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PFEUFFER

Operating instructions

Electronic moisture meter **HOH-EXPRESS**

HE 90



Pfeuffer GmbH
Flugplatzstraße 70
97318 Kitzingen
GERMANY
Phone: +49 9321 9369-0
info@pfeuffer.com
www.pfeuffer.com

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Translation of the original operating instructions



These operating instructions form part of the electronic moisture meter HE 90 and must be available to the operating personnel at all times. They are intended for the owner of the system, the operating personnel and the specialists who are responsible for transport, installation, setup, commissioning, operation, maintenance, cleaning, dismantling and disposal.

The Pfeuffer GmbH has prepared and reviewed these Operating Instructions with the greatest care. However, no guarantee is made for its completeness or accuracy.

Subject to technical modifications.

Translation

In the event of delivery of subsequent sale to the countries of the European Economic Area (EEA), the operating instructions must be translated into the corresponding language of the country of use. In the event of discrepancies in the translated text, the original operating instructions (German) must be used for clarification, or the manufacturer must be contacted.

Operating instructions in electronic format

The original operating instructions (German) and translations of the original operating instructions can be requested as PDF files by e-mail: doku@pfeuffer.com. Specifying the correct type designation and serial number is important for further processing!

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(DIN ISO 16016)

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1 Introduction

1.1 Designated use

The HOH-EXPRESS HE 90 is a versatile and precise moisture meter for agriculture. The HE 90 can be used to determine the moisture content of grain, milled products, maize (corn), oilseeds and legumes. Products such as spelt, triticale, soya bean meal and soya beans can be replaced by other products such as timothy grass, linseed, etc. The HE 90 can be programmed with up to 28 calibrations. It is equipped with an integrated receipt printer. With an optionally available PC interface (RS232), the measurement results can be transferred to a computer or directly to an accounting system.

The HE 90 is configured as a portable instrument with a mains plug.

Private use of the HE 90 is not allowed.

NOTICE

The HE 90 is exclusively intended for the indicated purpose.

Any other use beyond this definition, or conversion of the HE 90 without written consultation with Pfeuffer GmbH, is regarded as not in accordance with the designated use.

Pfeuffer GmbH will not be liable for any damage resulting from this! The risk is the responsibility of the owner alone.

The HE 90 is only allowed to be taken into operation if it can be ensured that all safety devices are functioning.

The measurement of liquid products is prohibited.

The samples to be used in accordance with the designated use of the HE 90 are obtained by the owner.

Correct treatment of these materials and the associated risks are exclusively the responsibility of the owner.

The owner must provide information about dangers and disposal.

The designated use also includes complying with the operating instructions as well as the maintenance and servicing conditions as defined in these operating instructions.

These operating instructions do not release the owner from its responsibility to develop and apply, or have applied, health and/or safety regulations appropriate for the requirements of the overall system, and to monitor compliance with the same.

1.2 Declaration of Conformity**EU Declaration of Conformity**

In accordance with the EU directives:

- Electromagnetic Compatibility (EMC) 2014/30/EU

Manufacturer: **PFEUFFER**

Pfeuffer GmbH
Flugplatzstraße 70
97318 Kitzingen
GERMANY

Phone: +49 9321 9369-0
info@pfeuffer.com
www.pfeuffer.com

This Declaration of Conformity is issued under the sole responsibility of the manufacturer.

Person authorized to compile the technical documents:

Lothar Pfeuffer, General Manager

Product: Moisture meter HOH-EXPRESS **HE 90**

Serial number: _____

The aforementioned product complies with the requirements of the following harmonized standards:

DIN EN 61010-1:2011

DIN EN 61000-6-2:2011

DIN EN 61000-6-3:2011

Any modification to the HE 90 not agreed with us shall result in this declaration becoming null and void.






Kitzingen, _____

Lothar Pfeuffer, General Manager









1.3 Structural features of the danger notes

The operating instructions from Pfeuffer GmbH contain instructions that you must comply with for your personal safety as well as to avoid damage to property. The instructions for your personal safety are highlighted by a warning triangle.

Comply with the following categories of danger notes and explanations of symbols:

<p>Pictogram</p> 	<p> SIGNAL WORD</p> <p>Type of danger and its source Possible consequence of failure to comply ⇒ Measure to guard against the danger.</p>
<p> DANGER</p> <p>This is a warning about a highly dangerous situation that will lead to serious or fatal injuries.</p>	
<p> WARNING</p> <p>This is a warning about a dangerous situation that may result in serious or fatal injuries.</p>	
<p> CAUTION</p> <p>This is a warning of a possibly dangerous situation that will lead to slight or moderate injuries.</p>	
<p>NOTICE This is a warning about harmful situations for the product and/or environment.</p>	

1.4 Pictograms in the operating instructions

	<p>Notes of particular importance and/or additional information</p>		<p>Warning</p>
	<p>Comply with the operating instructions</p>		<p>Warning of electrical voltage</p>
	<p>Pull out mains plug</p>		<p>Warning of hand injuries</p>
	<p>Protective earth connection</p>		<p>Recycling marking – Supply refuse for recycling</p>

1.5 Identification

The information in these operating instructions applies exclusively to the instrument with the type designation indicated on the title sheet. The type plate with the type designation is located on the side of the case and on the measuring instrument. It is important for all questions to specify the correct type designation, serial number and year of manufacture. Only in this way will rapid processing be possible.

Sample Pfeuffer GmbH type plate:



2 Safety

NOTICE It is strictly prohibited to deactivate the safety devices or modify their mode of effect.

2.1 Built-in safety systems

The built-in safety systems must be checked at regular intervals with the corresponding test methods, see the following table:

Test intervals	Test methods
d = daily	V = Visual inspection
w = weekly	F = Function test
m = monthly	M = Measurement
¼ y = every three months	
½ y = every six months	
y = yearly	

Mains disconnecter for a portable instrument

The connection for the mains cable (cold-device plug IEC 60320 C14) is located on the left side of the case.

Test	
Interval	Method
y	F



- ⇒ In an emergency, disconnect the mains cable from the electrical power supply, or pull out the cold-device coupler (IEC 60320 C13).
- ⇒ Secure the mains cable appropriately against unauthorized reconnection by placing it where it can be monitored continuously.



Arrange the plug/socket combination at the place of installation so that it can be observed clearly and reached quickly in an emergency.

2.2 Operating and danger areas on the HE 90

Operating area

Make sure the installation height is sufficient (according to the stature of the operating personnel).

Danger area

The entire area one meter around the HE 90 is a danger area during maintenance and repair work. Keep the area around the HE 90 clear of objects.

2.3 Operating and maintenance personnel

Operating and maintenance personnel are people who are responsible for transport, installation, setup, operation and cleaning of the HE 90, and for eliminating malfunctions.

1. The HE 90 is only allowed to be operated by authorized and instructed people.
2. The responsibilities for operating the HE 90 must be clearly defined and complied with so that no unclear competencies arise with regard to the aspect of safety.
3. The switch-off procedure specified in the operating instructions must be complied with during all work (operation, maintenance, repair, etc.), see **chapter 2.8**.
4. The operator must refrain from any working method that impairs safety on the HE 90.
5. The operator must ensure that only authorized people work on the HE 90.
6. The operator is obliged to report immediately to the owner any changes that take place on the HE 90 which impair safety.
7. The operating personnel must be provided by the owner with appropriate protective equipment in accordance with legal requirements and the material to be processed.
8. The owner must issue regular instructions regarding the use of personal protective equipment, and must check such equipment is being used.

2.4 Safety measures (to be carried out by the owner)

It should be noted that the owner is responsible for the following aspects with regard to the operating and maintenance personnel

- ⇒ Providing instruction in the protective instruments for the HE 90
- ⇒ Monitoring compliance with the safety measures

The work described in these operating instructions is configured in such a way that

- ⇒ it is explained in the chapters Function and Operation for the operating personnel
- ⇒ it is explained in the chapters Delivery, Transport and storage, Installation and commissioning, Maintenance and cleaning, Malfunctions – causes and rectification and Dismantling and disposal for a **specialist operator**.

The chapters Delivery, Transport and storage, Installation and commissioning, Maintenance and cleaning, Malfunctions – causes and rectification and Dismantling and disposal are **only intended for specialist operators**. Work described in this chapter is only to be carried out by **specialist operators**.

