

Operating instructions

Temperature measuring probe **GT 1**



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

Revision 4/10.02.2021
Translation of the original operating instructions



These operating instructions form part of the temperature measuring probe **GT 1** and must be available to the operating personnel at any time. They are intended for the owner of the system, the operating personnel and the specialists who are responsible for transport, setup, installation, commissioning, operation, maintenance, cleaning, disassembly 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

On delivery or subsequent sale to 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 referred to for clarification, or else contact the manufacturer.

Operating instructions in electronic format

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

© Copyright

This document is not allowed to be communicated or duplicated, utilized without express permission, which also applies to communicating its content. Offenders are liable to the payment of damages. All rights reserved with regard to patent claims or submission of design or utility patent.
(DIN ISO 16016)

1	Introduction	4
1.1	Designated use	4
1.2	Declaration of Conformity	5
1.3	Structural features of the danger notes	6
1.4	Pictograms in the operating instructions.....	6
2	Safety.....	7
3	Technical data	8
3.1	Dimensions	8
3.2	Weight	8
3.3	Power supply	8
3.4	General data	8
4	Delivery, transport and storage.....	9
4.1	Scope of delivery	9
4.2	Transport and packaging	9
4.3	Intermediate storage.....	9
4.4	Return transport.....	9
5	Operation.....	10
5.1	Overview.....	10
5.2	Insert and change battery.....	10
5.3	Display modes.....	11
5.4	MAX / MIN memory.....	12
5.5	Setting the time	13
5.6	Switching off the GT 1.....	13
5.7	Performing measurements.....	14
5.7.1	Measure haystack.....	14
5.7.2	Influence of moisture and storage temperature on the shelf life of grain	16
5.7.3	Monitoring of grain stocks is essential.....	17
5.8	Measurement uncertainty.....	17
6	Cleaning and maintenance	18
6.1	Cleaning	18
6.2	Maintenance.....	18
7	Malfunctions – causes and rectification.....	19
8	Spare parts.....	19
9	Disposal.....	19
	Measurement table for haystack	20

1 Introduction

1.1 Designated use

The temperature measuring probe **GT 1** is a versatile assistant in agriculture and in smaller grain storages. The temperature measurement range is from -10 °C to +70 °C in loose agricultural bulk materials as cereal, silage, compost, hay and straw. The **GT 1** is designed for measuring in the stack at different depths and at the surface. It has two temperature sensors, one in the measuring tip (OUT) and one in the housing (IN).

The **GT 1** is not waterproof and designated for use only in closed rooms. Protect it against moisture and humidity.

The **GT 1** is designed as a portable device to be operated by batteries.

The **GT 1** is not intended for private use.

NOTE

The **GT 1** is exclusively intended for the aforementioned purpose.

Any other use beyond this definition or conversion of the **GT 1** without written consultation with Pfeuffer GmbH is regarded as contrary to the intended use.

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

The GT 1 is not appropriate for the measurement of liquid and sticky products!

The samples to be used for intended operation of the **GT 1** are obtained by the owner.

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

The owner must also provide notes on danger and notes on 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.

1.2 Declaration of Conformity

EU Declaration of Conformity

Manufacturer: **Pfeuffer GmbH**
Flugplatzstraße 70
97318 Kitzingen
GERMANY

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: Temperature measuring probe **GT 1**

Serial number _____

The aforementioned product complies with the requirements of the following directives:

- 2014/35/EU Low voltage
- 2014/30/EU Electromagnetic compatibility (EMC)


Any modification to the **GT 1** not agreed with us shall result in this declaration losing its validity.


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. Information intended for your personal safety is highlighted by a warning triangle. Comply with the following categories of danger notes and explanations of symbols:

Pictogram  **SIGNAL WORD**

 Type of danger and its source.
Possible consequence of failure to comply.
⇒ Measure to guard against the danger.

DANGER

This is a warning about a highly dangerous situation that will lead to serious or fatal injuries.

WARNING

This is a warning about a dangerous situation that may result in serious or fatal injuries.





