

Frequency Meter

FM 2000

Instruction- & Operation Manual

valid for part no.: 20750-0F & 20750-GF

Caution:

As with any form of electrical equipment there is always a risk involved in the handling of electrical machinery. The greatest care must always be exercised during installation and maintenance, and it is recommended this be carried out by authorized personnel.

Table of contents

1.0	Technical Data	3
1.1	General information	3
1.2	Frequency Meter	3
1.3	Period Time Meter	3
1.4	Impulse Counter	3
2.0	Drawing of Dimensions / Connections	4
3.0	Test Mode.....	6
4.0	Algorithmical Adjustments	6
5.0	Multiplier Adjustment	7
6.0	Operating Mode / MODE Selection / Decimal Place	8
6.1	Operating Mode.....	8
6.2	MODE Selection	9
6.3	Decimal Point	13
7.0	Measurement Display.....	13
8.0	Example.....	13
	Manufactures Declaration	14

1.0 Technical Data

1.1 General

Line voltage	refer to name plate
Power consumption	max. 6VA
Display	5 digits, 7-segment LED, decimal point, parameter display
Weight	approx. 400g
Dimensions	W 96 x H 48 x D 158 mm (including terminals)
Panel cut dimensions	W 92 x H 44mm
Installation position	horizontal
Spacing	min. 10mm
Ambient temperature	0 - 40°C
Input voltage	0 corresponds to 0V..4,5V 1 corresponds to 6V...20V max. voltage = 32V