Instructed person

A person who has been instructed and, if necessary, trained by a **specialist operator** regarding the tasks assigned to him/her and the possible dangers in the event of incorrect conduct, and who has also been instructed regarding the necessary protective instruments and protective measures.

Specialist operator

An individual who, due to his/her relevant specialist training and/or experience, is capable of recognizing risks and avoiding dangers that may occur during use of the product.

(Definition according to DIN EN 82079-1:2013-06)

Obligations on the owner



In the European Economic Area (EEA), national implementation of the framework directive 89/391/EEC and corresponding individual directives, in particular the directive 2009/104/EC concerning the minimum health and safety requirements for the use of work equipment by workers at work, as amended, are to be observed and adhered to.

In addition, he/she must comply with the local legal requirements on:

- ⇒ Safety of personnel (accident prevention regulations)
- ⇒ Accident prevention regulation DGUV Regulation 3 (previously BGV A 3) "Electrical systems and equipment" (DGUV = Association of German Statutory Accident Insurance)
- ⇒ Safety of work equipment (protective equipment and maintenance)
- ⇒ Product disposal (waste legislation)
- ⇒ Material disposal (waste legislation)
- ⇒ Cleaning (cleaning agents and disposal)
- ⇒ Hazardous substances (in Germany, the technical rules for hazardous substances – TRGS 555 apply)
- ⇒ Environmental protection regulations

Electrical connections



The HE 90 is only allowed to be connected to a socket earthed in accordance with the regulations, using a protective conductor.

Illuminance



The owner must ensure that there is adequate and homogenous illumination in all areas. At least 300 lux is recommended (maintained illuminance).
In Germany, ASR A3.4 applies (workplace directive – artificial lighting).

2.5 General safety notes



The safety equipment and safety notes described in these operating instructions must be complied with.



1. Disconnect the HE 90 from the mains if there are malfunctions.
2. Disconnect the HE 90 from the mains before cleaning work.
3. Do not allow the HE 90 to get wet during transport, storage, cleaning and operation.
4. Make sure that the HE 90 is only operated when in correct working order.
5. Never touch the mains cable with moist hands.
6. Only use genuine spare parts and accessories (see **chapter 11**).

2.6 Safety tests

Pfeuffer GmbH carried out the following safety tests at the factory:

Testing and checking according to DIN EN 60204-1:

- Check that the electrical equipment is in compliance with the technical documentation.
- Continuous connection of the protective earth system
- Insulation resistance tests
- Voltage tests
- Protection against residual voltages
- Function tests

The functions of the electrical equipment, in particular those relating to safety and protective measures, have been tested.

2.7 Residual dangers in connection with the HE 90

⇒ During all work on electrically operated components, pay attention to dangers from electrical current.

2.8 Switch-off procedure



! DANGER

Touching live parts can be fatal!

It is essential to comply with the following switch-off procedure prior to cleaning, maintenance or repair work (only by specialist personnel):



⇒ Disconnect the mains cable from the electrical power supply, or pull out the cold-device coupler (IEC 60320 C13).

⇒ The mains cable must be able to be kept under the direct supervision of the person in the danger area.

⇒ During cleaning, make sure that no water, steam or dust can penetrate the electronics area.

3 Technical data

HOH-EXPRESS HE 90	Moisture meter
Products	Grains, maize, legumes, oil seeds
Calibrations	14 (optional up to 28)
Parameter	Moisture
Measuring time	approx. 30 seconds

3.1 Dimensions and weight

Height	130 mm
Width	540 mm
Length	270 mm
Weight, netto	approx. 9 kg

3.2 Power supply

Operating voltage/frequency	230 V _{AC} , 50/60 Hz, on request (115 V _{AC} , 50/60 Hz)
Power consumption	50 VA
Internal fuse	800 mA slow-blow glass microfuse 5x20 mm
Mains cable	With removable supply cable (cold-device cable IEC 60320 C13); 10 A, 250 V
Installation regulations	Configured according to VDE

3.3 General data

Temperature storage and transport	-15 °C to +55 °C
Temperature measurement	+10 °C to +45 °C
Atmospheric humidity	20 % to 90 % non-condensing

4 Delivery, transport and storage



The Delivery, transport and storage chapter is only intended for **specialist operators**.

4.1 Scope of delivery

The standard scope of delivery to the owner comprises:

1. Operating panel with display, measuring device and printer (in hardwood carrying case)
2. Measurement cell (upper and lower part) with temperature sensors and handles
3. Hand mill for the grinding of wheat, durum, rye, barley, triticale, rapeseed, etc.
4. Measuring cup "0,02 l" and measuring cup "Raps" (Rapeseed)
5. Funnel with protection for spindle
6. Cleaning brush (2x black, with hard bristles, 1x with soft bristles) and hand brush
7. Cleaning screw for measurement cell
8. Mains cable with removable connection (cold-device cable IEC 60320 C13)
9. Screw clamp for secure attachment on a work table (2 pieces)
10. Operating instructions HE 90

The relevant item numbers can be found in **chapter 11**.

4.2 Transport and packaging

Systems, machines and instruments from Pfeuffer GmbH are carefully tested and packaged prior to dispatch, however it is not possible to exclude the risk of damage during transport.

Incoming check

Check for completeness with reference to the delivery note.

In case of damage

Check the delivery for damage (visual inspection).

In case of complaints

If the delivery suffered damage in transit:

- ⇒ Keep the packaging (to allow it to be checked subsequently by the forwarding company, or for sending back).
- ⇒ Immediately inform the supplier or Pfeuffer GmbH.

4.3 Intermediate storage

The freight packaging of the HE 90 and the accessory/replacement parts is configured for a storage duration of up to six months from delivery.

- ⇒ Do not place any heavy objects on the packaging.
- ⇒ **Storage conditions**
- ⇒ Enclosed, dry room with a room temperature between min. -10 °C and max. +55 °C.

Packaging for return delivery

- ⇒ If possible, use the original packaging and the original packaging material. If neither is available any longer, request new packaging from Pfeuffer GmbH.

5 Installation and commissioning**Installation**

- ⇒ Carefully unpack the HE 90.
- ⇒ Place it horizontally on a solid table with a smooth, clean surface.
- ⇒ Make sure there is an adequate distance to all sides so that no heat build-up can occur.
- ⇒ Avoid exposure to direct sunlight and extreme ambient conditions.
- ⇒ Make sure that the installation height is ergonomic according to the stature of the operating personnel.
- ⇒ Fasten the equipment case to the tabletop using the two screw clamps.
- ⇒ The cover of the carrying case is removable. The required space can thus be reduced to a minimum. For longer periods of use, it is advisable to close the cover again to protect the instrument from dust.



Installation in unheated, draughty and dusty surroundings can have a negative effect on the service life of the HE 90.

- ⇒ Connect the supplied mains cable (cold-device cable IEC 60320 C13) to the HE 90.



⇒ Connect the plug of the mains cable to a suitably earthed socket with protective earth conductor.

- ⇒ Take the HE 90 into operation according to the instructions in **chapter 7**.

6 Function

6.1 Components



Figure 1: Overview HE 90

Item	Designation
1	Display
2	Keyboard with product assignment
3	ON/OFF button
4	Printer
5	Hardwood carrying case
6	Measurement cell (upper and lower part) with temperature sensors and handles
7	Accessory compartment cover with:
	Hand mill for the grinding of wheat, durum, rye, barley, triticale, rapeseed, etc.
	Funnel with protection for spindle, measuring cup "0,02 l" and "Raps" (Rapeseed)
	Cleaning screw for measurement cell
	Cleaning brush (2x black with hard bristles, 1x with soft bristles) and hand brush
	Mains cable with removable connection (cold-device cable IEC 60320 C13)
	Screw terminal for secure attachment on a work table (2 pieces)
not ill.	Cold-device plug (IEC 60320 C14) for connecting the mains cable (on the left side of the case)

6.2 Sequence of functions

The HE 90 is a moisture meter and is used to measure for almost all agricultural grain crops (also for flour and meal products). There are many different calibrations available, see **chapter 8.2**.