CAUTION

This is a warning of a possibly dangerous situation that will lead to slight or moderate injuries.

NOTE

This is a warning about harmful situations for the product and/or environment.

1.4 Pictograms in the operating instructions

	Information of particular importance and/or additional information		Warning of cut danger
	Warning		Warning of corrosive substances

2 Safety**NOTE**

Opening the housing and inappropriate operation will invalidate the warranty.

Obligations on the owner

In the European Economic Area (EEA), it is mandatory to comply with and follow the national implementation of the general directive 89/391/EEC as well as the corresponding individual directives and, of these, in particular Directive 2009/104/EC "concerning the minimum safety and health requirements for the use of work equipment by workers at work", in each case in the valid version.

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

- Safety of personnel (accident prevention regulations)
- The accident prevention regulations DGUV regulation 3 (previously BGV A 3) "Electrical systems and equipment" (DGUV = German Social Accident Insurance Association)
- 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.

General safety notes

The safety devices and safety information given in these operating instructions must be complied with.

- ⇒ Do not allow the **GT 1** to become damp during transport, storage, cleaning and operation.
- ⇒ Only use the **GT 1** when it is in correct condition.
- ⇒ Never touch the battery or the rechargeable battery with moist hands.
- ⇒ Only use genuine spare parts and accessories (see **chapter 8**).

3 Technical data

GT 1	Temperature measuring probe
Products	Cereal, silage, compost, hay and straw
Parameter	Temperature

3.1 Dimensions

Models for cereals, oilseeds and grains (with cone tip):

	Length	Item no.
GT 1	1.5 m	1332 1102
GT 1-2	2.0 m	1332 1108
GT 1-3	2.8 m	1332 1103

Model for silage (with knife tip):

	Length	Item no.
GT 1S	0.5 m	1332 1105

Models for hay, straw and compost (with knife tip):

	Length	Item no.
GT 1H	1.5 m	1332 1106
GT 1-3H	2.8 m	1332 1107

3.2 Weight

Total weight depending on the model	approx. 350 to 530 g
-------------------------------------	----------------------

3.3 Power supply

Battery or rechargeable battery	Micro AAA 1.5 V
---------------------------------	-----------------

3.4 General data

Ambient temperature for storage and transport	-10 °C to +60 °C
Measuring range	-10 °C to +70 °C
Measurement accuracy (knife tip)	±1 °C
Atmospheric humidity	20 % – 80 % non-condensing

4 Delivery, transport and storage

4.1 Scope of delivery

The standard scope of delivery to the owner comprises:

1. Temperature measuring probe **GT 1**
2. Battery, Micro AAA 1,5 V
3. (Tip for haystack measurement (knife and knife carrier) for **GT 1S** or **GT 1H**)
4. Operating instructions

4.2 Transport and packaging

Systems, machines and instruments from Pfeuffer GmbH are carefully checked and packaged before shipping; nevertheless, it is impossible to rule out the possibility of transport damage entirely.

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 shipping packaging of the **GT 1** and its accessories and replacement parts is designed for a storage period of 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. +60 °C.

- ⇒ Keep the original packaging in case you need to send the equipment back.

