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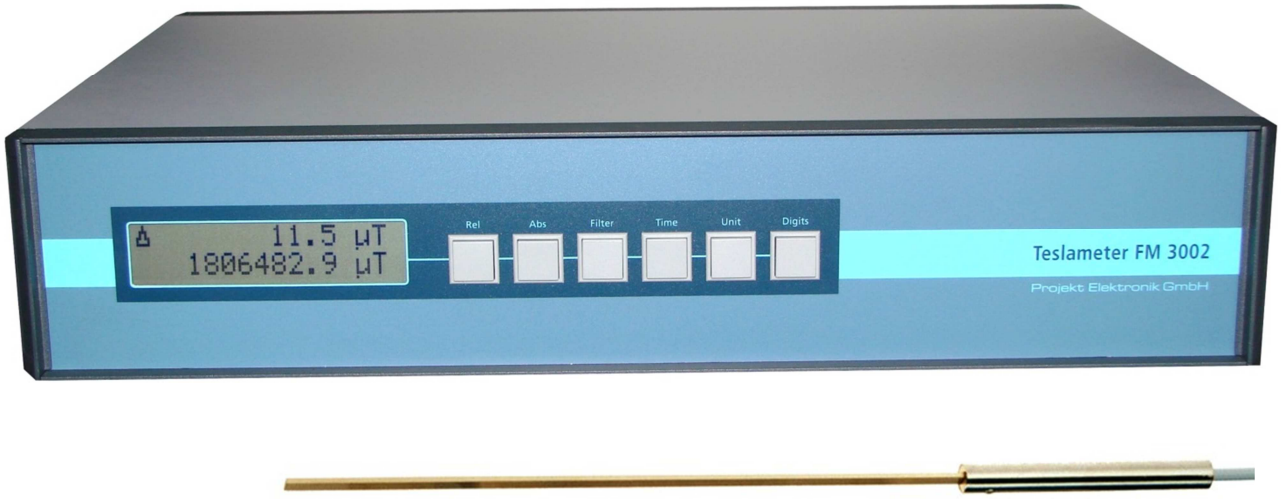
Operating Manual

Teslameter FM 3002



18.07.2016

1. Warnings

Please read this Operating Manual carefully!

To ensure protection of the user and the instrument itself, operation of the Teslameter is permissible only in strict accordance with the Operating Manual.

Observe personal protection rules!

When measuring magnetic fields, consider and observe the regulations concerning potential dangers caused by DC and AC magnetic fields.

The direct influence of magnetic fields may be harmful to one's health (for field strength limits see DIN VDE 0848).

The operation of cardiac pacemakers may be affected.

Examples for sources of potentially hazardous magnetic fields:

- Ultrasonic sources
- Induction heaters and furnaces
- magnetic resonance tomograph
- Medical magnetic fields

For more information see following documents:

- Electromagnetic Compatibility (Elektromagnetische Verträglichkeit), VDE, Vol. 1 to 4
- DIN VDE 0848
- Papers of the Berufsgenossenschaft Energie Textil Elektro Mediengestaltung, Cologne z.B. DGUV Regel 103-013 (BGR B11) – Elektromagnetische Felder

2. Technical Advice

☞ **Please read this Operating Manual carefully!**

2.1 Minimum Operation Conditions (EMC)

Measurement results may not be valid in the presence of strong RF fields (>3V/m) or burst-signals (pulsed interferences) on the power line.

2.2 ESD

Electrostatic discharges (>0,5 kV) to any of the connectors may damage the measurement instrument. Structural safety measures would affect measurement accuracy due to loss of sensitivity.

2.3 Radioactive Radiation

The sensor is susceptible to radioactive radiation. Exposing the probe to radiation will change the sensitivity of the probe und thus the measured value of the magnetic field.

2.4 Ground Connection / Earthiw

2.5 ng

When mounting the probe, it should be ensured that no potential difference exists between the protective earths (PE) of the Teslameter instrument and of the magnet. Otherwise, uncontrollable equalizing currents may flow on the test probe cable and cause substantial damage. In certain situations, the test probe may have to be isolated from the magnet.

2.6 Probe Connection

NEVER connect or disconnect a probe when the unit is switched ON!

2.7 Mechanical Clamping of the Probes

Should it be necessary to clamp the probe down in the area of the protective tube and not at the handle, this MUST NOT be done within the most forward 50 mm of the probe length!

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5. Description of the Instrument

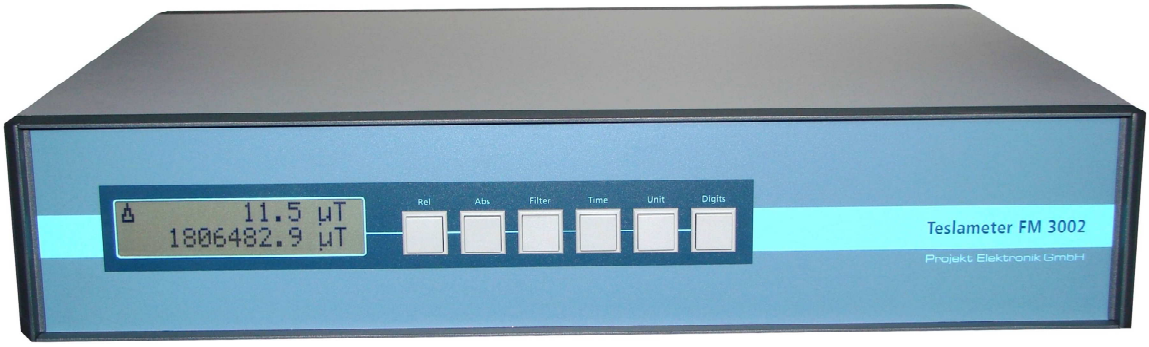


Fig. 1: Teslameter FM 3002

5.1 General Description

The Teslameter FM 3002 is a high-precision and extremely temperature-independent instrument for magnetic flux density measurement.