Switch on the HE 90 via the ON/OFF button on the operating panel. Grind the sample (approx. 20 ml) with the grain cutter or optionally with the Milomat laboratory mill. Place the lower part of the measurement cell on the holding device. Attach the handles to the upper part of the measurement cell. Turn the upper part of the measurement cell in as far as it will go to the limit stop. Select the appropriate product button on the operating panel to start the measuring process. The sample temperature is automatically measured and taken into account. After 30 seconds, the exact measurement result is shown on the display and can be printed out.

For precise information about operation, refer to **chapter 7**.

7 Operation



The HE 90 is only allowed to be operated by personnel who have been qualified and trained in its operation.

7.1 Operating elements

NOTICE Protect the HE 90 against direct sunlight and extreme temperatures in excess of +50 °C!

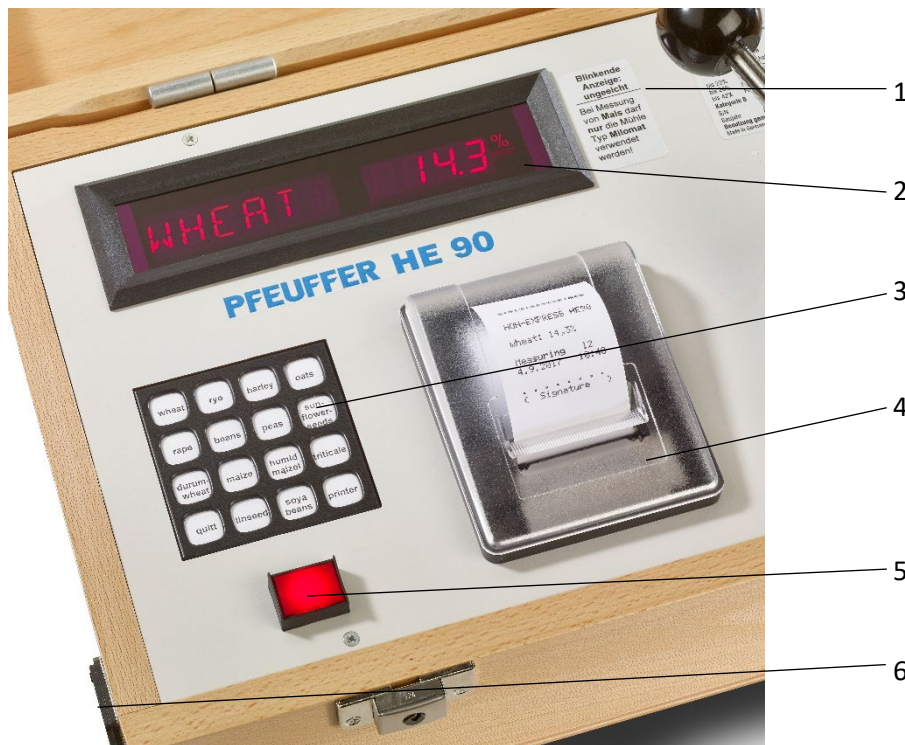


Figure 2: Operation HE 90

Item	Designation
1	Important notice label: Flashing display: not approved For example: When measuring maize, only the Milomat mill may be used!
2	Display with measurement result in percent
3	Keyboard
4	Receipt printer
5	ON/OFF button
6	Cold-device plug (IEC 60320 C14)

ON/OFF button

The red ON/OFF button is used to switch the instrument on. The control lamp in the button lights up. **TEST** is shown in the display. After a short time, the digital display flashes; all segments must light up! The control process is finished by pressing the **quitt** button. The instrument is ready for operation and measurement, if **SORT** is displayed.

Keyboard

Standard programming:

wheat	rye	barley	oats
rape-seed	beans	peas	sun-flowers
durum	maize normal	maize special	triticale
quitt	lin-seed	soya beans	printer

Activation of the second product level

The second product level is activated by pressing the button **quitt twice**. On the HE 90 accessory compartment cover, you can specify which products can then be selected and measured (chargeable additional programming).

Display texts in the different languages

DE	EN	FR	GR	HU	IT	NL	PL	PT	SK	ES	RO
ART	SORT	PROD	YLIKO	FAJTA	Prod	Prod	PROD	PRODUT	Druh	PROD	produs
ZEIT	TIME	TEMPS	OPA	IDOE	Tempo	Tijd	CZAS	TEMP	Cas	TIEMPO	timp
TEST	TEST	TEST	DOKIMH	TESZT	TEST	Test	TEST	TEST	Test	TEST	test
MESS-Z	MEAS-C	M-CELL	OP MET	MEROEC	Cella	MESS-Z	KOMORA	M-CEL	Msonda	CEL-ME	cel-m
LEER	EMPTY	VIDE	KENO	UERES	Vuoto	Leeg	PUSTY	VAZIA	Prazdn	VACIO	gol
ZELLE	CELL	ZELLUL	KYPSEL	CELLA	Cella	ZELLE	ZLAKOM	CELUDA	Sonda	CELDA	celula
ERROR	ERROR	FAUTE	ERROR	HIBA	Errore	ERROR	BLAD	ERROR	Chyba	ERROR	eroare

7.2 Setting the clock (option)

Switch on the instrument and press the button **quitt**. Press the buttons **quitt + quitt + printer** in a distance of about 0.5 seconds. The message **CLOCK** displays. If not, please repeat the procedure! The configuration of the buttons will be the following:

start		↑	store
		↑	
		↑	zero
quitt	←	↓	→

By means of the buttons ← and → the current setting can be checked. The sequence is the following: year, month, date (= calendar day), day (= weekday), hour, minute, second and number.

By means of the buttons ↑, ↗, ↘ and ↓ the requested value can be set. By means of the button **zero** the value is set to 0. By pressing the button **Store** the value is stored. The display remains dark for one second for control purposes.

A setting of the seconds is not possible. The display is used for control purposes to assure that the clock is working. After each pressing of the button **store** the seconds are set to 0.

Press the **start** button to begin the set date/time.

Press the **quitt** button to switch over to the normal mode.

7.3 Preparation of a sample

NOTICE ⇒ Select a **representative sample** for the measurement.

For information and notes about sampling, refer to the standard:
DIN EN ISO 24333: 2010 Cereals and cereal products – Sampling

Optimum, repeatable results can be achieved with **cleaned samples**.

Extraneous components must be removed prior to the measurement!

Measuring temperature	Atmospheric humidity
+10 °C to +45 °C	20 % to 90 %, non-condensing

Measurements below or above the specified measuring temperature are possible, but represent a risk of inaccurate measurement values!

⇒ Allow the product samples to acclimatize to room temperature!

This applies in particular to:

- Frozen samples, because the condition of aggregation of water is significant for the measurement.
- Hot samples taken during the drying process, for example.

In products with an extreme **surface moisture level**, drying is required for homogenization.

Measurement results from samples that are already releasing a fermentation odour can display greater errors than freshly harvested samples.

To achieve an accurate measurement result, it is necessary to have a **sample quantity** of **0,02 l** (corresponds to the supplied measuring cups).

7.4 Grinding the sample and filling the measurement cell

NOTICE **The parts of the measurement cell cannot be exchanged by mistake.**

This does not apply to older instruments. Attention must be paid that these parts are not exchanged. This can lead to incorrect measurements! The parts of the measurement cell are numbered. The upper and the lower part are marked with the same number.

NOTICE Remove moist grist from the measurement cell immediately after the measurement!
Clean the hand mill or laboratory mill, measurement cell and the spindle after each measurement, see **chapter 6.1**.

7.4.1 Grinding with the hand mill

NOTICE The products **oats, spelt, maize (corn)** and **sunflower seeds** must not be grinded with the hand mill!

Substantiation:
Grinding these products requires a lot of force, especially for very dry products (< 14 % moisture) and for very moist products (> 24 % moisture). Products with a high husk/glume content (e.g. oats, spelt) have problems with the grains being drawn into the knife disc.
The grinding of maize (corn) and sunflower seeds takes longer than that of cereals, because the smooth surface of the grains means that the knife disc hardly finds any points of attack. In addition, the cleaning effort is enormous.



Figure 3: Hand mill and lower part of measurement cell

- ⇒ In case of the product **wheat, durum, rye, barley** or **triticale** fill the measuring cup 0.02 l brimfully by shaking.
- ⇒ In case of **00 rapeseed** fill the measuring cup "Raps" (Rapeseed) brimfully by shaking.