4.4 Return transport

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

5 Operation

5.1 Overview

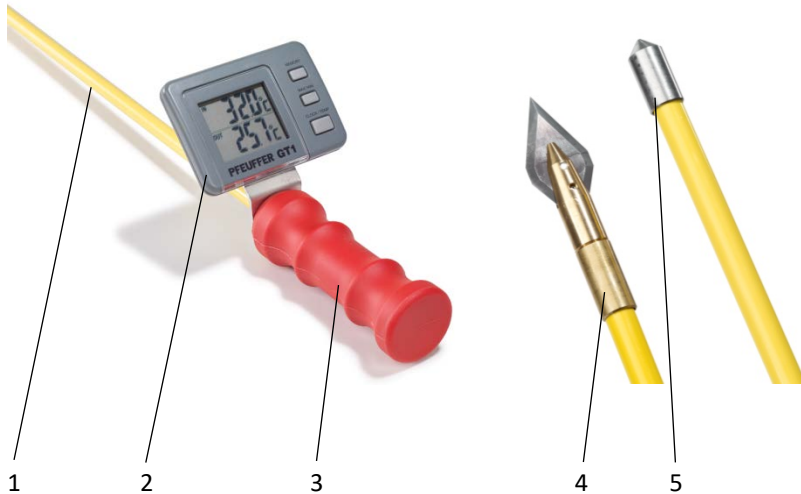


Figure 1: Temperature measuring probe GT1

Item	Designation
1	Glass fiber reinforced plastic probe (various lengths available)
2	LC display
3	Grip
4	Tip for haystack measurement for GT 1H or GT 1S
5	Cone tip

5.2 Insert and change battery



Figure 2: Insert battery

A commercially available Mikro AAA 1,5 V battery is required for powering the **GT 1**.

- ⇒ Open the battery compartment on the back of the display device by laterally sliding the cover in the arrow direction.
- ⇒ Insert the battery according to the polarity.
- ⇒ Close the cover.
- ⇒ The **GT 1** is ready for use.

- ⇒ To avoid battery leakage, remove the battery when not using the **GT 1** for a longer period.

**CAUTION**

A non-rechargeable battery cannot be recharged!

This can lead to dangerous acid leakage.

Acid contact can cause skin irritation, burns and corrosion.



Return used batteries/rechargeable batteries to a municipal collecting facility or retail outlet.



Disposal as normal domestic waste is prohibited, and represents a violation of battery legislation.

5.3 Display modes

IN = Temperature inside the measuring instrument (outside the grain pile)

OUT = Temperature on the measuring tip of the **GT 1**

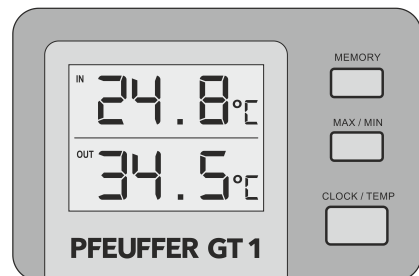
Use the button **CLOCK / TEMP** on the front to change between the different display modes.

It can take up to 10 seconds until the display has adjusted to the temperature change, as the measuring interval is 10 seconds.

Standard display:

Temperature inside the measuring instrument (IN):

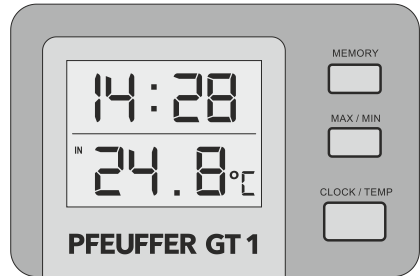
Temperature on the measuring tip (OUT):



Time: _____

Temperature inside the measuring instrument (IN):

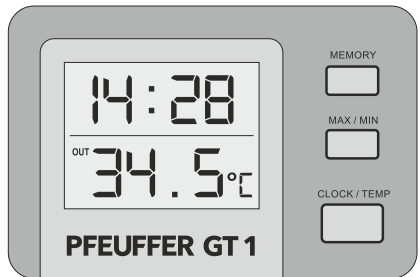
Button **CLOCK / TEMP** pressed once:



Time: _____

Temperature on the measuring tip (OUT):

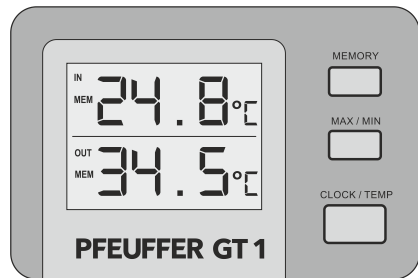
Button **CLOCK / TEMP** pressed twice:



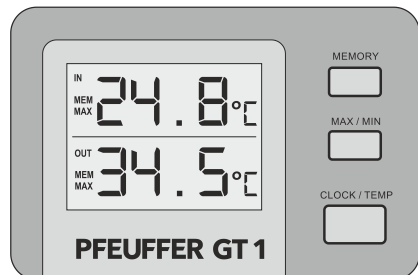
5.4 MAX / MIN memory

⇒ To save the minimum or maximum temperatures at the temperature sensors press once on the button **MEMORY**.

