

MeatMaster™ II



Introduction

MeatMaster™ II is a dedicated in-line process analyser designed for continuous fat and weight determination in natural fresh or frozen meat trimmings, meat cuts or minced meat.

MeatMaster II can determine the fat content in meat transported directly on a conveyor belt or meat packed in trays or cartons. The fat content of individual trays and cartons can be determined as well as entire batches of several tonnes of trays and cartons, or tonnes of loose meat passing by on the conveyor. In addition, MeatMaster II can detect Bone and Metal contaminants.

MeatMaster II has a total length of 2500 mm (98.4 inches) including a belt section for product in- and out-feed on each side and is applicable for measurements on meat in cartons and boxes as well as meat loose on the conveyor.

The Instrument can be configured with different conveyor speeds from 75 to 375 mm/sec (14.8, to 73.5 ft/min) in four steps, which determine the instrument capacity.

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Performance Data

Fat and Weight

| Meat presentation | Loose on the conveyor | Plastic wrapped, carton boxed or in white plastic boxes (Boxes without metallic additives) | In colored boxes i.e. E2 (some boxes contain a heavy element additive i.e Barium) | Notes and conditions. |
|---|--|--|--|--|
| Product fat range | 2-85 % Fat | 2-85 % Fat | 2-85 % Fat | 0-100 % fat is measured, but the accuracy cannot be guaranteed outside the fat range. |
| Product thickness range | 1-20 cm | 1-20 cm | 1-20 cm | Solid meat thickness. Outside an average product thickness of 5-15 cm, the accuracy and repeatability may be reduced. |
| FAT Accuracy error: (RMSEP)¹⁾ | ≤1 % absolute Average solid meat height 5-15 cm/subsample | ≤1 % absolute 20-30 kg in a box Average solid meat height 5-15 cm | ≤1.5 % absolute ²⁾ 20-30 kg in i.e. an E2 box (400 mm x 600 mm). Average solid meat height 5-15 cm | One standard deviation ³⁾ . |
| FAT Repeatability error⁴⁾ | ≤0.5 % absolute | ≤0.5 % absolute | ≤0.5 % absolute | One standard deviation ³⁾ . Sample size min. 20 kg and average solid meat height 5-15 cm |
| WEIGHT Accuracy error (RMSEP)¹⁾ | ≤2 % relative | ≤1 % relative | ≤1 % relative | One standard deviation ³⁾ Sample size min. 20 kg and average solid meat height 5-15 cm |
| WEIGHT Repeatability error⁴⁾ | ≤0.5 % relative | ≤0.5 % relative | ≤0.5 % relative | One standard deviation ³⁾ Sample size min. 20 kg and average solid meat height 5-15 cm |
| <p>¹⁾ Accuracy (RMSEP= Root Mean Square Error of Prediction). The accuracy should be evaluated on a large number of samples (minimum 24) and with a reference method with an accuracy error ≤0.5 % fat, including any sampling errors.</p> <p>²⁾ May be proven better depending on type of box and the structural variations between the boxes.</p> <p>³⁾ This means that 68 % of the samples will be within ±1 standard deviation and 95 % within ±2 standard deviations.</p> <p>⁴⁾ The repeatability is evaluated on consecutive measurements on the same sample.</p> | | | | |

Foreign Object Detection

Metal and bone detection is available for all conveyor speeds 75, 150, 250 or 375 mm/s. Performance (detection rate and number of false positives) depends on product presentation and the speed of the conveyor and the best performance is obtained with low speed (75 and 150 mm/s).

Metal Detection

A detection rate of approximately 99 % of metal object with a density higher than 7.85 g/cm³ (e.g. iron, stainless steel and copper) and a minimum size of 3 mm (118/1000 inch) should be obtained for all speeds. The actual performance should be determined on a project-to-project basis.

Bone Detection

A detection rate around 99 % for objects of 10 mm or more in any direction with a density of minimum 1.7 g/cm³ should be obtained for 75, 150 and 250 mm/s. For 375 mm/s the detection rate will be slightly poorer than for 75, 150 and 250 mm/s. The performance of bone detection is influenced by a number of factors such as product presentation, fat content, thickness of the meat and the speed of the conveyor.

Note:

Actual performance must be stated and experimentally verified on a project-to-project basis.

Conveyor Speeds and respective Capacity

The table below shows the four available belt speeds for the MeatMaster II and respective meat capacity.

| Application Conveyor Speed | Boxes or Crates ¹⁾ | Loose Meat |
|-------------------------------|-------------------------------|------------------------------|
| 75 mm/s (14.8 feet/min) | 415 units/h | 7.5 tons/h (16.500 lbs/h) |
| 150 mm/s (29.5 feet/min) | 830 units/h | 15 tons/h (33.000 lbs/h) |
| 250 mm/s (49 feet/min) | 1385 units/h | 25 tons/h (55.000 lbs/h) |
| 375mm/s (73.8 feet/min) | 2077 units/h | 38 tons/h (84.000 lbs/h) |