Place the hand mill on the lower part of the measurement cell. The screw cap of the hand mill cover must be firmly tightened. The measuring cup is poured into the hand mill. The crank handle of the hand mill is turned clockwise, until no sensible resistance can be felt (approx. 15 s). The coarse meal falls directly into the measurement cell.

The hand mill is removed, the upper part of the measurement cell is placed onto the spindle and turned up to the limit stop.

Should it not be possible to grind the sample properly, this might be due to worn knives of the hand mill or to a faulty crank – Replacement see **chapter 9.2.1** and **9.2.2**.

Should the replacement not lead to an improvement, then the hand mill must be returned to the manufacturer (Pfeuffer GmbH) or to an authorized dealer for repair.

7.4.2 Grinding with the laboratory mill Labomil



The **Labomil** laboratory mill is no longer part of the Pfeuffer product range. It has been replaced by the **Milomat** laboratory mill.

If you have any questions, please contact Pfeuffer GmbH.



Figure 4: Labomil and measurement cell lower part; adjustment of the lateral lever on the Labomil

- ⇒ In case of the product **wheat, durum, rye, barley, triticale, oats** or **sunflower seeds**, fill the measuring cup 0.02 l brimfully by strongly shaking.
- ⇒ In case of **00 rapeseed** fill the measuring cup "Raps" (Rapeseed) brimfully by shaking.
- ⇒ For **maize (corn)** see **chapter 7.5**.

Place the measurement cell lower part under the mill outlet. Slide the outlet onto the measurement cell by turning the outlet by about 20° to the left and then push it downwards. The sealing rubber must be placed on the measurement cell edge. The integrated spindle protection prevents the spindle from being soiled.

Adjust the lateral lever according to the used sample type: **Top position** for **moist maize (corn), sunflower seeds, oats**. Lower position for all other products.

Switch on mill and wait until the mill has started. Fill in the measuring cup and press the dosage button on the filling funnel slowly downwards until the filling funnel is completely emptied. Let the mill run for about 10 seconds until all grains are grind. Open the grinding chamber and clean the outlet with a brush. Push the outlet upwards and fix it by short turning it upwards to the right.

Remove the lower part of the measurement cell and place it on the measurement instrument. Insert the upper part of the measurement cell as far as it will go to the limit stop.



For further information on the **Labomil** laboratory mill, please refer to the separate operating instructions.

7.4.3 Grinding with the laboratory mill Milomat



Figure 5: Milomat and measurement cell lower part; turn the dosage button of Milomat

- ⇒ In case of the product **wheat, durum, rye, barley, triticale, oats** or **sunflower seeds**, fill the measuring cup 0.02 l brimfully by strongly shaking.
- ⇒ In case of **00 rapeseed** fill the measuring cup "Raps" (Rapeseed) brimfully by shaking.
- ⇒ For **maize (corn)** see **chapter 7.5**.

Place the measurement cell lower part under the mill outlet. Slide the outlet onto the measurement cell by turning the outlet by about 20° to the left and then push it downwards. The sealing rubber must be placed on the measurement cell edge. The integrated spindle protection prevents the spindle from being soiled.

Switch on mill and wait until the mill has started. Fill in the measuring cup and turn the dosage button on the filling funnel slowly to the back until the filling funnel is completely emptied. If necessary, repeat if not all the grains fall into the grinding chamber during the first turn. Let the mill run for about 10 seconds until all grains are grind. Open the grinding chamber and clean the outlet with a brush. Push the outlet upwards and fix it by short turning it upwards to the right.

Remove the lower part of the measurement cell and place it on the measurement instrument. Insert the upper part of the measurement cell as far as it will go to the limit stop.



For further information on the **Milomat** laboratory mill, please refer to the separate operating instructions.

7.4.4 Grinding with the electric grinder Multimix MX 32



The Multimix MX 32 electric grinder is no longer commercially available.



! WARNING

The Multimix MX32 electric grinder complies no longer with the valid safety regulations (no CE marking!).



When the glass of the grinding attachment is removed, the grinder does not prevent the appliance from being switched on.

The running knife is freely accessible; there is an acute risk of injury!



Open grinder!

Risk of injury from moving components!

Injuries of the hands and fingers!



During cleaning, maintenance or repair work:

⇒ Disconnect the power plug.

⇒ Pay attention to all rotating and moving parts.



⇒ Do not reach into the working area of the moving parts during operation.

⇒ Never open protective covers during operation.



Figure 6: Electric grinder Multimix MX 32 with grinding attachment

⇒ In case of the product **oats**, fill the measuring cup 0.02 l brimfully and put it into the grinding attachment of the electric grinder.

The grinding time is 30 seconds at switch position III. After the grinding, the grinding attachment is placed upside-down for cooling for 30 s.

The funnel with spindle protection is used to fill the measurement cell and prevents the threads from being blocked with grist.

The grinding attachment is placed with the glass downwards. The oats are completely emptied into the measurement cell with the brush.

Turn the funnel by one rotation, in order to distribute the coarse oats meal uniformly inside the measurement cell. The funnel is removed and the upper part of the measurement cell is closed up to the stop.

⇒ In case of the product **sunflower seeds**, fill the measuring cup 0.02 l brimfully with the cleaned sample.

The contents of the measuring cup is grinded for 15 s at switch position III by means of the electric grinder and then cooled for 30 s. The measurement cell is filled and closed as described above.



If the knives of the electric grinder are worn, they have to be replaced. Item number see **chapter 11**.

7.5 Sample preparation and grinding of maize (corn)

NOTICE When measuring maize, note that the program for the maize calibration of the HE 90 must be adapted to the corresponding mill.
A label over the display of the HE 90 indicates whether the calibration is programmed for Multimix, Labomil or Milomat.
You can also determine this status by reading a check number (checksum). To do this, press the **quitt** button **three times** with a distance of approx. 0.5 seconds. The instrument now shows **CRC** and the check number.
It is as follows for the different types of mills:
Multimix MX 32 **A221**, Labomil **7451**, Milomat **6594**
Press the **quitt** button to switch back to normal mode.

7.5.1 Maize with a moisture content of 10 % to 27 % – Determination with the standard measurement cell

⇒ Fill one measuring cup 0.02 l brimfully with maize grains by strongly shaking.

Grinding with the laboratory mill **Labomil**: Proceed as described in **chapter 7.4.2**.

Grinding with the laboratory mill **Milomat**: Proceed as described in **chapter 7.4.3**.

Grinding with electric grinder **Multimix MX 32**: The sample is grinded in the electric grinder in switch position III for **60 s**. Subsequently allow to cool down for 30 s. Proceed as described in **chapter 7.4.4**.

7.5.2 Maize with a moisture content of 23 % to 42 % Feuchte – Determination with the special measurement cell for moist maize

⇒ Fill one measuring cup heaped with maize grain by strongly shaking.

⇒ Grinding with the laboratory mill **Labomil**: Proceed as described in **chapter 7.4.2**.

⇒ Grinding with the laboratory mill **Milomat**: Proceed as described in **chapter 7.4.3**.

Grinding with electric grinder **Multimix MX 32**: The sample is grinded in the electric grinder in switch position III for **30 s**. Subsequently allow to cool down for 30 s. Using the special measurement cell for moist maize (item no. 2190 0040), proceed in the same way as described in **chapter 7.4.4**.

7.5.3 Increasing the measurement accuracy for moist maize

The high non-homogeneity of moist maize can be compensated by means of the following procedure in order to increase the measurement accuracy.



Figure 7: Sample dividing cup with separating sheet and stirring stick (option)

Laboratory mill Labomil:

⇒ Fill two measuring cup heaped with maize grain by strongly shaking.

Place the sample dividing cup under the mill outlet instead of the lower part of the measurement cell. Grinding process see **chapter 7.4.2**.

Laboratory mill Milomat:

⇒ Fill two measuring cup heaped with maize grain by strongly shaking.

Place the sample dividing cup under the mill outlet instead of the lower part of the measurement cell. Grinding process see **chapter 7.4.3**.

Electric grinder Multimix MX 32:

⇒ Fill the two measuring cups into the grinding attachment of the electric grinder and grind it for 30 s at switch position III. Then cool it down for 30 s. Fill the complete contents of the grinding attachment into the sample dividing cup.

After grinding, mix the sample well in the sample dividing cup using the stirring stick and smooth the surface of the sample by shaking gently. Insert the separating sheet into the guide of the cup and fill the partial sample into the special measurement cell for moist maize (item no. 2190 0040) using the filling funnel.