The display is digital - 7½ digits - and requires no temperature or correction tables which means one can resolve 1 800 000.0 µT to 0.1 µT. Better accuracy would be possible only by using the proton resonance method (NMR), which is time-consuming and cannot be used in just any situation.

As a speciality, the FM 3002 has not only a highly accurate and stable display but also an enhanced-accuracy analog output, which makes possible the use of the instrument as a high-accuracy measuring transducer.

Several correction processes, some of which intervene up to 20,000 times per second, are used to take into account and correct the non-linearities and the complex temperature dependencies of the Hall element in each individual probe.

Each instrument can be shipped ex works including the individual correction data of any two probes (transverse or axial) so that two different probes can be used on it by simply plugging them out and in. The transverse and axial probes both have the same accuracy of typ. 0.01 % of reading ± 0.005 % of range with a temperature coefficient of ≤ 5 ppm/K (<0.0005 %) at 25 °C.

Optional a probe extension cord up to 27 m is available. This can be plugged between probe and device, if a larger distance between measured object and measuring instrument have to be covered. The influence of the probe extension cord to the measured value is very low. An additional calibration is not necessary. However we recommend to omit the application of a probe extension cord where possible. With optimal accuracy and low electromagnetic susceptibility in mind it is more appropriate to extend the analog output or the RS232 interface.

Nuclear magnetic resonance (NMR) is used as a reference standard.

Outstanding performance data like these establish the FM 3002 as a top-of-the-class measuring instrument. Each unit is shipped with a factory calibration certificate stating traceability to national reference standards. Re-calibration is recommended in one-year intervals.

The FM 3002 has a 2 HE-19'' housing. As desktop version it is equipped with stands, as rack version it comes without stand but with mounting brackets.

5.2 Functional Principle

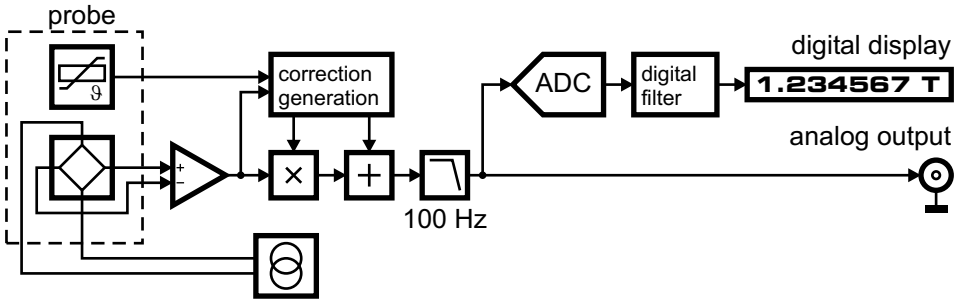


Fig. 2: structural construction of Teslameter FM 3002

The graphic shows the simplified structural construction of the Teslameter FM 3002. To achieve the outstanding accuracy of the device a multitude of parameters is incorporated. In the graphic thereof are only shown the measurement of the probe temperature and the actual value of the probe signal.

The generated corrections directly affect to the analog signal path. This principle offers considerable advances against solely digital correction techniques. At solely digital correction techniques first the probe signal is digitized with an analog-to-digital converter, corrected at the digital level and then again putted out as an analog signal via a digital-to-analog converter. Due to the restricted resolution of the converter it is inevitable that steps occur in the output signal. In contrast the Teslameter FM 3002 with its principle generates a continuous signal response.

The analog output of the Teslameter FM 3002 is directly feed from the corrected signal and therefor provides full correction and yet a bandwidth of 100 Hz.

Eventually the corrected high precision analog output is sampled with a high-resolution analog-to-digital converter. Out of it the values for the digital display and the serial port are obtained. The settings for integration time and filter affect only the digital path. The program for relative measurement is also generated in the digital path. The analog output is not affected by these settings.

5.3 Items Supplied:

1 Teslameter FM 3002
1 probe in a probe case
1 power cord
1 RS 232 cable 10 m
1 factory calibration certificate
1 operating manual
1 CD with software examples
1 zero chamber (option)
1 probe extension cord (option)

5.4 Technical Data

Range: ± 1.800 000 0 T	± 1.800 000 0 V ± 1 800 000.0 µT	analog output 7½-digit display
Non-linearity (incl. probe) (at 23 °C; 50 mT – 1.8 T)	≤ 0.01 % of reading, ± 0.005 % of range	
Resolution (display)	0.1 µT (1/18 000 000)	
Temperature coefficient instrument	≤ 3 ppm/K (0.0003 %/K)	
Temperature coefficient probe at 25 °C probe T; A	≤ 5 ppm/K (0.0005 %/K)	
Zero drift	≤ 2 µT/K	
Long-time stability	≤ 0.1 % / year (typ. 0.05 %/year)	
Bandwidth	0 - 100 Hz (– 3 dB) DC	analog output display
Noise	≤ 0.5 μT_{eff} (0 - 1 Hz)	
Display units	µT, mT, T, G, kG	
Measuring time	0.1 s to 5 s	
Probe size	9 x 2.5 x 200 mm Ø 8 x 200 mm 2.80 m	transverse probe T 1 axial probe A 1 probe cable
Effective area	1.5 mm x 3.0 mm ∅ 0.8 mm	transverse probe axial probe
Operation temperature Storage temperature Relative humidity	+10 °C to +40 °C - 20 °C to +50 °C 70 % at +35 °C	
Size housing *(W x H x D)*	449 x 104 x 320 mm 483 x 89 x 320 mm	desktop version 19“ rack version
Power	115 V~, 230 V~ ±10 % / 50 Hz - 60 Hz / 20 VA	
Pollution Protection Weight	2 under IEC664 Class I 4.50 kg	
Probe Extension Cord additional error	±(10 µT + 10 ppm) (cord length 15 m)	

Technical data are subject to change without prior notice!

