Extensograph®-E
For measuring the flour quality and stretching behaviour of dough

ICC-Standard no. 114/1
AACC Method no. 54-10
ISO 5530-2

... where quality is measured.
The application of constant flour qualities is of decisive importance for the milling and baking industries. Different baking products require different demands regarding the flour quality.

Use the Brabender® Extensograph®-E for measuring the stretching properties of your dough, in particular the resistance to extension and the extensibility, to make reliable statements about the baking behaviour of the dough.

Like no other instrument, the Extensograph®-E shows the influence of flour additives like ascorbic acid, enzymes (proteinas), and emulsifiers and, thus, permits to determine the rheological properties of each flour and to adjust the "rheological optimum" for the respective purpose.

Testing flour quality:
- Stretching behaviour of the dough
- Baking characteristics
- Influence of flour additives
- Rheological optimum

**Test procedure**

Before starting the test in the Extensograph®-E, prepare your sample dough from flour, distilled water and salt in the Farinograph®. This ensures objectivity and reproducibility during dough preparation and a constant starting consistency.

After a certain proving time, the dough is stretched until rupture in the Extensograph®-E. The force exerted is measured and recorded. This procedure is repeated three times.

**Standard and short method**

There are several standards describing in detail the Extensograph®-E test procedure:
- ICC-Standard no. 114/1
- AACC Method no. 54-10
- ISO 5530-2
- RACI, GB/T, GOST R, IRAM, FTWG, and others...

Apart from these standard methods, there are accepted short methods which allow to save time with reduced proving times that are similar to those in production - the results correlate very well with those from the standard methods.

**Menu-guided test procedure**

The program guides you through the entire test. Clear on-line diagrams show the test progress.

The evaluation is not limited to the standard methods - you can, just as well, run tests without duplication and with any proving times.

The software manages the tests of a day and shows, for each sample, which proving times have already been completed.

**The Extensogram**

The Extensogram, recorded online and represented as a color diagram on the monitor, shows the exerted force as a function of the stretching length (time).

The shape of the measuring curve and its variation during the individual proving times, the area below the curve as well as the numerical values of the different evaluation points, permit to make reliable and reproducible statements as to the flour quality and the suitability of the flour for a certain task. Furthermore, the influence of flour additives on the flour characteristics can be made evident.

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Extensogram profiles of different flour qualities

- Strong flour
- Extensible, elastic dough
- Suited for long fermentation processes, large proving tolerance

- Light, voluminous baking products with a good volume

- Rigid, tough dough structure
- Poor extensibility
- Dough hardly rises during proving

- Results in small pieces of dough with poor spring

- Flour producing a wet, plastic dough
- Soft dough

- Narrow fermentation tolerance, dough tends to spread
- Small baking volume

- Flour not suitable for normal baking products

Automatic test evaluation

The Extensogram includes:

- Resistance to extension (5 cm)
- Resistance to extension (Max.)
- Extensibility
- Area below the curve (energy)
- Ratio number (Resistance 5 cm / extensibility)
- Ratio number (Max.) (Resistance max. / extensibility)

From these values, the rheological properties of the respective flour and the influence of flour additives (ascorbic acid, enzymes, emulsifiers) on the flour quality can be clearly recognized. Furthermore, the "rheological optimum" for the respective application of the flour can be determined and adjusted on the basis of the evaluation data.

... where quality is measured.
**Rheological optimum**

Different products require different flour qualities and dough properties. The “rheological optimum” characterizes the physical condition of a dough which, under the given processing conditions, supplies an optimum baking result.

The diagrams show the effect of various amounts of flour additives on the flour quality.

**Influence of additives**

- Increasing addition of ascorbic acid
  - no addition
  - highest addition

- Increasing addition of proteinase
  - no addition
  - highest addition

**Data correlation**

Use the powerful correlation program to compare diagrams and results of up to 10 tests with each other. Test conditions and results are contrasted in tables and evaluated statistically.

Quick assess trends or irregularities by drawing and printing the Extensograms of a proving time in a single diagram.

**Extensograph®-E**

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sample weight</td>
<td>300 g of flour + 6 g of salt + dest. water</td>
</tr>
<tr>
<td>Speed of balling unit</td>
<td>$83 \pm 3$ min$^{-1}$</td>
</tr>
<tr>
<td>Speed of dough roll</td>
<td>$15 \pm 1$ min$^{-1}$</td>
</tr>
<tr>
<td>Speed of stretching hook</td>
<td>$14.5 \pm 0.5$ mm/s</td>
</tr>
<tr>
<td>Force measurement</td>
<td>electronical</td>
</tr>
<tr>
<td>PC port</td>
<td>USB</td>
</tr>
</tbody>
</table>
| Mains connection       | $1x$ 230 V; 50/60 Hz + N + PE; 3.2 A
                      | $115 V; 50/60$ Hz + PE; 6.3 A                  |
| Dimensions (W x H x D) | Instrument with tray holder arms, without rack
                      | $850 \times 450 \times 630$ mm
                      | Space required (at table edge)
                      | $850 \times 1000 \times 630$ mm               |
| Weight                 | approx. 75 kg net                                |

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