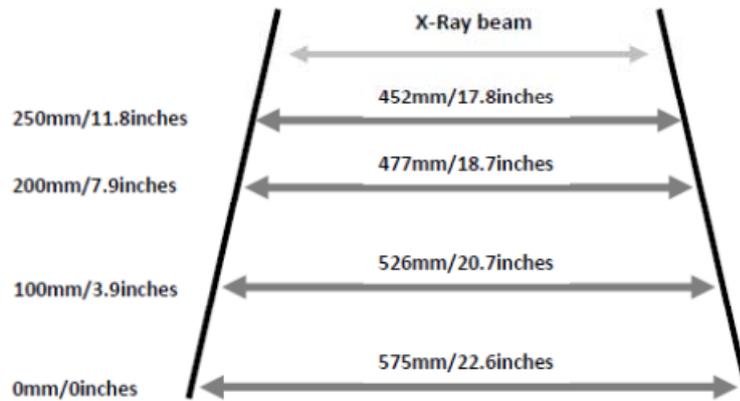
¹⁾ Example based on boxes or crates with a length of 600 mm. A minimum gap of 50 mm between boxes or crates is mandatory from the measuring point of view.

Note:

The exact capacity will depend on the conditions of use and will be estimated for each customer's application. A downtime of approximately five minutes each five hours for a reference measurement, which is needed to guaranty best performance, must be taken into consideration and is not included in above example.

Measurement Area

The figure illustrates a cross-section of the measurement area. The MeatMaster II comfortably accommodates all box and crate standards.



Weight and Dimensions

MeatMaster II 2500

| | |
|--------------------------------|---|
| Length (total) | 2,505 mm (9. 62 Inches) |
| Height (total) | Min. 2,456 mm (96.69 inches) Max. 2,522 mm (99.29 inches), feeds are adjustable |
| In-feed height | Min: 784 mm (30.87 inches) Max: 850 mm (33.46 inches) |
| Width (total) | 976 mm (38.43 Inches) (without additional back cabinet) 1,226 mm (48.27 Inches) (with additional back cabinet) |
| Space requirement [W*D] | 2,505 mm (98.62 Inches) * 2,700 mm (106 Inches) (calculated with additional back cabinet, 750 mm (29.5 Inches) free space both sides) |
| Tunnel aperture [W*H] | 575 mm (22.63 Inches) * 260 mm (10.23 Inches) |
| Weight (operational) | Approx. 1,000 kg (2,205 lbs) |

Instrument Data

| | |
|------------------------------------|---|
| Power supply | 220-240 V / AC \pm 10 %, 1 phase, 50/60 Hz (US/CAN: 120 V /AC \pm 10 %, 2 phase, 60 Hz) A line conditioner may be required depending on local conditions. FOSS offers a line conditioner for mounting inside the MeatMaster II instrument |
| Power consumption | Max. 1200 VA |
| Water requirements | Quality: Potable water, 8-15 °C (46-59 °F) and a maximum pressure of 10 bars (140 psi) |
| Water consumption | 60 l/h (16 U.S. gal/h) |
| Cooling need: 450 W | Local water recirculation setup might be considered |
| Water connections | In: Quick release fitting for hard plastic tubing (Pex) 12 mm outer diameter(e.g. fitting type: Norgren 102471228). Out: Quick release fitting for hard plastic tubing (Pex) 10 mm outer diameter (e.g. fitting type: Norgren 102251038) |
| Air requirements: | Clean dry air at min 2 bars (28 psi), a dew point lower than temperature at MeatMaster II location and a flow of approx. 15 l/min. (4 U.S. gal/min.) |
| Air connection | In: \varnothing 4/6 mm hose (inner dia. 4 mm / outer dia. 6mm) for pressurised air. |
| Ambient temperature | 2-15 °C (max dT/dt 3 °C/3h), 35-59 °F (max dT/dt 5.5 °F/3h) (Please contact Foss ANA in case ambient temperature is >15 °C) |
| Ambient humidity | 5–95 % RH |
| Degree of protection | IP 69 K (Except X-ray warning lamp and Touch Screen Panel surface. (Stainless steel protection hood for Touch Screen Panel will be supplied with instrument) |
| Noise level | < 70 dB |
| X-ray | |
| X-ray source | Operated at 140 kV / 3 mA |
| X-ray emission | MeatMaster II is shielded to <1 μ Sv/hour or <2 μ Sv/hour at a distance of 5 cm (2 inches) depending on configuration |
| X-ray dose received by meat | < 0.000005 Gy (Grey) |

Data Connection

- Ethernet 10/100
- OPC data standards
- Internet access for remote support min. 1.4 Mbytes/s

Standards and Approvals

MeatMaster II is CE or UL labelled and complies with the following directives:

- EMC (Electromagnetic Compatibility) Directive 2004/108/EEC
- LVD (Low voltage directive) 2006/95/EEC
- MD (Machine Directive) 2006/42/EEC

Patents

Patent No.:

- US: 6600805
- CA: 2387756
- AU: 768044
- NZ: 518315
- EP: 1226431

Reference Methods

- Schmid-Bondzynski-Ratslaff (SBR) method No. 131, 1989 from the Nordic Committee for Food Analysis (NMKL)
- ISO 1443:1973 Fat in Meat Products

Installation

The analyser is of a robust design. We recommend nevertheless that the installed unit is protected by concrete mounted poles or rails that prevent the unit from being hit by passing vehicles. Such devices are not part of a FOSS delivery unless specified.