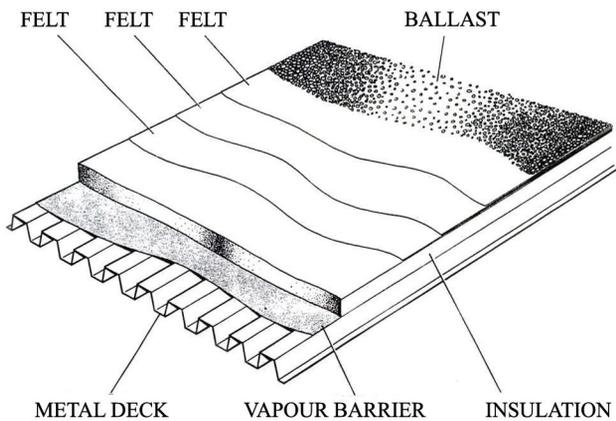


Figure 6. Typical Built-Up Roof on metal deck.

## MAINTENANCE OF THE INSTRUMENT

Apart from the replacement of the 9V PP3 alkaline batteries, the only maintenance check required is the regular examination of the electrode mat. Clean with a damp cloth and soapy solution, but never use solvent to clean the surface. If damage is identified, the mat should be replaced. In the event of instrument malfunction, return the instrument immediately to your supplier.

## LIMITATIONS

The Tramex Dec Scanner and RWS Roof and Wall Scanner are not suitable for use on any roofing with electrically conductive or metal-faced membranes. Metal and other electrically conductive surface coverings and near-surface embedded metallic components are not suitable for surveying with these instruments because of the electrical conductivity of these materials. Most types of black EPDM produce false positive readings when tested with this method due to the material's high dielectric constant. The degree to which these false positives need to be factored out will affect the depth of signal penetration. Aluminum foil on top-faced insulation or waterproofing membranes give false positive readings, however liquid-applied aluminum pigmented emulsified asphalt based coatings do not normally have a significant effect on the readings.

## CALIBRATION

Requirements for quality management and validation procedures, such as ISO 9001, have increased the need for regulation and verification of measuring and test instruments. It is therefore recommended that calibration of the Dec Scanner should be checked and certified in accordance with the standards and/or protocols laid down by your industry (usually on an annual basis) by an authorized test provider. The name of your nearest test provider and estimate of cost is available on request. Calibration adjustments should not be carried out by anyone other than Tramex or their authorized service provider who will issue a calibration certificate on completion.

## WARRANTY

Tramex warrants that this instrument will be free from defects and faulty workmanship for a period of one year from date of first purchase. If a fault develops during the warranty period, Tramex will, at its absolute discretion, either repair the defective product without charge for the parts and labor, or will provide a replacement in exchange for the defective product returned to Tramex Ltd. This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care.

In no event shall Tramex, its agents or distributors be liable to the customer or any other person, company or organization for any special, indirect, or consequential loss or damage of any type whatsoever (including, without limitation, loss of business, revenue, profits, data, savings or goodwill), whether occasioned by the act, breach, omission, default, or negligence of Tramex Ltd., whether or not foreseeable, arising howsoever out of or in connection with the sale of this product including arising out of breach of contract, tort, misrepresentation or arising from statute or indemnity. Without prejudice to the above, all other warranties, representations and conditions whether made orally or implied by circumstances, custom, contract, equity, statute or common law are hereby excluded, including all terms implied by Section 13, 14 and 15 of the Sale of Goods Act 1893, and Sale of Goods and Supply of Services Act 1980.

## Warranty claims

The Warranty card should be completed and returned to Tramex Ltd, Ireland. A defective product should be returned shipping pre-paid, with full description of defect to your supplier or to Tramex at the address shown on the back of this guide.

## PRODUCT DEVELOPMENT

It is the policy of Tramex to continually improve and update all its products. We therefore reserve the right to alter the specification or design of this instrument without prior notice.

## SAFETY

This Users guide does not purport to address the safety concerns, if any, associated with this instrument or its use. It is the responsibility of the user of this instrument to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

## TECHNICAL DATA

### Dimensions:

**Dec Scanner** 30"W x 15<sup>3</sup>/<sub>4</sub>"D x 6<sup>1</sup>/<sub>4</sub>"H  
(762mmW x 400mmD x 158mmH)

**Carry case** 38"W x 20"D 12"H  
(940mmW x 508mmD x 305mmH)

### Weight:

**Dec Scanner** 24.6lbs (11.15Kg)

**Carry Case** 21.9lbs (9.95Kg)

**Outer carton & packing** 4.4lbs (2.0Kg)

**Total Shipping Weight** 51lbs (23.16Kg)

**Dimensional Shipping Weight** 66lbs (30 Kg)

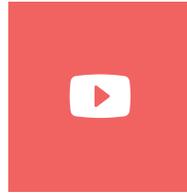
### Battery:

Each unit operates with a PP3 9V alkaline battery (supplied). The Base Unit has a battery life in excess of 72 hours.

The Control Panel Unit has a battery life in excess of 50 hours. (These times will be greatly extended if Lithium PP3 batteries are used.)

[www.tramexmeters.com](http://www.tramexmeters.com)

FIND US ON:



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