1.2 Frequency meter

Input frequency	0 to 100kHz
Accuracy	0,01% ± 1 digit

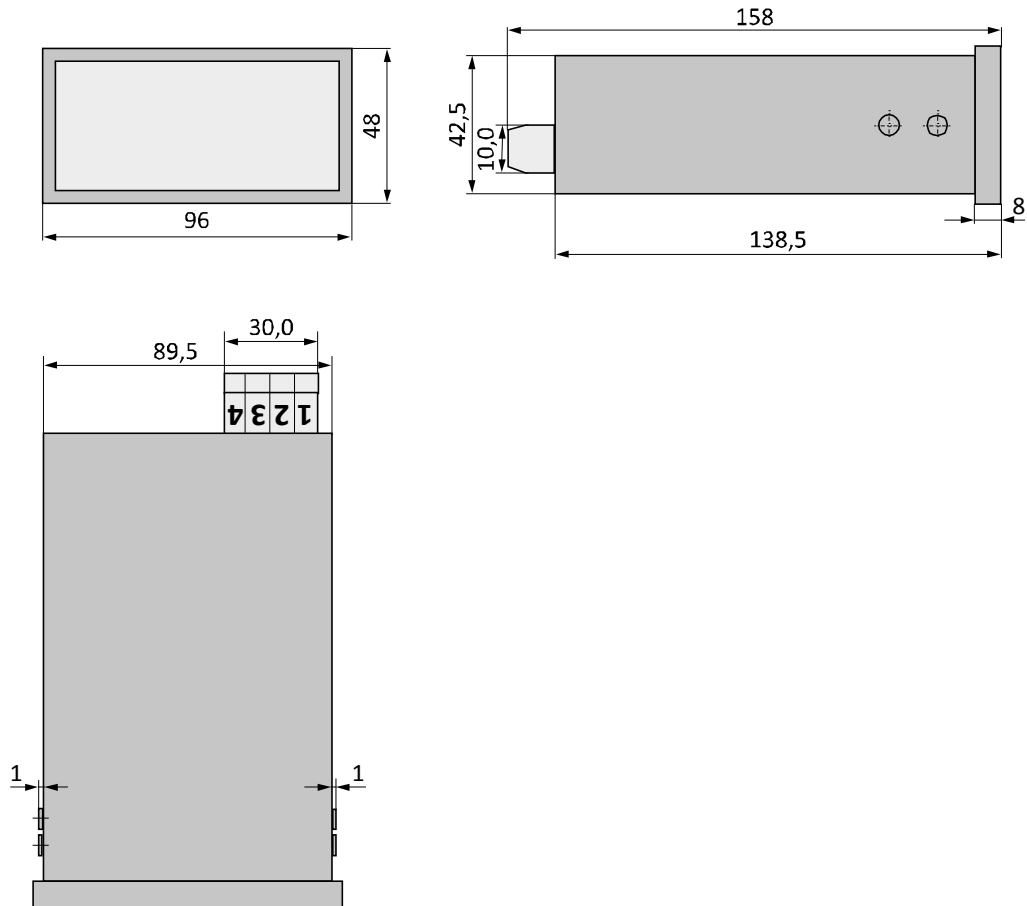
1.3 Periode time meter

Input frequency	0,1 to 100Hz
Accuracy	0,1% ± 1 Digit

1.4 Impulse counter

Input frequency	0 to 100kHz
------------------------	-------------

2.0 Dimensions / Connections



Terminal 1 - Line voltage (L) refer to type plate

Terminal 2 - Line voltage (N) refer to type plate

Terminal 3 - Input measuring signal (\perp) refer to type plate

Terminal 4 - Input measuring signal (+) refer to type plate

MANUFACTURERS DECLARATION

The EMC-law of November 9th 1992 concerning the electromagnetic compatibility with reference to the EMC-directive EMCD 89/336/EWG is a national law. This directive distinguishes between two criteria: product components and product distribution.

According to these criteria our products are classified as follows:

- Product components: *parts from suppliers which are inoperative on their own.*
- Product distribution: *not commonly available, sold to qualified persons.*

The law states, that an EG-declaration of conformity as well as a CE-marking is not requested for such components.

In order to meet the requirements of the EMC-directive we supply the following:

- Product related documents which describe the interference radiation of our products. This information will enable the user to provide all necessary steps to meet the EMC-requirements during planning and installation.
- EMC-specific components such as filters, chokes, shielded wiring, metal enclosures and others are available from TAE. TAE will furthermore provide specific technical information concerning the proper use of such components for their products in order to meet the requirements of the harmonised standards.

It is the users responsibility to carry out our instructions and to induce adequate provisions. The user is also responsible that his machine and installation meets the requirements of the EMC-standards.

Based on the EMC-law and its corresponding standards we have carried out extensive measurements at our premises. These tests have included our complete product line. *With the use of filters and proper wiring all our products meet the requirements of standard EN 50081-2 (sweep radiation) and standard EN 55011 class A for industrial use.*

The extent of the necessary modification depends on the individual product line. Our pamphlet "**TAE PRODUCTS AND EMC**" provides information of the minimum requirements for our products in order to meet the standard EN 50081-2. Our "**GUIDE LINES FOR EMC-CONFORMAL INSTALLATION**" provide information for a properly and EMC-conformal installation.

These guidelines and recommendation for the use of electronic equipment are based on the following standards:

DIN EN-50178 (VDE 0160:1994-11)	Electronic equipment for use in electrical power installations
DIN VDE 0100	Erection of power installations
DIN VDE 0110	Dimensioning of clearance and creepage distances
DIN 40050	IP-Protections
DIN 50081/50082	EMC Basic Standards

3.0 Test Mode

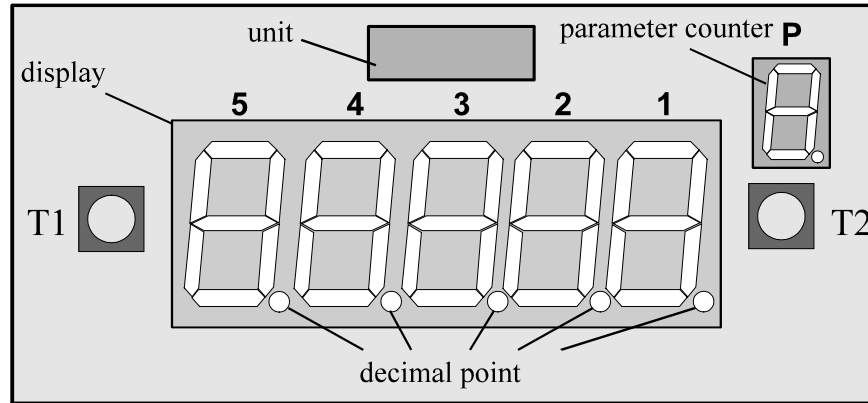


Figure 1: Front view of the Frequency Meter FM 2000

In order to start the test mode of the FM 2000 key **T1** must be pressed and be held while key **T2** is pressed at the same time. Note: The test mode cannot be started during the configuration function.