5.5 Rear Panel Overview

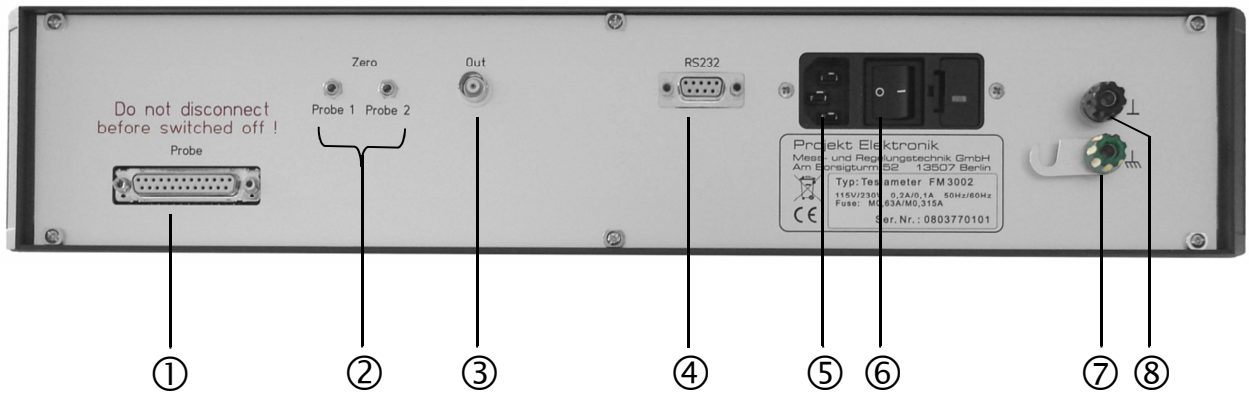


Fig. 3: rear panel of the instrument

①	probe connector	⑤	mains socket
②	zero point trimmer 'Zero'	⑥	power switch
③	analog output	⑦	connector protective earth
④	RS232 connector	⑧	connector analog ground

5.6 Power ⑤

The FM 3002 is operated on 230 V or 115 V AC power.
The operating voltage is selected by plugging the corresponding fuse adaptor into the power outlet. The selected voltage will be displayed in the fuse adaptor as being 230 V or 115 V. Instrument operation is possible with both 50 Hz and 60 Hz.
The fuse holder on the power switch houses two medium-blow 0.315 A / 250 V fuses (M 0.315/250). For 115 V operation, the fuses should be replaced by medium-blow 0.63 A units.
If operating the mains switch does not result in the digital display lighting up, these fuses should be checked.

5.7 Probes and Probe Connector ①

Two probes of any kind (axial and/or transverse) can be provided for each Teslameter unit.
Each probe is marked at its plug end with the serial number of the associated instrument (nameplate on the rear panel of the FM 3002); in situations where several FM 3002 are used, this ensures the use of each together with the correct probe only.
The 25-position probe plug is plugged into the 25-position receptacle "Probe" and the two retaining screws in the plug are tightened.

NEVER connect or disconnect a probe when the unit is switched ON!

5.8 Ground Connection / Earthing ⑦⑧

The PE (protective earth) conductor of the power supply is connected to the instrument case.
The analog ground is connected to PE through 1 MOhm || 22 nF.
The voltage between PE and analog ground must not exceed ± 39 V.
Two terminals (black for analog ground and yellow-green for PE) enable the analog ground to be connected directly to PE.

When mounting the probe, it should be ensured that no potential difference exists between the protective earths (PE) of the Teslameter instrument and of the magnet. Otherwise, uncontrollable equalizing currents may flow on the test probe cable and cause substantial damage. In certain situations, the test probe may have to be isolated from the magnet.

5.9 Radioactive Radiation

The sensor in the probe of the Teslameter FM 3002 is a hall element. This sensor is susceptible to radioactive radiation. There is some shielding through the brass material of the probe. But exposing the probe to radiation will change the sensitivity of the probe und thus the measured value of the magnetic field.

5.10 Warm-up

Several components must have reached their rated operating temperature before the instrument reaches its full accuracy and temperature stability.

Almost all performance data specified will be met approx. 10 min after power turn-on.

For highly accurate repeatable measurements with a < 100 µT tolerance, a warm-up phase of approx. 30 min should be observed.

5.11 Measuring Range

The measuring range is ± 1.8 T.

Exceeding the display range of approx. ± 2.3 T causes the message "!OVERLOAD!" to appear on the display.

The measuring range of the FM 3002 is specified to have an accuracy of ± 0.01 % of reading up to 1.8 T and of ± 0.01 % of the range (2 T).

For flux densities higher than 1.8 T, the displayed value or output voltage is still proportional, although with a higher error of approx. 1 - 3 %.

5.12 Analog Output ③

The analog output "out" (BNC female connector on the rear panel) offers a highly accurate, stable, low-noise voltage signal highly proportional to the value of the measured flux density with the ration 1.000 000 0 V ≡ 1.000 000 0 T.
This voltage can be used as flux density value in field control or for analog field scanning and detection.

The output is short-circuit proof with an internal impedance ≤ 1 Ohm.