Turn the filling funnel by one rotation so that the coarse maize meal is evenly distributed in the measurement cell. Remove the filling funnel and screw in the upper part of the measurement cell as far as it will go to the limit stop. To improve the accuracy, carry out a measurement with the second part of the sample as well.

7.6 Measurement

Fill the grinded product into the lower part of the measurement cell. Attach the handles to the upper part of the measurement cell. Screw the upper part of the measurement cell in as far as it will go to the limit stop. Place the measurement cell on the holding device of the measuring instrument. Press the appropriate button with the sample designation, e.g. **wheat**. The measuring process starts.

A temperature adjustment time of 30 seconds runs automatically, visible on the **TIME** display counting down from 30.

If an incorrect product was selected, the measurement can be aborted with **quitt** (display **SORT**) and restarted immediately.

After the temperature adjustment time has passed, the moisture content is shown in percent [%] on the display.

For instruments equipped with a serial interface (option), the selected product, as well as the measured moisture, is now transmitted to the computer.

By pressing the **printer** button, the measurement result is output from the printer as a receipt.

If the allowed measuring range of the concerning measurement cell is exceeded during the moisture analysis of maize, this is indicated by a flashing display or by the **EEEE** display (see error messages in **chapter 10**). The measurement must then be repeated with the appropriate measurement cell.

Display of the second product level see **chapter 7.1**.

NOTICE

The measurement cell must be cleaned carefully after each measurement, see **chapter 9.1**. The instrument is then ready for the next measurement operation.



The measurement reliability is increased if two or three moisture content values are determined from the same sample and the **average value** is calculated from them.

8 Additional products

In the following various methods for the determination of special products are represented in tabular form as examples.

- ① You are looking for your product range in the **overview 8.2**. E.g. "red fescue". Then go to the "Prepare as" column. In this column **007** is indicated. If, for another product, **002** (15 s), is indicated, that means that this product must be measured in the same way as **002**. The grinding time, however, is 15 seconds.
- ② You look in **table 8.1** "prepare as" for the preparation you are looking for. In the example **007**. There you will now find all further information
- ③ The first column indicates, whether the product must be crushed manually (e. g. by means of a chopping knife). The weight indication opposite to the point describes the quantity to be grinded. In case of **007** no point is indicated, that means that no pre-grinding is necessary.
- ④ The following three columns indicate which measuring cup respectively which weight must be applied for the measurement. Two points correspond to two measuring cups. In case of **007** one point is indicated for 0.02 l.
- ⑤ The next following two columns indicate, whether brimful or heaped measuring cup shall be used. In case of **007** one brimful measuring cup is used.
- ⑥ The next column indicates how often the measuring cup must be jammed in order to compress the sample inside the measuring cup. In case of **007** the measuring cup must be jammed 10 times. That means one heaped measuring cup is filled and then jammed 10 times. Afterwards the heaped quantity is removed.
- ⑦ In the following three columns the type of grinding is indicated. The product is either filled directly into the measurement cell without grinding or grinded by means of the hand mill, laboratory mill Milomat/Labomil or the electric grinder Multimix MX32. In case of **007** no grinding is necessary.
- ⑧ Should the product be grinded by means of the electric grinder Multimix MX32, the grinding time is indicated in the next column. Basically grinding at switch position III.
- ⑨ The following column indicates the cooling period after the grinding. Normally 30 seconds (concerns only to electric grinder Multimix MX32).
- ⑩ The measurement cell is then closed and the corresponding product button for e.g. "red fescue" is pressed. The time runs backwards. The measurement starts. The result is displayed after 30 s, e.g. **r.fesc. 11,2 % M**

In short form:

- ① Red fescue (**overview 8.2**)
- ② Prepare as **007** (**table 8.1**)
- ③ Pre-grinding and weight (not necessary)
- ④ 1x 0,02 l measuring cup
- ⑤ Filled brimfully
- ⑥ 10 times jamming
- ⑦ Without grinding into measurement cell
- ⑧ Grinding period (not necessary)
- ⑨ Cooling period (not necessary)
- ⑩ Close measurement cell, press the button for red fescue, indication of measurement result after 30 s

8.1 Table "Prepare as"

① Select product in **chapter 8.2.**

⑩ Close measurement cell, press product button.

②	Pre- paration	③	④			⑤		⑥	⑦				⑧	⑨
			Measuring cup		Rape- seed	Filled heap- ed	Filled brimfully		No. of jams	With -out	Grinding			
Pre- grinding Mass [g]	0.02 l	Mass [g]	Hand mill	Milomat/ Labomil				MX32			Time [s]	Time [s]		
001			●			●			●					
002	●*		●			●			●			60	30	
003			●			●			●			30	30	
004			●			●						15	30	
005			●			●			●					
006			●			●			●			30	30	
007			●			●		10						
008												10	30	
009			●									30	30	
010			●									60	30	
011			●●			●			●			30	30	
012			●			●						10	30	
013	30 g		●			●		10				30	30	
014			●			●			●					
015						●								
016	30 g		●			●		10				30	30	
017			●			●						30	30	
018			●			●								
019			●			●			●			15	30	
020			●			●		10				30	30	
021	30 g		●			●						10	30	
022	30 g		●			●						30	30	
023			●			●								
024												15	30	

* Products larger than 8x10 mm must be pre-crushed for the laboratory mill Milomat / Labomil.

8.2 List of available programs

Subject to technical modifications! All data without guarantee!

Product name	Product name in German	Measuring range at 20 °C	Prepare as	Mill
Poppy	<i>Blaumohn</i>	3.2 - 30.2	001	without
Beans	<i>Bohnen</i>	7.4 - 32.1	002	M/L/MX32
Brewing barley	<i>Braugerste</i>	8.5 - 35.2	005	M/L/Hm
Buckwheat	<i>Buchweizen</i>	7.5 - 32.2	005	M/L/Hm
Buckwheat, husked	<i>Buchweizen, geschält</i>	7.1 - 32.2	005	M/L/Hm
Buckwheat groat	<i>Buchweizengrütze</i>	7.6 - 32.2	004	MX32
Buckwheat bran	<i>Buchweizenkleie</i>	7.7 - 32.2	007	without
Buckwheat flour	<i>Buchweizenmehl</i>	7.4 - 32.2	007	without
Spelt	<i>Dinkel</i>	8.6 - 30.0	005	M/L/Hm
Spelt in glumes	<i>Dinkel im Spelz</i>	7.5 - 47.0	006	M/L/MX32
Spelt flakes	<i>Dinkelflocken</i>	7.0 - 35.4	004	MX32
Spelt flour	<i>Dinkelmehl</i>	8.6 - 30.0	007	ohne
Thistle seeds	<i>Distelsaat</i>	3.9 - 25.0	005	M/L/Hm
Durum (hard wheat)	<i>Durum</i>	7.5 - 30.0	005	M/L/Hm
Durum semolina	<i>Durumgrieß</i>	7.6 - 25.0	007	without
Durum flour	<i>Durummehl</i>	5.0 - 28.0	007	without
Peas	<i>Erbsen</i>	7.7 - 31.8	002	M/L/MX32
Peas, husked	<i>Erbsen, geschält</i>	7.7 - 31.8	002	M/L/MX32
Peanut	<i>Erdnuss</i>	3.2 - 20.0	002 (15 s)	M/L/MX32
Mixed flakes	<i>Flockengemisch</i>	7.0 - 30.0	005	MX32
Barley	<i>Gerste</i>	7.5 - 30.0	005	M/L/Hm
Barley flakes	<i>Gerstenflocken</i>	7.5 - 47.0	004	MX32
Barley flour	<i>Gerstenmehl</i>	8.6 - 25.9	007	without
Tall oat-grass	<i>Glatthafer</i>	6.4 - 35.1	007	without
Pearl barley	<i>Graupen</i>	7.5 - 30.0	005	M/L/Hm
Unripe spelt grain	<i>Grünkern</i>	13.5 - 69.6	003	M/L/MX32
Unripe spelt grain, dry	<i>Grünkern, trocken</i>	8.4 - 34.0	005	M/L/Hm
Grass pellets, big	<i>Grünpellets, groß</i>	5.9 - 35.6	008	MX32
Grass pellets, small	<i>Grünpellets, klein</i>	6.4 - 35.5	008	MX32
Oats	<i>Hafer</i>	6.5 - 35.0	006	M/L/MX32
Oat flakes	<i>Haferflocken</i>	5.6 - 46.0	004	MX32
Oat groat	<i>Hafergrütze</i>	5.6 - 46.0	004	MX32
Oat kernels	<i>Haferkerne</i>	5.6 - 46.0	005	M/L/Hm
Oat flour	<i>Hafermehl</i>	5.6 - 46.0	007	without
Oat bran	<i>Haferschälkleie</i>	5.8 - 35.0	007	without
Hemp	<i>Hanf</i>	2.0 - 27.6	023	MX32
Hazelnut	<i>Haselnuss</i>	2.2 - 16.2	002 (15 s)	M/L/MX32
Millet	<i>Hirse</i>	7.5 - 30.0	015	M/L/Hm
Millet small, Teff	<i>Hirse klein, Teff</i>	7.6 - 35.6	015	M/L/Hm