During the test mode all display functions are individually tested and each single digital display will show one after the other the numbers 0 to 9 and the decimal point.

4.0 Algorithmical Adjustments

The Frequency Meter FM 2000 is being configured with two keys **T1** and **T2** and with the parameter counter **P**.

The algorithmical adjustment is activated by pressing key **T2**. The parameter counter **P** will now indicate the number 1 and the decimal point of the parameter counter will also light up. This indicates that the parameter counter can be increased by a repeated pressing of key **T2**. The other five digital display units will show the value which has been recalled by the parameter counter **P**.

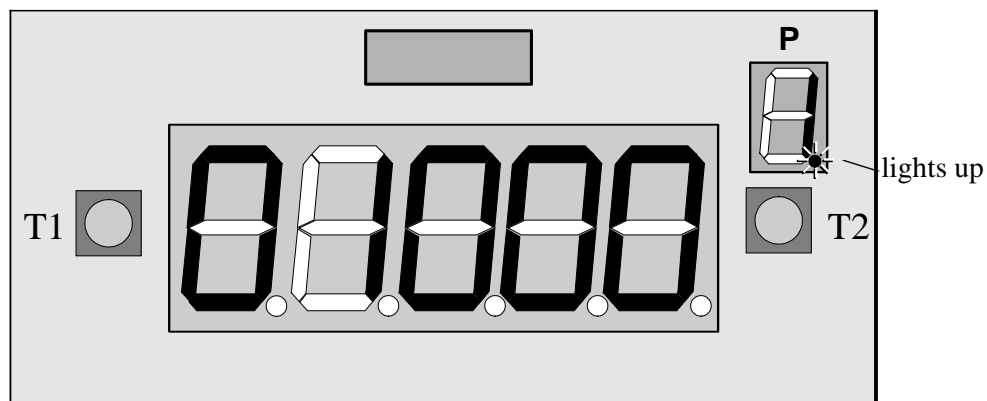


Figure 2: Display of the parameter counter during the algorithmical adjustment.

In order to change the indicated parameter the decimal point must be moved to the individual display unit by pressing key **T1**. The indicated number of this display can now be altered by pressing key **T2**.

If key **T1** is pressed again the system returns to the parameter counter **P**.

Pressing now key **T2** again will increase the parameter counter to the next parameter. At the end of the algorithmical adjustment the parameter counter will return to the operating mode and the new values of the parameters are stored. The FM 2000 will now operate with the set new parameters.

NOTE: This newly set parameter cannot be cancelled if the line voltage is interrupted!

All parameters can be changed as often as requested and any parameter which is not to be changed can be skipped with the parameter counter by selecting the next parameter.

5.0 Multiplier Adjustment

When the parameter counter **P** shows the number 1 it is possible to set a multiplier for the actual measuring value. The standard value is 01000.

This standard value corresponds to the multiplier 1.0. If for instance the factor 0.5 is requested the parameter must then be adjusted to 00500.