To take advantage of the high accuracy (± 0.01 % of reading, ± 0.005 % of range), the input impedance of the connected evaluation electronics should be > 20 kOhm.
The bandwidth of the output signal is limited to 100 Hz (-3 dB).

The analog output is independent on relative measurement. It provides the instantaneous absolute flux density value at any time.

5.13 Zeroing ②

The highly stable electronics of the FM 3002 and the many probe data it has stored in memory ensure a zero setting which is precise and stable and easily repeatable.
Still, the zero setting should be checked and reset, if necessary, after some time.
To this end, the probe is introduced in a zero chamber; the instrument will show whether the zero setting should be readjusted.
This can be done - for each of probes 1 and 2 separately - by means of the "zero" slotted trimmer potentiometer on the rear panel of the FM 3002.
The zero setting should be checked also whenever the probe is changed.
Zeroing should not be carried out before an approx. 30 min warm-up period has elapsed.

5.14 Zero Chamber (Option)

Optional a zero chamber is attainable for our instruments.

The zero chamber is a one side closed pipe of good magnetic shielding metal to shield the existing outer field. That is at least the earth magnetic field. In addition there may be other interfering fields from the environment. In real world shielding may not be 100 %. A small residual magnetic field remains inside of the zero chamber.

Fig. 4: zero chamber

5.15 Probes

Two different types of probe are offered: an axial probe and a transverse probe .

The connecting cable comes with a length of 2.80 m. Lengths up to 25 m are possible on demand.
Lengths greater than 2.80 m do not affect the accuracy and temperature specifications as the instrument will be calibrated with the longer cable, so that the same high precision can be guaranteed.

5.16 Transverse Probe

Dimensions (mm): L = 200 D = 9.0 C = 2.5 A = 4 ±1
Active area (mm): 1.5 x 3.0

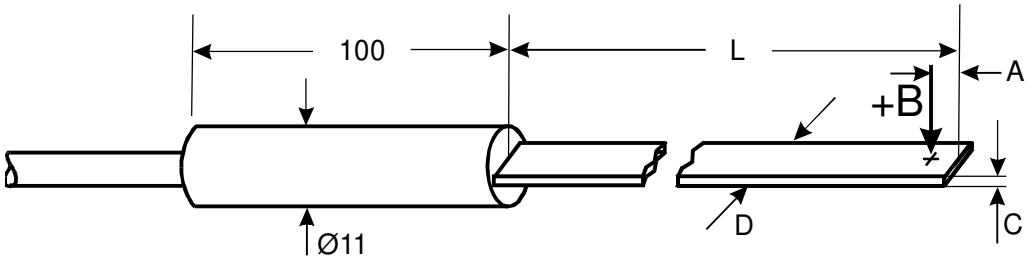


Fig. 5: transverse probe

5.17 Axial Probe

Dimensions (mm): L = 200 D = 8.0 A = 2 ±0.5
Active area (mm): Ø 0.8

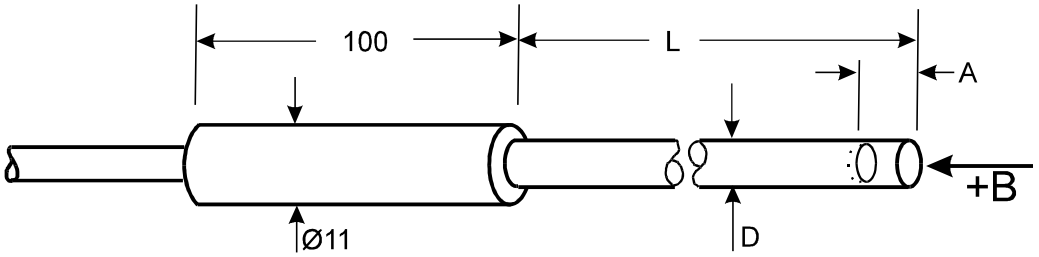


Fig. 6: axial probe

5.18 Polarity of Measured Value

On the transverse probes, the center of the active area is marked by a „+“ symbol. On Axial Probes, that center lies on the central probe axis.

If the magnetic flux density vector enters the measuring probe through the „+“ symbol, the value displayed will be positive (Fig. 7: *definition of polarity*). As memory hook one can think about an arrow, which when seen from behind is a cross. Positive indicated values mean the field is in the direction of the arrow.
For transverse probes, the reading at the analog output and on the display relates to a vector entering the probe at 90° to the surface of the probe profile.

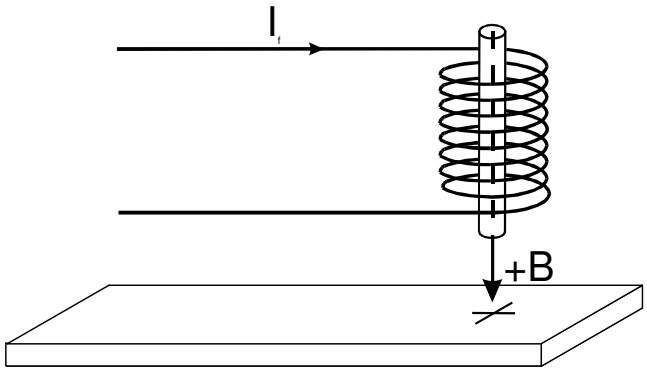


Fig. 7: definition of polarity

5.19 Remark on Precision and Repeatability

The flux density is a vector. To measure the exact value, the probe has to be positioned exactly perpendicular to the flux direction. If the lines of magnetic force do not enter the Hall element at right angle, the displayed value results from the true magnetic flux density according to the following relation:

$$B = B_{max} \bullet \cos \alpha$$

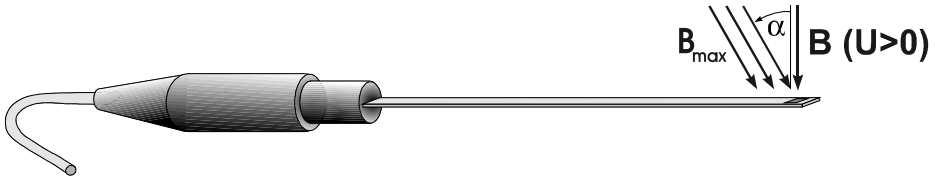


Fig. 8: Trigonometric of the measuring arrangement

For example to measure a flux of 1 T with precision of 0.1 µT the deviation of the angle have to be less than two arc minutes. For illustration: On a rotation with radius 100 mm this relates to a distance of only 0.3 mm.