Product name	Product name in German	Measuring range at 20 °C	Prepare as	Mill
Millet flour	<i>Hirse</i> mehl	7.5 - 34.6	007	without
Carrot seeds	<i>Karottensaat</i>	5.4 - 25.0	005	M/L/Hm
Potatoe meal	<i>Kartoffelschrot</i>	5.0 - 30.0	017	MX32
Chickpeas	<i>Kichererbsen</i>	7.5 - 31.8	002	M/L/MX32
Kidneybeans	<i>Kidneybohnen</i>	7.2 – 28.7	002	M/L/MX32
Red clover	<i>Klee: Rotklee</i>	8.7 - 30.0	007	without
White clover	<i>Klee: Weißklee</i>	4.9 - 30.3	015	M/L/Hm
Cocksfoot	<i>Knautgras</i>	5.9 - 31.9	007	without
Copra	<i>Kopra</i>	8.0 - 24.3	013	MX32
Caraway	<i>Kümmel</i>	5.2 - 30.0	015	M/L/Hm
Pumpkin seeds	<i>Kürbiskerne</i>	3.9 - 26.5	009	MX32
Linseed expeller	<i>Leinexpeller</i>	5.3 - 29.1	014	without
Linseed	<i>Leinsamen</i>	4.7 - 49.9	015	M/L/Hm
Lentils	<i>Linsen</i>	8.9 - 31.4	002	M/L/MX32
Lupins	<i>Lupinen</i>	5.2 - 31.0	002	M/L/MX32
Alfalfa	<i>Luzerne</i>	4.9 - 30.3	015	M/L/Hm
Maize normal	<i>Mais normal</i>	7.6 - 30.0	010	L
Maize normal	<i>Mais normal</i>	9.5 - 30.0	010	M
Maize normal	<i>Mais normal</i>	9.5 - 30.0	010	MX32
Maize special	<i>Mais spezial *</i>	20.0 - 66.8	003	L
Maize special	<i>Mais spezial *</i>	20.0 - 55.0	003	M
Maize special	<i>Mais spezial *</i>	20.0 - 48.6	003	MX32
Cornflakes	<i>Cornflakes (Maisflocken)</i>	9.5 - 33.9	011	MX32
Corn gluten feed pellets	<i>Maisgluten-Futtermittelpellets</i>	5.0 - 26.0	002 (30 s)	M/L/MX32
Maize semolina (Polenta)	<i>Maisgrieß (Polenta)</i>	7.6 - 25.0	007	without
Maize germs	<i>Maiskeime</i>	8.2 - 25.0	007	without
Maize germ meal	<i>Maiskeimschrot</i>	8.6 - 25.0	007	without
Maize source flakes	<i>Maisquellflocken</i>	9.5 - 33.9	004	MX32
Mallow	<i>Malve</i>	6.0 - 25.0	024	MX32
Almonds	<i>Mandeln</i>	2.2 - 25.0	002 (15 s)	M/L/MX32
Pasta with egg	<i>Nudel mit Ei</i>	8.0 - 35.0	021	MX32
Pasta without egg	<i>Nudel ohne Ei</i>	7.5 - 28.0	021	MX32
Oil radish	<i>Ölrettich</i>	4.1 - 29.8	005	M/L/Hm
Palm kernles	<i>Palmkerne</i>	3.4 - 24.2	013	MX32
Palm kernel expeller	<i>Palmkernexpeller</i>	6.0 - 30.0	014	without
Palm kernel extraction meal	<i>Palmkern-extraktionsschrot</i>	5.8 - 30.0	012	MX32
Pepper, black	<i>Pfeffer, schwarz</i>	10.0 - 24.2	018	Hm
Pepper, white	<i>Pfeffer, weiß</i>	8.5 - 24.0	018	Hm
Phacelia	<i>Phazelia</i>	6.7 - 30.0	014	without

Product name	Product name in German	Measuring range at 20 °C	Prepare as	Mill
Ryegrass	<i>Raigras</i>	6.5 - 30.0	007	without
Rapeseed	<i>Raps</i>	3.1 - 29.7	015	M/L/Hm
Rapeseed meal	<i>Rapsschrot</i>	7.5 - 32.0	018	Hm
Rice	<i>Reis</i>	8.0 - 25.0	005	M/L/Hm
Rice: Basmati, brown	<i>Reis: Basmati, braun</i>	6.2 - 34.6	005	M/L/Hm
Rice: Basmati, white	<i>Reis: Basmati, weiß</i>	8.0 - 25.0	005	M/L/Hm
Rice: Cargo, long grain, parboiled	<i>Reis: Cargo, Langkorn, parboiled</i>	6.0 - 34.6	005	M/L/Hm
Rice: Cargo, medium grain	<i>Reis: Cargo, mittellang</i>	6.0 - 34.6	005	M/L/Hm
Rice: Long grain rice	<i>Reis: Langkornreis</i>	7.9 - 24.9	005	M/L/Hm
Rice: Paddy	<i>Reis: Paddy</i>	7.0 - 25.0	005	M/L/Hm
Rice: Parboiled	<i>Reis: Parboiled</i>	7.3 - 25.0	005	M/L/Hm
Rice: Short grain	<i>Reis: Rundkorn</i>	7.3 - 25.0	005	M/L/Hm
Rice: Short grain, husked	<i>Reis: Rundkorn, geschält</i>	8.0 - 25.0	005	M/L/Hm
Rice: Thai	<i>Reis: Thai</i>	7.7 - 25.0	005	M/L/Hm
Rice: Whole grain, long grain	<i>Reis: Vollkorn Langkorn</i>	7.9 - 25.0	005	M/L/Hm
Rice: Whole grain, short grain	<i>Reis: Vollkorn Rundkorn</i>	6.2 - 34.6	005	M/L/Hm
Rye	<i>Roggen</i>	7.9 - 47.0	005	M/L/Hm
Rye flakes	<i>Roggenflocken</i>	7.0 - 42.0	004	MX32
Rye bran	<i>Roggenkleie</i>	7.9 - 35.0	007	without
Rye flour	<i>Roggenmehl</i>	5.0 - 25.0	007	without
Rye flour type 1150	<i>Roggenmehl Typ 1150</i>	8.5 - 29.4	007	without
Rye flour type 1370	<i>Roggenmehl Typ 1370</i>	8.6 - 29.4	007	without
Rye flour type 997	<i>Roggenmehl Typ 997</i>	10.1 - 29.4	007	without
Rye flour: Whole meal	<i>Roggenvollkornmehl</i>	8.5 - 30.0	007	without
Red fescue	<i>Rotschwingel</i>	6.8 - 35.1	007	without
Mustard	<i>Senf</i>	4.8 - 28.3	015	M/L/Hm
Mustard: Brown mustard	<i>Senf: Brauner Senf</i>	5.1 - 25.6	015	M/L/Hm
Mustard: Oriental mustard	<i>Senf: Orient Senf</i>	4.1 - 25.0	015	M/L/Hm
Sesame	<i>Sesam</i>	3.1 - 11.5	015	M/L/Hm
Soya beans	<i>Sojabohnen</i>	5.0 - 34.0	002	M
Soya beans	<i>Sojabohnen</i>	5.0 - 34.0	002	MX32
Soya bean flour	<i>Sojamehl</i>	3.6 - 25.2	007	without
Soya bean meal	<i>Sojaschrot</i>	6.7 - 30.0	018	without
Sunflower	<i>Sonnenblumen</i>	3.4 - 24.0	019	M/L/MX32
Sunflower meal	<i>Sonnenblumenschrot</i>	6.0 - 25.0	018	without
Sorghum	<i>Sorghum</i>	7.5 - 33.0	005	M/L/Hm
Spinach seed	<i>Spinatsaat</i>	5.5 - 30.0	005	M/L/Hm
Tapioca pellets	<i>Tapioka-Pellets</i>	5.0 - 28.3	020	MX32