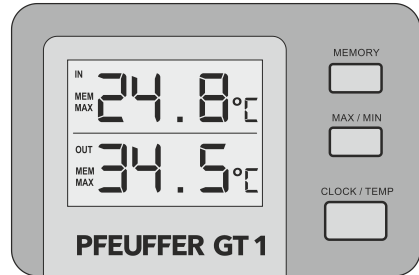
The display shows **MEM** before the temperature value.



⇒ Then press once the button **MAX / MIN** to read the corresponding temperature maxima.

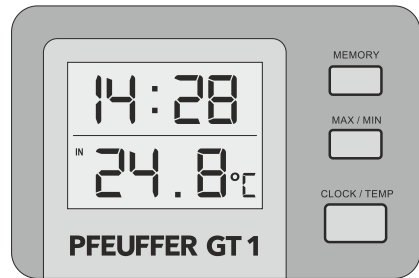


- ⇒ Press a second time on the button **MAX / MIN** to read the temperature minima.
- ⇒ To clear the memory press again on the button **MEMORY** so that the indicator **MEM** disappears.

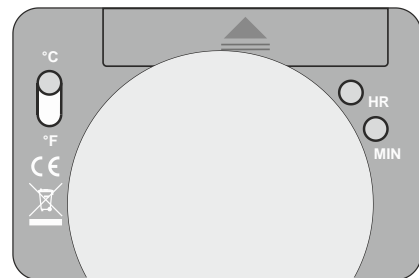


5.5 Setting the time

- ⇒ Press once on the button **CLOCK / TEMP** to switch into Time mode.



- ⇒ With the button **HR** on the back of the LC display you set the hours and with the **MIN** button you set the minutes.
- ⇒ Press the appropriate button until the desired time is set.

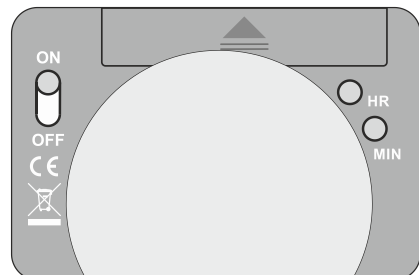


5.6 Switching off the GT 1

- ⇒ Depending on the model, you can use the slide switch to change the temperature display from °C to °F (degrees Fahrenheit).

To switch off the **GT 1**, remove the battery in this case.

- ⇒ Or you can switch on or off the **GT 1** directly with the **ON / OFF** slide switch.



5.7 Performing measurements

With the **GT 1** temperatures from -10 °C to +70 °C can be measured.

NOTE

To avoid damages of the temperature measuring probe, protect the **GT 1** against direct sunlight and extreme temperatures in excess of +70 °C!

For a correct measurement the temperature in the metal tip has to adjust to the temperature in the measured product. This depends on the temperature difference between the measured product and the measuring probe and can take a few minutes.

Temperatures below -10 °C are displayed with **LLL**, temperatures over +70 °C are displayed with **HHH**. The **GT 1** collects the temperature of the grain that is directly in contact with the tip of the probe. There can be huge temperature differences depending to the different points in the pile/bale. Therefore, you should make measurements in at least 5 different areas of the pile/bale. Use the highest value as reference.



Refer to an expert for detailed information about the adequate temperature for the storage of grain, compost, silage, hay and straw.

The information and instructions in the **chapters 5.7.1 to 5.7.3** are for a rough overview only and is not exhaustive.

All statements without guarantee!

5.7.1 Measure haystack¹

Because of the danger of self-ignition, the farmer must check the temperature of the stored material for three months regularly with a temperature measuring probe. In fire hazard immediately take the necessary measures. (§ 16 VVB²).