The repeatability of the measurement extremely depends on the quality of the mechanical clamping of the probe.

The main reason to use a high-precision teslameter is not the absolute precision rather than the long term stability and the reliability in differential measurement.

5.20 Mechanical Clamping of the Probes

Transverse and axial probes are housed in a protective brass tube so as to maximize the protection for the Hall element.

Should it be necessary to clamp the probe down in the area of the protective tube and not at the handle, this MUST NOT be done within the most forward 50 mm of the probe length!

5.21 Typical Temperature Responses

Fig. 9: typical temperature responses shows the temperature responses and error limits within the 10 to 40 °C temperature range for fields of + 0.8 T and – 0.8 T.

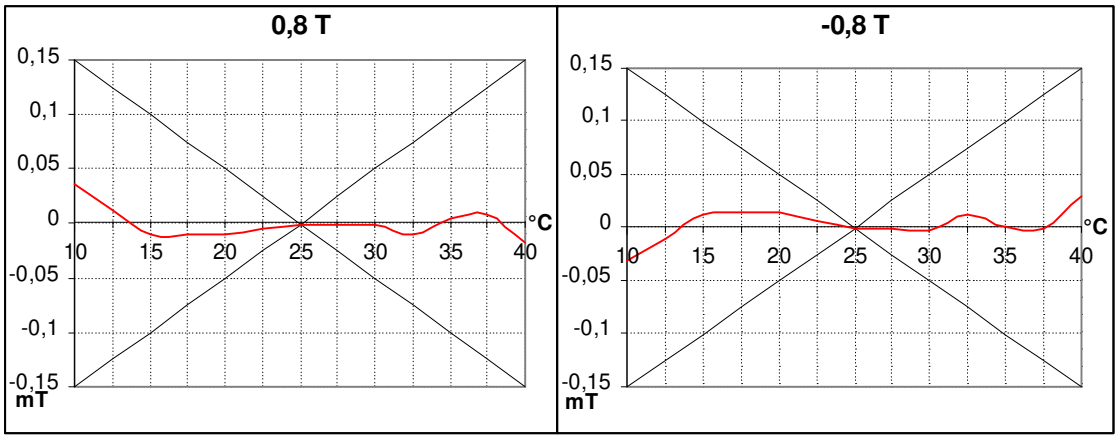


Fig. 9: typical temperature responses

5.22 Power ON ⑥

After the probe has been plugged in, the instrument can be turned ON using the power switch on the rear panel. The digital display lights up.

With the probe located in a space with a magnetic field of a magnitude equivalent to the Earth's magnetic field (approx. ± 50 µT), the display will show that.

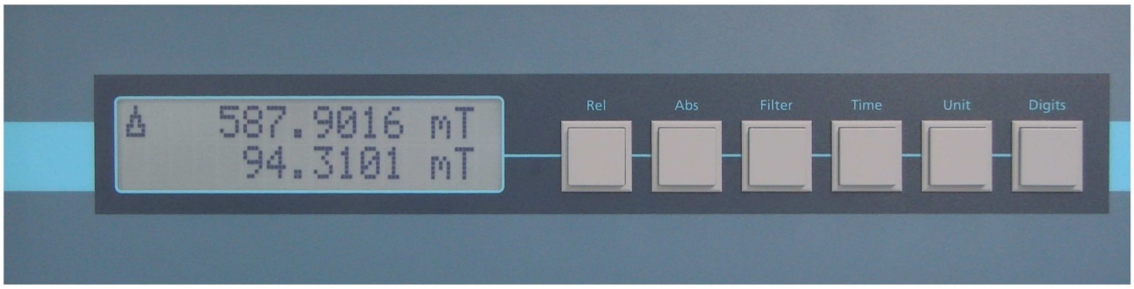


Fig. 10: display with keys

The display shows the magnetic flux as number and unit. Different settings allow the variable adjustment to varying measurement tasks.

6.1 Absolute and Relative Measurement: Key "Rel" and Key "Abs"

After power-on the unit is in absolute mode. Positive and negative values will be displayed. See also "Polarity of Measured Value".

The upper display row shows the true flux density measured by the probe. By pressing the key "Abs" one can switch to absolute mode at every time.

By pressing the key "Rel" the actual absolute value is saved as reference and showed at the lower part of the display. At the upper part the relative value referred to the saved reference value is shown marked with "Δ".

relative value = actual absolute value – reference value

Pressing "Rel" again sets the actual absolute value as new reference value (lower display line).

See also chapter 3 Serial Interface for other possibilities of relative and absolute measurement.

The relative mode has no effect on the analog output of the FM 3002. The analog output always provides the actual absolute value.

6.2 Integration Time and Filter: Key “Time” and Key “Filter”

The key “Time” sets the integration time. According to that the refresh rate of the display is set, which means that after expiration of the integration time a new value is displayed.

The internal sampling rate is 10 Hz.

