LABORATORY APPLICATIONS

SQC in laboratory
the more data the higher precision

Only series of measurements analysis can provide information on the measurement result accuracy. Automaton of this process by means of Auto-SQC, like in Radwag balances, guarantees quick reaction. It is especially crucial for these laboratories that work in feedback kind of cooperation with production departments.

Analysis of plethora of information is not a problematic issue whenever ergonomic solutions offered by Radwag are in use.

Being aware of the multiple possibilities of usage, Radwag applications consist of two modules of Statistics. These modules are different in terms of functional capabilities. The first one enables statistical operation performance on freely selected data. Statistical operation provides the user with information on sum, mean value, Min and Max value, range, standard deviation and variance. This module is characteristic for offering the possibility of adding new measurements to an already performed series of measurements (OPEN formula).

The second module, called SQC, i.e. Statistical Quality Control, is intended for mass control of a sample, wherein the weighment tolerance has been specified. The particular process may be defined clearly by a batch number and by a quantity of measurements performed per series. The module’s characteristic feature is the lack of possibility to add new measurements to an already performed series (CLOSE formula).

Considerable advantage of this module is presentation of sample weight by means of graph (SQC-GRAPH). The visual presentation is an invaluable asset for the process of sampling.
Statistics

Statistics module offers possibility of quick analysis of data regardless of rigors driven by tolerance. Net weight measurement may be performed with different tare settings (single, sum of all, autotare etc.)

**initial filtration of measuring data**

Initial filtration is possible, when for a product selected from a database which is to be analyzed, the percent tolerance has been specified in relation to reference mass. In addition to that, the result control function has to be activated. Through such operation only those measurements which are within the weighment tolerance will be selected for analysis. Initial filtration procedure allows to eliminate not only those measurement which are not within the weighment tolerance but also random ones.

**measurement series**

Statistical data are displayed in an Info workspace, all the information is updated on-line after each performed measurement.

The user can:
- Adjust content of Info workspace (personalization);
- View complete information on measurement data at any time;
- Save information, print reports.

**report example**

<table>
<thead>
<tr>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
</tr>
<tr>
<td>SUM</td>
</tr>
<tr>
<td>X</td>
</tr>
<tr>
<td>MIN</td>
</tr>
<tr>
<td>MAX</td>
</tr>
<tr>
<td>D</td>
</tr>
<tr>
<td>SDV</td>
</tr>
<tr>
<td>RDV</td>
</tr>
</tbody>
</table>

| 35 | 98.8054 g | 2.82301 g | 2.7426 g | 2.8589 g | 0.1163 g | 0.80 % |

**Chart of Probability Distribution for a series of measurements**

Data archiving is possible by print or by means of USB data storage device.
SQC Statistics module SQC is an ingenious device for control of various samples’ weight. The tests may be performed either within production (critical limits and warning limits) or in course of other monitoring processes.

All data is permanently saved to balance memory thus allowing for its potential verification (compliance with legal acts, branch regulations, etc.)

**Ergonomics, personalization**

The user has three touch panels at his disposal allowing him to freely configure measuring procedures, e.g. number of measurements, names, printouts etc.

Panel allowing for specification of test parameters such as batch quantity, control performed accordingly to a given tolerance, the user can design adjusted to his needs printout of a given procedure.

The user can specify the record mode of measurements (manual, automatic, for stable measurements, with the use of low or high threshold value).

**Viewer-Graph**

The graph can be freely and easily adjusted. All the user has to do is to touch the panel and move finger to a demanded position in order to enforce automatic adjustment of the graph. When willing to return to the initial settings the user has to press the zoom icon.

Precise weighing module serves for performing measurements with specified parameters for stability and filtering of the measuring signal. It guarantees measurement accuracy regardless of any influence factors.

**SQC-Graph**

The user has at his disposal function of automatic adjustment of weightment tolerance (bargraph) thus being able to perform sampling as safely and quickly as needed.

**SQC Reports** is a brand new device intended for storing and processing great deal of information. It records various information on performed test to a database, i.e. test number, name, statistical data, information data.