Product name	Product name in German	Measuring range at 20 °C	Prepare as	Mill
Triticale	<i>Triticale</i>	7.5 - 33.0	005	M/L/Hm
Walnut	<i>Walnuss</i>	3.4 - 24.0	002 (15 s)	M/L/MX32
Ryegrass, hybrid	<i>Weidelgras, Bastard</i>	6.5 - 35.9	007	without
Ryegrass, German	<i>Weidelgras, deutsch</i>	6.5 - 30.0	007	without
Ryegrass, German Lipo	<i>Weidelgras, deutsch Lipo</i>	6.5 - 32.0	007	without
Ryegrass, annual	<i>Weidelgras, einjährig</i>	6.5 - 32.0	007	without
Ryegrass, Italian	<i>Weidelgras, welsches</i>	6.5 - 30.0	007	without
Ryegrass, Italian Lipo	<i>Weidelgras, welsches Lipo</i>	6.5 - 30.0	007	without
Ryegrass, annual Westerwold	<i>Weidelgras, Westerwold</i>	6.4 - 32.3	007	without
Wheat	<i>Weizen</i>	7.5 - 45.2	005	M/L/Hm
Wheat flakes	<i>Weizenflocken</i>	7.0 - 42.0	004	MX32
Wheat semolina	<i>Weizengrieß</i>	7.6 - 25.0	007	without
Wheat semolina bran	<i>Weizengrießkleie</i>	7.5 - 25.1	007	without
Wheat germs	<i>Weizenkeime</i>	6.5 - 35.0	007	without
Wheat bran	<i>Weizenkleie</i>	7.5 - 35.0	007	without
Wheat bran pellets	<i>Weizenkleie-Pellets</i>	5.6 - 30.0	020	MX32
Wheat flour	<i>Weizenmehl</i>	5.8 - 30.0	007	without
Wheat flour type 1050	<i>Weizenmehl Typ 1050</i>	8.5 - 29.3	007	without
Wheat flour type 550	<i>Weizenmehl Typ 550</i>	8.8 - 31.5	007	without
Wheat flour type 812	<i>Weizenmehl Typ 812</i>	8.5 - 31.9	007	without
Wheat flour, second flour	<i>Weizenmehl, Nachmehl</i>	7.7 - 40.0	007	without
Wheat meal	<i>Weizenschrot</i>	7.5 - 30.0	007	without
Wheat flour: Whole meal	<i>Weizenvollkornmehl</i>	8.8 - 30.0	007	without
Vetches	<i>Wicken</i>	7.0 - 25.0	005	M/L/Hm
Timothy grass	<i>Wiesenlieschgras</i>	5.9 - 30.0	007	without
Kentucky bluegrass	<i>Wiesenrispengras</i>	7.1 - 30.0	007	without
Meadow fescue	<i>Wiesenschwingel</i>	6.5 - 30.0	007	without
Sugar beet pulp pellets	<i>Zuckerrübenschnitzel-Pellets</i>	5.8 - 29.3	022	MX32

* Determination only with a special measurement cell for moist maize (item no. 2190 0040)

Legend:

Mill	Explanation
M	Grinding with the laboratory mill Milomat (item number 1520 0700)
L	Grinding with the laboratory mill Labomil (no longer in the Pfeuffer GmbH delivery program), products only for existing instruments (HE60/90), where a Labomil is still available! No longer selectable for new instruments!
MX32	Grinding with the electrical grinder Multimix MX 32 (no longer commercially available), products only for existing instruments (HE60/90), where an electric grinder is still available! No longer selectable for new instruments!
Hm	Hand mill (included in scope of delivery HE 60/90)
without	Without grinding

9 Maintenance and cleaning



The maintenance and cleaning chapter is only intended for **specialist operators**.

NOTICE

Pfeuffer GmbH expressly points out that repair work may only be carried out by its own service department or by an authorized repair facility.

Opening the housing or the measurement cell and inappropriate operation will invalidate the warranty (and the official approval).

To ensure trouble-free operation, it is essential for the HE 90 to be cleaned and maintained at regular intervals.



It is essential to comply with the switch-off procedure before cleaning, maintenance or repair work! (See **chapter 2.8**)

9.1 Cleaning

NOTICE

During cleaning, make sure that no water, steam or dust can penetrate the electronics area.

For cleaning use

- do not use sharp objects or tools.
- only use objects that are expressly intended for this purpose.
- do not use compressed air:

! WARNING



Risk of injury when blowing out or blowing off the instrument with compressed air:

Ejecting away dirt particles! Danger of eye injuries!

Whirling up aerosols and dusts! Danger of respiratory complaints!

Damage to the sensitive measuring electronics due to the high pressure!

⇒ Carefully remove dirt and dust with a suitable industrial vacuum cleaner.



Cleaning and maintenance intervals:

AEM = after each measurement

AR = as required

9.1.1 Measurement cell

Measure	Interval
Clean the upper part of the measurement cell with the hand brush. When brushing, make sure that the milling disk is pointing downwards, to prevent any dirt getting into the threads.	AEM
Clean the lower part of the measurement cell with the hard or soft brush, depending on the moisture and degree of gumming.	AEM



With very moist, oily and sticky products, it is recommended that you mill a dry sample of cereal (approx. 14 % moisture content) in the measurement cell as a cleaning measure. Residues will be bound up with the meal and can be removed easily.

NOTICE Do not empty the measurement cell upper part or lower part by knocking it out! This can lead to damage to the measurement cell.

9.1.2 Threads and contact surfaces of the measurement cell

The threads and contact surfaces of the measurement cell can become blocked with oily products after frequent measurements. This means the measurement cell can only be screwed closed by exerting increased force.

Measure	Interval
Clean the threads of the spindle on the measurement cell lower part using the hand brush or the hard cleaning brush.	AR
Clean the top contact surface on the spindle of the measurement cell lower part using a clean, lint-free cloth.	AR
To clean the internal thread of the upper part of the measurement cell, please use the appropriate cleaning screw for the measurement cell. Carefully screw the cleaning screw supplied with the product into the measurement cell upper part. The milling disk should be pointing downwards when you do this so that no dirt will get into the threads. Turn the cleaning screw to and for several times to release adhering dirt particles. Then clean the cleaning screw with the hand brush.	AR
In case of severe contamination, clean the contact spring inside the measurement cell upper part carefully using a commercially available cosmetic cotton wool bud.	AR

NOTICE To avoid damage to the threads, take care not to mis-thread the cleaning screw.

9.1.3 Case and measuring instrument

Measure	Interval
Clean the surface, the guide pin and the contact pins with a clean, lint-free cloth or with a soft hand brush.	AR

9.1.4 Printer

Measure	Interval
Clean all surfaces with a clean, lint-free cloth or with a soft hand brush	AR
In case of heavy contamination, carefully vacuum out the interior (after removing the paper roll and ribbon) with an industrial vacuum cleaner in its weakest position.	AR

9.2 Maintenance

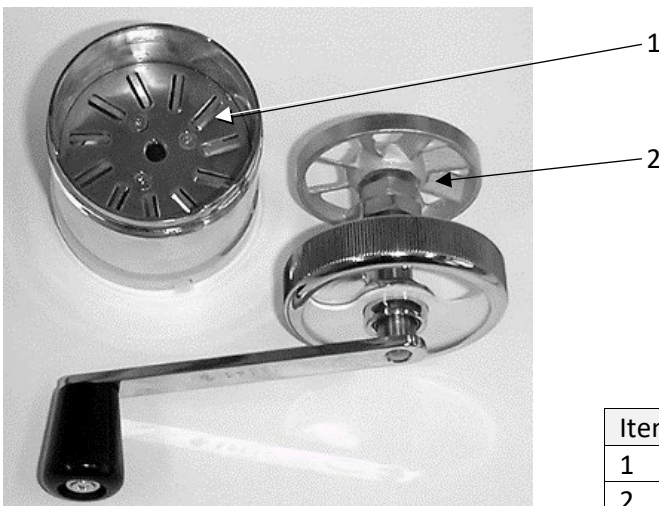
Maintenance is a part of servicing and refers to the scheduled cleaning, checking and replacement of wearing parts. The aim of maintenance is to maintain the full functionality of the instrument over its lifetime.