With the key “Time” one can chose the integration times from the below-mentioned table. Out of it results the number of samples used for averaging.

TIME	100 ms	200 ms	500 ms	1 s	2 s	5 s
averaged Samples	1 (off)	2	5	10	20	50

A short key press shows the actual integration time at the display. With successive presses the integration time is raised cyclically. Every successive press has to be done within 0.8 s or it will be taken again as a first press.

The key “Filter” allows the filtering about a selectable number of values. Therefor a built-in digital filter is used. The table shows the selectable filter lengths.

FILTER	1	2	4	8	16	32	64

After a fast change of flux it is advisable to wait Filter x Time before using the measured value.

A short key press shows the actual filter length at the display. With successive presses the filter length is raised cyclically. Every successive press has to be done within 0.8 s or it will be taken again as a first press.

See also chapter 3 Serial Interface for other possibilities of setting integration time and filter length..

6.3 Units: Key “Unit”

The key “Unit” sets the unit for the displayed values. The table shows the selectable units.

UNIT	µT	mT	T	Gs	kGs

Every key press selects cyclically the next unit.

Exception: see chapter 2.4

See also chapter 3 Serial Interface for other possibilities of setting integration time and filter length.

6.4 Shown Digits: Key “Digits”

The key “Digits” allows to hide decimal places which will replaced by a underscore. Here the value is rounded mathematically correct. The use of this function does not interfere with the precision of the FM 3002 in any way. It is only a reading simplification.

Every key press hides one more decimal place up to maximal four places.

example with 1.2345678 T:

key press	display
0	1.2345678 T
1	1.234568_ T
2	1.23457__ T
3	1.2346___ T
4	1.235____ T
5	1.2345678 T
...	...

The using of the key “Digits” has a anomaly. To avoid misunderstandings only decimal places can be blinded out. If there are not enough decimal places the error message “More decimal places needed” is displayed.

Double-pressing results in the next possible selection. The same applies to the key “Unit”.

See also chapter 3 Serial Interface for hiding the decimal places.

6.5 Acoustic Feedback

Every new setting is acknowledged acoustically by a two-tone. At an error message the feedback is a disharmonic tone.

See also chapter 3 Serial Interface for switching acoustic feedback on and off

7. RS232 Interface

7.1 General④

All functions to be served at the key-pad can be controlled remotely via the RS232 interface. Furthermore, there are extended and additional commands.

Every ordinary terminal or terminal program can used to communicate with the FM 3002. The control is text-oriented thereby it can easily integrated in existing environments.

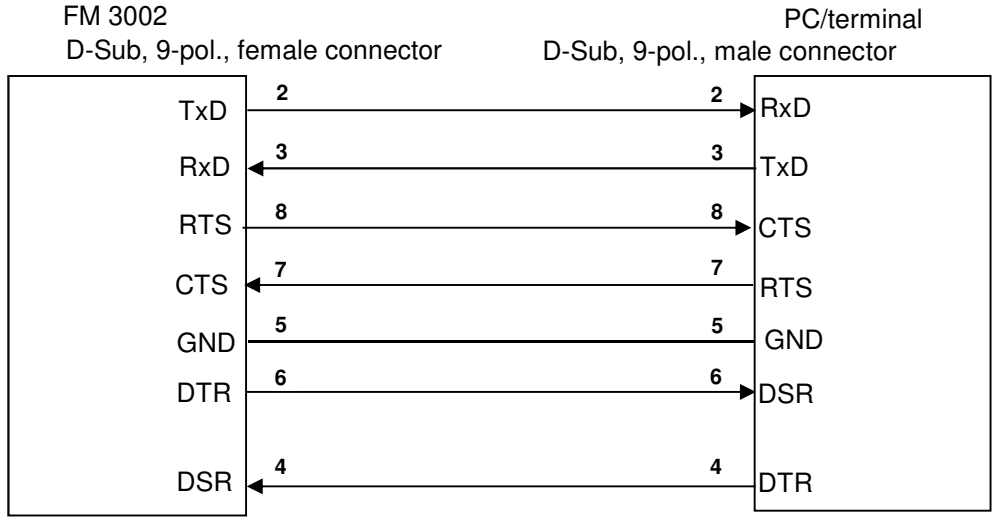
The terminal program should use a font which contains the “µ”-sign for display.
Unfortunately HyperTerminal under Microsoft Windows does not do that by default. Here the font should be switched to Courier New or Fixedsys.

7.2 Configuration of the Interface

For communicating with the FM 3002, the RS232 interface should be configured as follows:

baudrate	9600
databits	8
parity	none
stopbits	1
flow control	none

To connect the FM 3002 with an IBM-compatible PC a serial cable (1:1) has to be used. Important are only the lines TXD, RXD and GND. The other lines are not used.



Common USB to RS323 converter have the correct pinout and can be used without further addon. Due to the great variety of offered converters a general functioning guarantee can not be given.

7.3 Commands

The FM 3002 has a simple command structure consisting of the command name followed by one optional parameter. Command and parameter are separated by a space. Supplementary whitespaces will be tolerated. Every command line is finished with a newline character (LF/10d/0Ah). A preceding carriage-return character (CR/13d/0Ch) will be tolerated too.