SQC Reports contain Viewer-Graph module which enables dynamic adjustment of the graphs.
Statistics module SQC is an ingenious device for control of various samples’ weight. The tests may be performed either within production (critical limits and warning limits) or in course of other monitoring processes.

**record**

Information on the monitoring process allows to verify data at any moment. This guarantees compliance with quality systems such as ISO, GLP, GMP, HACCP, etc.

### report example

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nominal mass</td>
<td>10.3</td>
</tr>
<tr>
<td>T2- threshold</td>
<td>1.03 g</td>
</tr>
<tr>
<td>T1- threshold</td>
<td>0.515 g</td>
</tr>
<tr>
<td>T1+ threshold</td>
<td>0.515 g</td>
</tr>
<tr>
<td>T2+ threshold</td>
<td>1.03 g</td>
</tr>
<tr>
<td>Net</td>
<td>10.349 g</td>
</tr>
<tr>
<td>Average</td>
<td>10.36022 g</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>0.011895 g</td>
</tr>
</tbody>
</table>

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**Signature**

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**Measurements chart**

- **Average** [g]: 10.36022 g
- **Nominal mass** [g]: 10.3 g
- **Measurements** [g]:
  - 10.315 g
  - 10.320 g
  - 10.325 g
  - 10.330 g
  - 10.335 g
  - 10.340 g
  - 10.345 g
  - 10.350 g
  - 10.355 g
  - 10.360 g
  - 10.365 g
  - 10.370 g
  - 10.375 g

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SQC  Statistical Quality Control

Statistics module SQC is an ingenious device for control of various samples' weight. The tests may be performed either within production (critical limits and warning limits) or in-course of other monitoring processes.

archiving

Export of information guarantees data safety and possibility to analyze the data by means of other computer systems. Regular printout means quick assessment of a particular series in terms of tolerance and specified thresholds (T1/T2).

### Sample Measurement Report

<table>
<thead>
<tr>
<th>Measurement</th>
<th>Operator</th>
<th>Product</th>
<th>Start date</th>
<th>End date</th>
<th>Batch number</th>
<th>Batch quantity</th>
<th>Nominal mass</th>
<th>T2- threshold</th>
<th>T1- threshold</th>
<th>T1+ threshold</th>
<th>T2+ threshold</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>en</td>
<td>probe 1</td>
<td>2014.05.19</td>
<td>13:18:28</td>
<td>43786</td>
<td>10</td>
<td>10.3 g</td>
<td>1.03 g</td>
<td>0.515 g</td>
<td>0.515 g</td>
<td>1.03 g</td>
</tr>
</tbody>
</table>

#### Measurement 1

Net: 10.361[0] g

#### Measurement 2

Net: 10.373[1] g

### Export

One of the possible ways of archiving SQC procedure report is its export to USB data storage device.

#### Export - record form

- Date: 2014.05.20
- Time: 13:29:39
- Serial number: 392543

Export of information guarantees data safety and possibility to analyze the data by means of other computer systems. Regular printout means quick assessment of a particular series in terms of tolerance and specified thresholds (T1/T2).
Automatic cycle measurement requires cooperation of at least two devices. The first one is PA-02/H automatic feeder which forms an ordered set out of a particular number of randomly arranged elements. Thus prepared sample’s elements are separately transferred one by one by means of a chute to a weighing pan. The second device is balance which measures the elements and records their mass. These two devices work in feedback kind of cooperation for which the vibration level may be adjusted.

SQC MODULE of .3Y series balances presents statistical analysis in a form of chart directly on a balance display. The charts may be printed on a freely chosen printer (PLC) or exported to .bmp file (transfer to USB port).

**PA-02/H TECHNICAL DATA**

<table>
<thead>
<tr>
<th>Property</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fed object diameter</td>
<td>( \phi 3 \div 10 \text{ mm} )</td>
</tr>
<tr>
<td>Feeder diameter</td>
<td>( \phi 180 \text{ mm} )</td>
</tr>
<tr>
<td>Height of feeder’s vibrating element</td>
<td>70 mm</td>
</tr>
<tr>
<td>Feeder speed</td>
<td>1 \div 15 \text{ pcs / min}</td>
</tr>
</tbody>
</table>
**SQC automatic cycle measurement**

All statistical operations related to a tested sample are performed by SQC MODULE. This makes the statistical control workstation a mobile one and therefore it can be located in various production or control areas. EXPORT option of .3Y series balances allows sending demanded data concerning tested sample to a superior computer system.