The HE 90 should therefore be checked for wear and tear at regular intervals. The inspection intervals depend on the significance of the measured value, the frequency of use and the ambient conditions to which the HE 90 is exposed. Only through regular checks (visual inspection) can damage to the device caused during use be detected early and reliably. We therefore recommend that this check will be carried out at least once a year, preferably after the harvest period.

If you are unsure whether your instrument is still completely ready for use, Pfeuffer GmbH's professional service team will be pleased to assist you.

Wear parts and possible wear:
Milling discs: flaking of the chrome plating, abrasion of the fluting
Spindle on the measurement cell lower part: dirt in the threads
Contact pins: wear, weak contact, contact resistance
Contact spring inside the measurement cell upper part: dirt in the upper part

9.2.1 Replacement of the knife disk of the hand mill



Item	Designation
1	Knife disk
2	Crank

Figure 8: Hand mill

Untwist the hand mill. Remove the old knife disk by loosening the three recessed head screws. Insert the new knife disk and screw in the screws. The maximum cutting effect can be reached if the distance between the knife disk and the crank is less than 0.1 mm. This can be checked. For this purpose move the crank handle out of and into the hand mill, while the hand mill is closed. It should be free from play. Should the grinding quality and grinding duration not improve after having replaced the knife disk, this might be due to a higher distance. Should the distance be higher then loosen the lock nuts of the crank and adjust the distance. Then fix both nuts tightly.

9.2.2 Mounting the crank of the hand mill

Remove the crank handle by means of a left-hand rotation, remove the cover and put the shaft with the defective crank into the vise (for a better care of the shaft we recommend aluminum chops). Take the crank from the shaft by means of a left-hand rotation and screw in the new crank tightly.

9.2.3 Renewing the internal fuse

The internal fuse must be replaced if the display does not light up after the instrument is switched on even though the mains voltage is present.

There is a plug connection in the cold-device plug (IEC 60320 C14) on the left side of the case. An internal glass microfuse (800 mA slow-blow, 5x20 mm) is incorporated in this.

NOTICE Always observe the exact fuse specifications on the type plate!



⇒ Disconnect the mains plug from the electrical power supply.



- ⇒ Pull out the plug connection below the cold-device plug.
- ⇒ Renew the glass microfuse. Item number see **chapter 11**.
- ⇒ Insert the plug connection back into the cold-device plug.
- ⇒ The HE 90 is ready for operation.

Figure 9: Exchanging the internal fuse

9.2.4 Inserting a new paper roll

Insert the paper into the slot in the same way, the existing paper roll was inserted. As long as the message **SORT** appears on the display, by means of the button **printer** the paper can be advanced.

9.2.5 Changing the printer cartridge

Press down the right side of the old cartridge (opposite to EJECT) and pull it upwards. Place the new cartridge into the same position. The cartridge must be located at the printing head. For the purpose the screw at the top of the cartridge can be turned carefully.

10 Malfuncions – causes and rectification



The information provided in this chapter about possible malfunctions is structured to be understood by specialists in electrical, electronic or mechanical maintenance. Appropriate tools and test instruments must be provided to these personnel. If the specified measures do not prove successful, contact Pfeuffer GmbH. It is important for all questions to specify the correct type designation, serial number and year of manufacture. Only in this way will rapid processing be possible.



It is essential to comply with the switch-off procedure before cleaning, maintenance or repair work! (See **chapter 2.8**)

Problem	Cause	Rectification
The HE 90 does not function at all.	No mains voltage. Internal fuse in the cold-device plug is defective.	Have the mains voltage checked by an Electrician and switched on. Test and replacement by an Electrician , see chapter 9.2.3 .
Flashing measured value display.	Measured value exceeded Display not approved value	See chapter 10.2 .
Message EMPTY	The measurement cell is not filled or the sample is too dry.	Fill the measurement cell.
Message MEAS-C	No measurement cell is attached or it is defective.	Attach the measurement cell. Press the quitt button to clear the display. If the message is still displayed, contact Pfeuffer GmbH.
Message CELL	The measurement button assigned to the measurement cell has not been pressed.	After pressing the quitt button twice , you can select the correct button. See also chapter 10.2 .
Message EEEE	–	See chapter 10.1 . For maize (corn) see chapter 10.2 .
Message ERROR	Technical defect.	Contact Pfeuffer GmbH.

10.1 Display EEEE

If the grist is too moist for a reliable measurement, the display shows **EEEE**. An approximate result can be obtained by carrying out the following procedure (the example is referred to rapeseed and can be applied for other grain types as well):

1. Fill a brimful measuring cup of the sample to be determined together with a second measuring cup filled with a sample of known moisture content (moisture content between 7 and 9 %) and mix them 10 times inside a 100 ml bottle.
2. Remove a brimful measuring cup from the bottle and carry out a measurement.

3. The moisture content of the moist sample is calculated as follows:

Moisture of mixed sample (measured)	22.0 %
<u>Moisture of dry sample</u>	<u>8.0 %</u>
Difference	14.0 %

4. The requested moisture will then be: $22.0 \% + 14.0 \% = 36.0 \%$

10.2 Note for moisture determination of maize (corn)

If the permissible measuring range for the relevant measurement cell is exceeded or undershot by more than 3 % moisture content, the error message **EEEE** is issued. If the exceedance is lower, the measured value is displayed flashing. The error message **CELL** indicates that the selected maize product button does not correspond to the suitable measurement cell. The correct button can be selected after pressing the **quitt** button **twice**.

11 Spare parts and accessories

NOTICE

We wish to point out expressly that replacement and accessory parts not supplied by us will not have been tested and approved by us either. Installing and/or using such products can thus result in the design properties of the HE 90 being negatively impaired. Pfeuffer GmbH cannot be held liable for damage attributable to the use of non-genuine parts and non-genuine accessories.

Standard parts can be obtained from the dealer.

Product	Item number
Laboratory mill Milomat	1520 0700
Interface RS232	1190 0050
Measurement cell (upper and lower part) with temperature sensors and handles	2190 0010
Cleaning screw for measurement cell	3170 6010
Special measurement cell for moist maize	2190 0040
Cleaning screw for special measurement cell for moist maize	3170 3010
Hand mill for the grinding of cereals, rapeseed, etc.	2130 0110
Crank	2120 0195
Knife disc made of special steel	3112 0010
Measuring cup 0.02 liter	3112 0006
Measuring cup "Raps" (rapeseed)	3112 0007
Funnel with spindle protection	3112 0012
Cleaning brush, black, with hard bristles	3190 0017
Cleaning brush with soft bristles	3190 0027
Hand brush	3190 0050
Mains cable with removable connection (cold-device cable IEC 60320 C13)	2290 0100
Screw clamp for secure attachment on a work table (2 pieces)	3109 0010

Product	Item number
Sample dividing cup with stirring stick and separating sheet	1520 0550
800 mA slow-blow glass microfuse 5x20 mm (10 pieces)	3253 0214
Paper rolls for printer, single (set of 5 pieces)	1190 0060
Paper rolls for printer, double (set of 5 pieces)	1190 0065
Printer cartridge for printer, blue	1190 0070

Electric grinder Multimix MX 32 spare parts:

Product	Item number
Glass	1510 0123
Upper knife	1510 0127
Lower knife	1510 0126

12 Emergency



⇒ In an emergency, disconnect the HE 90 from the electrical power supply.

13 Dismantling and disposal



Dismantling is only allowed to be carried out by **specialist personnel**.



⇒ Disconnect the mains plug before you start dismantling.



Special waste

Oil, cleaning agents, contaminated cleaning tools (brush, rags, etc.) must be disposed of according to the local regulations and in accordance with the notes in the manufacturers' safety data sheets.



The HE 90 must be disposed of in accordance with the applicable local environmental regulations (directive for electrical and electronic equipment waste 2012/19/EU).