All commands (but not the parameters) may abbreviated as long as they are distinguishable. The commands are not case-sensitive.

typographic convention of the examples:

normal script - output FM 3002
bold script - input user
[ ] - optional-brackets; brackets are not entered

7.4 Relative

command:	relative [reference]
without parameter:	switches to relative measurement and uses the actual measured value as reference (equal to pressing the “Rel” key)
with parameter:	switches to relative measurement and uses the given number as reference (interpreted as a multiple of 0.1µT)
parameter:	- 25000000 ≤ reference ≤ 25000000

example:

```
> rel
display is relative, reference =      1234.5 µT
>
```

```
> rel 12345678
display is relative, reference =   1234567.8 µT
>
```

7.5 Absolute

command:	absolute
without parameter:	switches to absolute measurement (equal to pressing the “Abs” key)

example:

```
> abs
display is absolute
>
```

7.6 Filter

command:	filter [taps]
without parameter:	shows the actual filter length (equal to pressing the “Filter” key once)
with parameter:	sets the filter length to the given length
parameter:	1 ≤ taps ≤ 64

example:

```
> filter
filter is 10
>
```

```
> filter 8
filter is 8
>
```

7.7 Time or Inttime

command:	time [time]
	inttime [time]
without parameter:	shows the actual integration time in milliseconds (equal to pressing the “Time” key once)
with parameter:	sets the integration time to the given value (interpreted as ms, rounded to a multiple of 100 ms)
parameter:	100 ≤ time ≤ 25500

example:

```
> time
integration time is 100 ms
>
```

```
> time 1500
integration time is 1500 ms
>
```

7.8 Unit

command:	unit [unit]
without parameter:	shows the actual unit
with parameter:	sets the display unit to the given unit
parameter:	µT, uT, mmT, mT, T, G, Gs, kG, kGs

example:

```
> unit
unit is mT
>
```

```
> unit kG
unit is kGs
>
```

7.9 Digits

command:	digits [digits]
without parameter:	shows the number of hidden decimal places
with parameter:	hides the give number of decimal places
parameter:	0 ≤ digits ≤ 4

example:

```
> dig
0 decimal places blinded out
>
```

```
> dig 3
3 decimal places blinded out
>
```

7.10 Status or FM Status

command:	status
	fmstatus
without parameter:	prints out a list of the actual settings

example:

```
> STATUS
FM3002 status
-------------
serial no. is 0801770101
filter is 1
integration time is 1000 ms
unit is µT
0 decimal places blinded out
sound is on
keys are unlocked
offset = -76755
slope = 23702056
factory calibration active
>
```

7.11 Default

command:	default
without parameter:	resets the instrument to factory settings (exemption: settings for slope and offset are conserved)

example:

```
> default
factory settings restored
>
```

7.12 Externcalibration

command:	externcalibration [{on/off}]
without parameter:	shows if the factory calibration or an (external) custom calibration is active; these influences only the display, not the analog output
with parameter:	switches the (external) custom calibration on or off (factory calibration active); these influences only the display, not the analog output

example:

```
> ext
factory calibration active
>
```

```
> externcalibration on
external calibration active
>
```

7.13 Logging

command:	logging [number]
without parameter:	switches between deactivated logging and permanent logging
with parameter:	returns the give number of measured values; may be aborted through log without parameter
parameter:	1 ≤ number ≤ 65534

example:

```
> log 2
logging 2 records
        13.068753 kGs
        13.068780 kGs
>
```

7.14 Sound

command:	sound [{on/off}]
without parameter:	shows the actual setting of acoustic feedback
with parameter:	switches acoustic feedback on or off
parameter:	on, off

example:

```
> sound
sound is on
>
```

```
> sound off
sound is off
>
```

7.15 Keys

command:	keys [{on/off}]
without parameter:	shows if the front keys are locked or not
with parameter:	switches the lock of the front keys on or off; after cycling power, the front keys are unlocked
parameter:	on, off

example:

```
> keys
keys are unlocked
>
```

```
> keys off
keys are locked
>
```

7.16 Version

command:	version
without parameter:	shows the version of the software

example:

```
> ver
V1.3, built May 28 2008, 21:41:29
>
```

7.17 HyperTerminal under Microsoft Windows Vista

HyperTerminal as part of the past Windows versions should be one of the widest used terminal programs. For Windows Vista Microsoft writes now: „HyperTerminal is not part of Windows anymore“. Therefore it remains only the possibility to switch to one of the numerous alternatives.

examples:

Putty
HTerm

8. Controlsoftware for FM 3002

8.1 FM3002Control v 1.0

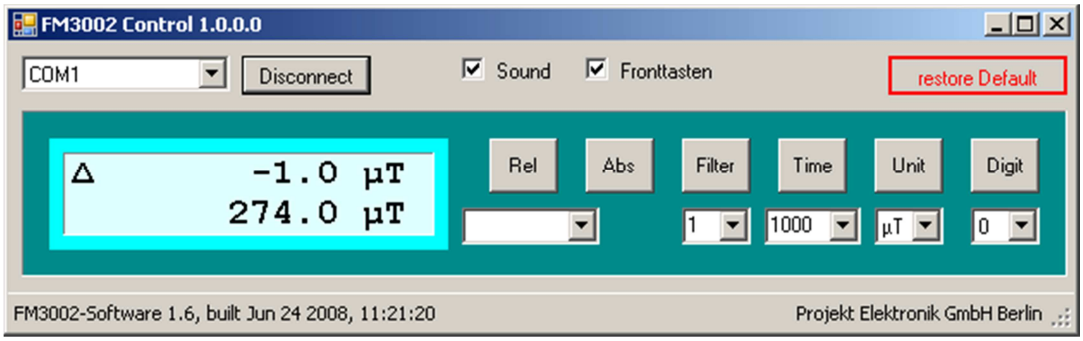


Fig. 11: window FM3002Control

8.2 General Description

The software FM3002Control is used to demonstrate the control of a FM 3002 via serial interface. It allows to test the different functions of the instrument.