This obligation is exacerbated by VdS safety³, as outside Bavaria you have to inform the fire department at a haystack temperature from more than +60 °C.

- ⇒ Start the measurement one or two days after putting into storage.
- ⇒ Then continue measuring for twelve weeks (at least once a week).
- ⇒ Perform control measurements at locations with high temperature.
- ⇒ Measure at least at five points and different depths.
- ⇒ In particular, measure at the discharge points of the hay elevator or under the blow-out openings of the hay blower.

¹ Source: Brochure Risk-Management – Measure haystack, Insurance chamber Bavaria/Germany, www.vkb.de

² Regulation on the prevention of fires (only in Bavaria/Germany)

³ VdS Loss prevention Ltd., www.vds.de

- ⇒ At temperatures of more than +60 °C, measure several times a day and notify the fire department as a precaution.
- ⇒ Make a note of the measured values in a measurement table, and keep this carefully as information for the insurance company.
(There is a measurement table on the last page of these operating instructions or contact your fire insurance)

Over +70 °C – acute fire danger

Call the fire department!



Use of a special instrument to cool down the bale.

Clearing away of the heated haystack → in the presence of the fire department ready to extinguish!

Extinguishing of smouldering areas.

Up to +70 °C – fire danger

Special attention necessary!

Measure at intervals of maximum of five hours

Up to +60 °C – critical

- | | |
|-------------------|-------------------------|
| 1. and 2. week | Measure every other day |
| 3. and 4. week | Measure every third day |
| 5. until 12. week | Measure once a week |

Up to +45 °C – harmless

- | | |
|-------------------|-------------------------|
| 1. week | Measure every other day |
| 2. until 4. week | Measure twice a week |
| 5. until 12. week | Measure once a week |

**CAUTION****Risk of injury on pointed objects!**

To avoid cuts



- ⇒ never transport the **GT 1** with the knife screwed on!
- ⇒ take out the knife carrier of the packaging first at the measuring point.
- ⇒ unscrew the knife carrier from the **GT 1** after each measurement.
- ⇒ clean the knife carrier and the knife carefully.
- ⇒ keep it in the packaging intended for it.

5.7.2 Influence of moisture and storage temperature on the shelf life of grain

Moisture and temperature have a big influence on the shelf life of seeds, bread stuffs and feed grain. The following tables give a rough guide about possible storage times depending on moisture and storage temperature.

All statements without guarantee!

Seeds and brewing barley

Moisture in %	Storage temperature in °C	Shelf life approx.
12 – 15	9 – 12	permanently
15 – 16,5	8 – 10	1 – 1,5 years
16,5 – 18	5 – 7	4 – 6 months
18 – 20	5	2 – 3 months
20 – 22	5	2 – 4 weeks
22 – 25	5	1 – 2 weeks
25 – 30	4 – 5	2 – 3 days
More than 30	-	-

Bread stuffs

Moisture in %	Storage temperature in °C	Shelf life approx.
12 – 15	10 – 12	permanently
15 – 16,5	9 – 10	permanently
16,5 – 18	8 – 10	8 – 14 months
18 – 20	8 – 10	6 – 10 months
20 – 22	6 – 8	8 – 12 weeks
22 – 25	5 – 7	3 – 8 weeks
25 – 30	4 – 5	5 – 10 days
More than 30	-	-

Feedgrains

Moisture in %	Storage temperature in °C	Shelf life approx.
12 – 15	10 – 14	permanently
15 – 16,5	10 – 12	permanently
16,5 – 18	8 – 10	10 – 20 months
18 – 20	8 – 10	8 – 16 months
20 – 22	8 – 10	16 – 40 weeks
22 – 25	5 – 8	10 – 25 weeks
25 – 30	4 – 5	14 – 30 days
More than 30	4 – 5	a few days

5.7.3 Monitoring of grain stocks is essential

Detail of the original article by *H.-J. Plesse LWK Hannover*:

(...) Experience has shown that grain cannot be stored over a longer period of time without the corresponding monitoring. This means that the grain is cooled down to a final temperature of ca. 6 to 8°C, a temperature at which the above mentioned phenomena cannot develop anymore. At the same time the development of fungi, microorganisms and pest is constrained or eliminated. (...)