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**MAIN INFORMATION**

The tested sample may be defined in a balance DATABASE. Its reference value must be specified in terms of mass and quantity. The tolerance thresholds must be given. Information may be updated by means of DATABASE EDITOR computer software.

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**MEASUREMENTS**

The measurement accuracy depends on applied balance type. Generally while selecting balance one should remember that the smaller sample weight is (this condition refers to a single element weight) the smaller scales interval should be.

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**RESULTS**

Sample analysis results are recorded into database and into ALIBI MEMORY. Both, text and graphic form of the measurements can be analyzed.

Transfer of data to other applications is possible due to EXPORT option.
Statistics

The R2 series balance is a reliable device which meets requirements of any laboratory. It features an LCD display with a new text information line, 14-button keypad and automatic adjustment. Statistics function is one of many applications to which the user gets access via the user menu. The function is supported with information contained within databases such as Users Database, Products Database, Packagings Database (tares). Statistics report consists of 3 defined areas, header, footer and measurements area where statistical results are printed. Statistics report consists of 3 defined areas, header, footer and measurements area where statistical results are printed.

report example

<table>
<thead>
<tr>
<th>Operation mode</th>
<th>Statistics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Date</td>
<td>22.05.2014</td>
</tr>
<tr>
<td>Time</td>
<td>15:06:13</td>
</tr>
<tr>
<td>Operator</td>
<td>Jack</td>
</tr>
</tbody>
</table>

7.202[8] g  
7.114[5] g  
7.174[3] g  
7.168[3] g  
7.216[7] g  
7.180[1] g  
7.171[2] g  
7.210[7] g  
7.204[0] g  
7.176[2] g

-----------Statistics-----------

N 10  
Sum 71.8188 g  
Avg 7.18188 g  
Min 7.1145 g  
Max 7.2167 g  
Dif 0.1022 g  
Sdv 0.028109 g  
Rdv 0.39 %

Signature

quick access to information

The balance comprises 2 buttons enabling easy access to DataBase and Functions. Additionally it is equipped with 4 programmable function keys F1–F4. The function keys can perform different operations for each mode:

• header printout
• tare editing,
• footer printout,
• product selection

ergonomics and area of use

The R2 series comprises various balance types with weighing accuracy ranging from 0.01 mg to 0.1 g. Capabilities of all the series types in terms of statistical analysis are identical.
Statistics

PC computer software is a truly universal tool by means of which it is possible to transfer any data from a freely chosen balance. Connection between the balance and the software is either wireless (WiFi) or established via communication interface (usually RS 232) or Ethernet.

**PW-Win**

flexibility and reliability

- manual operation
- automatic operation
- automatic operation in a cycle
- modifiable date form
- Hot-key (tare)
- Hot-key (readout)
- message-box
- measurement series graph
- export
- language versions: Polish, Czech, German, English, French, Slovak, Spanish

**PW-WIN** collects data in a form of a table.

A balance adjustment report may be added to the measurement series as a confirmation of correct operation of the balance. To do it the user has a dialog box at his disposal.

**RadKey**, simple software, endless possibilities

There is no need to own a dedicated software for statistical analysis. The measurement result may be “captured” by means of RadKey – a terminate and stay resident program, and next sent to a freely chosen spreadsheet or text PC software.

Usually the data is transferred to a spreadsheet where the user can create his own formulae and balance sheets for a particular measurement series and where it is possible to compare results performed at different dates or taken from either various balances or series of measurements.

- collecting data from measurements and transferring them to any PC software (.txt, .xls, doc. rtf)
- saving data to a file
- programmable Hot-key for indication tarring and readout
- text characters converted to numeric ones (accepted by spreadsheets)
- record of data in a form of column or row (control character)
- language versions: Polish, Czech, German, English, French