The software runs on all platforms wherefore the Microsoft .NET Framework 3.5 is available. Actual (September 2008) that are Windows XP, Windows Vista, Windows Server 2003 and Windows Server 2008.
Detailed information can be found at http://msdn.microsoft.com/en-us/library/bb882520.aspx

The supplied source code illustrates the control of the instrument by software and can used as a base for developing an own software.

All in all the software is designed as a demo. The use in productive environment is done at one's own risk.

8.3 Installation

The software FM3002Control is supplied with a ClickOnce-Installation. Therefore run setup.exe in the Setup directory on the CD. The installation runs autonomous and finally starts FM3002Control.

To run the software the Microsoft .NET Framework 3.5 is necessary. If it is not installed at the computer, the installation-routine will do that too.

During the installation an entry at the Start-menu is created, so one can start the software later via Start → Program → Projekt Elektronik GmbH → FM3002Control.

8.4 Usage

To use the software FM3002Control, the FM 3002 has to be connected to the serial port of the PC.

After the start of FM3002Control chose the correct port to where the FM 3002 is connected in the upper left dropdown-box. Now press “Connect” to establish the connection. If the connection is successfully established the remaining controls are enabled. The actual set parameters of the FM 3002 are read out and the dropdown-boxes are preset to these parameter-values. Moreover the version of the internal firmware of the FM 3002 is printed in the status-bar.

The user-interface of FM3002Control is primarily built after the front of the FM 3002 and is only adapted to the extended possibilities of the serial interface commands.

The display-area shows the same as the display of the instrument. Because the software has to wait for the measured values with longer measuring times the software can react lazily.

In the dropdown-box under the buttons the corresponding parameter is chosen. Therefore one of the predefined values can be chosen or where permitted one can enter any other value (in the boundaries of permitted range). By pressing the button, the setting is send to the FM 3002. For the exact function and the value-range see the operating manual of the FM 3002.

In the upper part of the window, the acoustic feedback and the lock of the front-keys can switched on and off. With “restore Default” the FM 3002 can be reset to the factory values. For details see here the operating manual of the FM 3002, too.

8.5 Uninstall

FM3002Control can be uninstalled under Start → Settings → Control Panel → Add or Remove Programs.

8.6 Source Code

FM3002Control has been developed with Visual Basic 2008 Express. The source code is at the CD in the directory Source. It can be used as base to develop own software or to integrate into existing environments.

9. Maintenance and Warranty

9.1 Visual Inspection

Be sure before taking readings that the probe cable, the probe, the housing and the power chord are undamaged and in a proper and safe condition.

Check the cables for breakage or chafing.

9.2 Cleaning

Do not use a strong cleaner on the instrument.

Clean the instrument with a soft cloth moistened slightly with soap suds or methylated spirits.

9.3 Maintenance

There are no parts inside the device, which have to be serviced by the operator.

9.4 Warranty

Projekt Elektronik Mess- und Regelungstechnik GmbH warrants for a period of two years after delivery that the device will function dependably.

Warranty repairs occurring within this period will be carried out free of charge.

Violation of the rules set forth in this Operating Manual voids any warranty claims. No responsibility will be assumed for damage resulting from such actions.

The opening of or willful damage to the instrument will void any and all warranty claims!

Great care should be used when using movable magnets, as the Hall element will be destroyed when it strikes a pole surface!

10. Calibration

10.1 General

Loosely seen the FM 3002 consists of two parts. The first part is the analog signal processing which also provides the signal for the analog output at the rear panel. The second part is the digital display and interface unit which converts the analog signal.

At the analog part only the offset can be adjusted with the corresponding potentiometer at the rear panel of the FM 3002. An extended calibration can only be done by the manufacturer.

10.2 Factory Calibration

As manufacturer we recommend the regular calibration (approx. once a year, depending on usage). For this instrument, we have the necessary test equipment and the confirmation of the traceability to national standards (PTB). The confirmation is given with a factory calibration certificate.

10.3 Custom Calibration

There is the possibility of a custom calibration of the digital part. Therefor the commands externcalibration on/off, slope and offset are available.

If desired we will send you a detailed instruction.

11. Customer Service

11.1 Repair

For repairs send the instrument to the following address:

Projekt Elektronik Mess- und Regelungstechnik GmbH
Am Borsigturm 54 Tel. +49 30 43032240
13507 Berlin / Germany Fax +49 30 43032243

11.2 Follow-Up Orders

Follow-up orders can be placed at Projekt Elektronik Mess- und Regelungstechnik GmbH by letter, telephone or fax stating the name of the item.

11.3 Disposal

Should disposal of the instrument be necessary, it can be returned to

Projekt Elektronik Mess- und Regelungstechnik GmbH
Am Borsigturm 54
13507 Berlin / Germany

freight/postage prepaid, together with a declaration of assignment.

EU Declaration of Conformity

Name of manufacturer	Projekt Elektronik Mess- und Regelungstechnik GmbH
Manufacturer's address	Am Borsigturm 54 D - 13507 Berlin Germany Tel. +49 30 43032240 Fax +49 30 43032243 http://www.projekt-elektronik.com Email: info@projekt-elektronik.com
declares that this product	
Product name	Teslameter FM 3002
Model number	F770
Short description	The Teslameter FM 3002 is a measuring instrument for the measurement of the magnetic flow density.
following the regulations of the EMC guidelines	2014 / 30 / EU
the low voltage guideline	2014 / 35 / EU
and RoHS directive	2011 / 65 / EU
complies with the following standards and/or standardizing documents	EN 61326-1:2013 EN 61010-1:2010
Supplemental information	As to the restrictions regarding EN 61000-4-3, see also Minimum Operation Conditions (EMC) page 3
Berlin, 18. July 2016	Dipl.-Ing. Hartmut Heinze Managing Director / CE Coordinator

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