An increasing storage time leads to a cooling down of the sides of the pile or the outer layers. Resulting from the warmer core, a thermal develops which carries the released water vapor inwards or upwards. Sooner or later this will lead to a moist surface of the pile and to a germination of the corn. (...)

Temperature monitoring of the grain pile is essential to cool down the pile in case it heats up again too much. This can be done at low costs by means of stick in thermometer like the **GT 1**. However, this requires access from above. (...)

When ventilating or cooling by means of ambient air, the grain temperature as well as the ambient temperature and the relative humidity play a role.

If there is a difference of at least 5 to 6 °C, the pile can be ventilated a certain time even with a high humidity. The air that is blown into the pile is heated by the grain. With each °C the relative humidity decreases by ca. 5 %, so that a moisture equilibrium to the dry grain is reached. The pile temperature relevant for the ventilation should be measured in the lower half of the silo, as this part cools down soonest. (...)

If a compressor cooling aggregate is used, the air is processed technically. In this case the parameters for temperature and moisture can be set correspondingly and stay constant, so that the ventilation can be done day and night. (...) A part of the emerging process heat is used to heat up the cooled down air, so that the relative humidity equals the equilibrium moisture of dry grain. This has a favorable drying effect, even if only a small one. (...)

5.8 Measurement uncertainty

The accuracy of the results of the **GT 1** is influenced by many parameters.

- **Exposure time in the bulk:** The exposure time in the bulk is decisive for the temperature adjustment of grain and measuring probe. Wait at least 2 (better 5) minutes!
- **The accuracy of the measuring instrument** is about ± 1 °C. However, the change of temperature in the bulk is more important than the absolute accuracy. There it is important to make measurements at the same points and to note down the results. Due to the spatial separation between tip and measuring instrument, there can be differences between the displayed temperatures.

NOTE Do not misinterpret the result of the **GT 1** as the one and only reference, as there are many parameters that can influence the value. Nevertheless the measuring results are very helpful for the safe storage of grain, hay and straw.

6 Cleaning and maintenance

NOTE Opening the housing and inappropriate operation will invalidate the warranty.

6.1 Cleaning

NOTE Do not use any sharp objects or tools for cleaning. Only use objects that are expressly intended for this purpose.
During cleaning, make sure that no water, steam or dust can penetrate the electronics area.



Cleaning and maintenance intervals:
AEM = After each measurement
AR = As required

Measure	Interval
Clean the LC Display with a clean, lint-free cloth.	AR
Clean the probe and the measuring tip with a clean, lint-free cloth or use a moist cloth in case of heavy contamination	AR

6.2 Maintenance

⇒ Check the **GT 1** 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 **GT 1** is exposed. Only through regular checks (visual inspection) can damage to the device caused during use be detected early and reliably.

7 Malfunctions – causes and rectification

If the specified measures do not prove successful, contact Pfeuffer GmbH.

Problem	Cause	Rectification
Unrealistic result in the display	Display is set to °F.	Set the slide switch on the back of the LC display to °C. Or remove battery, wait 10 seconds and insert again.
No display	Battery is empty.	Change battery.

8 Spare parts**NOTE**

It is expressly pointed out that spare 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 lead to negative changes to the design properties of the **GT 1** under certain circumstances.

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
Knife tip (knife and knife carrier)	2150 0200

9 Disposal

The **GT 1** must be disposed of according to applicable local environmental regulations (directive for electric and electronic equipment waste 2012/19/EU).

Dispose of battery, see **chapter 5.2**.

Measurement table for haystack

Name: _____ Location: _____

Period	Measurement point and depth	Temperature
2 days after putting into storage		
Date:		
1 week after putting into storage		
Date:		
2 weeks after putting into storage		
Date		
3 weeks after putting into storage		
Date		
4 weeks after putting into storage		
Date		