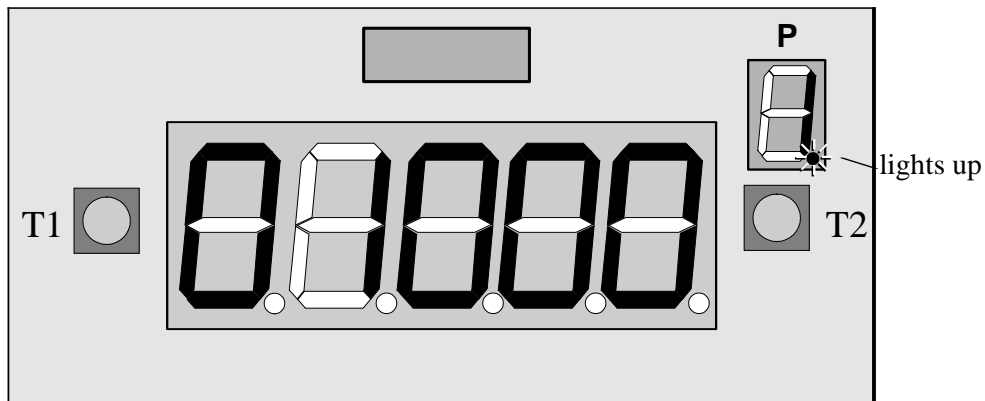


Figure 3: Display of the FM 2000 for multiplier adjustment

The requested segments (1 to 5) can be activated with key **T1**. The decimal point of the activated segment lights up. The figures can now be selected with key **T2**. Activating key **T1** will return the system to the parameter counter **P** after the parameter 1 has been completely adjusted.

6.0 Operating Mode / MODE Selection / Decimal Place

The operating mode, the mode selection and the decimal place can be adjusted by setting the parameter counter to number 2.

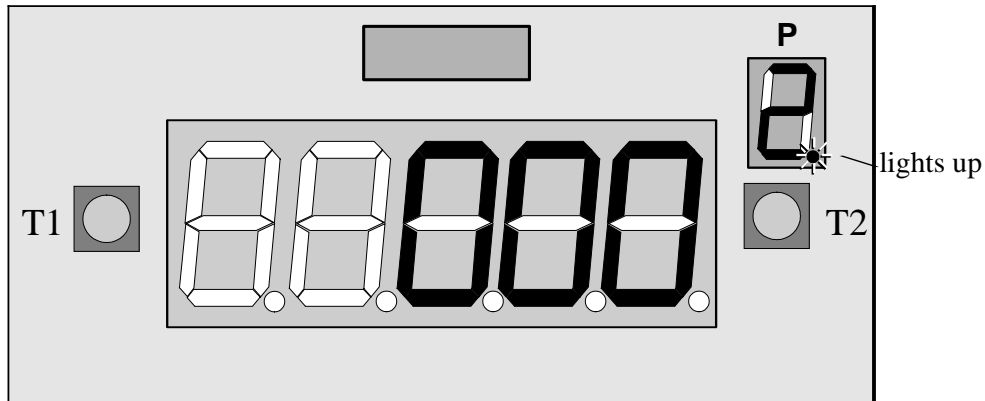


Figure 4: Display of the parameter counter for setting the Operating Mode / MODE Selection and Decimal Place

6.1 Operating Mode

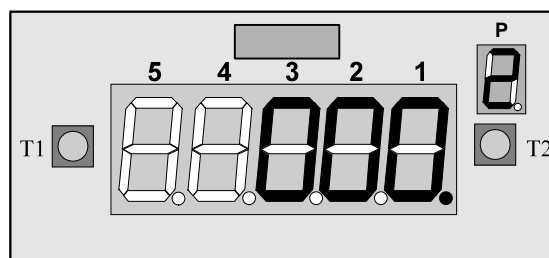
The Frequency Meter FM 2000 offers a selection between three operating modes:

- Frequency Meter
- Period time Meter
- Impulse Counter

The first digit display (right side) indicates the operating mode when the parameter counter is set to number 2:

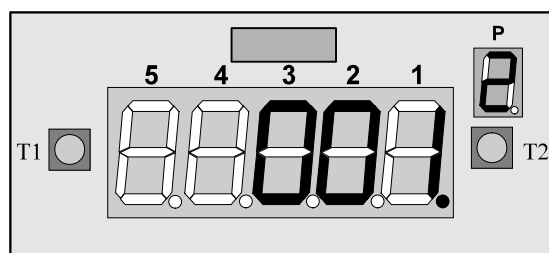
0: Frequency Meter

The operating mode is set for frequency measurement



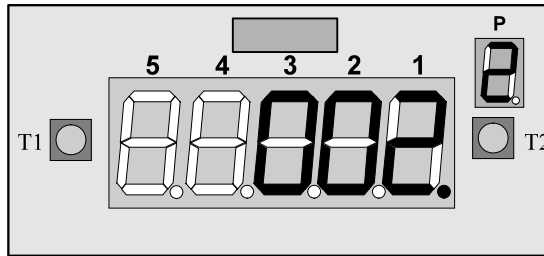
1: Periode Time Meter

The operating mode is set for measuring the period time (very exactly frequency display in the range of 0,1 to 100Hz)



2: Impulse Counter

The operating mode is set for impulse counting



Procedure:

- a) Parameter counter is set to number 2
- b) Activate with key **T1** the first digit display
- c) Select with key **T2** one of the above mentioned modes
- d) After complete setting of parameter 2 return the parameter counter by pressing key **T1** again.

6.2 MODE Selection

The FM 2000 offers the selection between seven different MODES in order to adapt the display of the measured values to the individual requirements. The selected MODE applies to the display only and is independent from the selected multiplier. The following MODE selection is indicated in the parameter 2 on the second digit segment (second from right) and refers to the operating modes: frequency meter and period-time meter:

MODE 0: Standard display (no changes)

This mode provides the display of the measured value without any change.

example:

	operating mode 0 Frequency meter	operating mode 1 Period time meter
Frequency to be measured	567,8Hz	67,358Hz
Display indicates	567	6735

MODE 1: last digit shows 0

This mode is used if the measuring procedure with 10 times measuring accuracy is too slow and the flickering of the last digit should be eliminated.

example:

	operating mode 0 Frequency meter	operating mode 1 Period Time meter
Frequency to be measured	567,8Hz	67,358Hz
Display indicates	560	6730

MODE 2: 10-times measuring accuracy

The FM 2000 offers a new measuring method which allows to measure with a 10-times accuracy without a substantial increase of the measuring time. However the last two digits will need about 10 seconds before the correct value is indicated.

example:

	operating mode 0 Frequency meter	operating mode 1 Period Time meter
Frequency to be measured	567,8Hz	67,358Hz
Display indicates	5678	67358

MODE 3: Shifting of the display with additional 0

For lower frequencies it may become necessary to obtain a larger indication on the display without the delay of 10 seconds for the measuring time. In this case the display is shifted one digit to the left and a zero is added at the end.

example:

	operating mode 0 Frequency meter	operating mode 1 Period Time meter
Frequency to be measured	567,8Hz	67,358Hz
Display indicates	5670	67350

MODE 4: Steady Display

Due to different measuring methods most instruments show a flickering of the last digit in their display. The measuring method of mode 4 is the same as it is used for mode 2 but with the intention to eliminate the flickering of the last digit.

example:

	operating mode 0 Frequency meter	operating mode 1 Period Time meter
Frequency to be measured	567,8Hz	67,358Hz
Display indicates	567	6735

MODE 5: Steady display, Indication is shifted 1 digit to the right.

The indication on the display is shifted 1 digit to the right.

example:

	operating mode 0 Frequency meter	operating mode 1 Period Time meter
Frequency to be measured	567,8Hz	67,358Hz
Display indicates	56	673

MODE 6: Steady display. Indication is shifted two digits to the right.

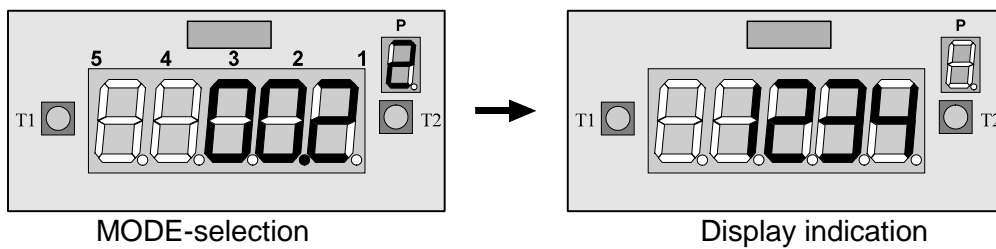
example:

	operating mode 0 Frequency meter	operating mode 1 Period Time meter
Frequency to be measured	567,8Hz	67,358Hz
Display indicates	5	67

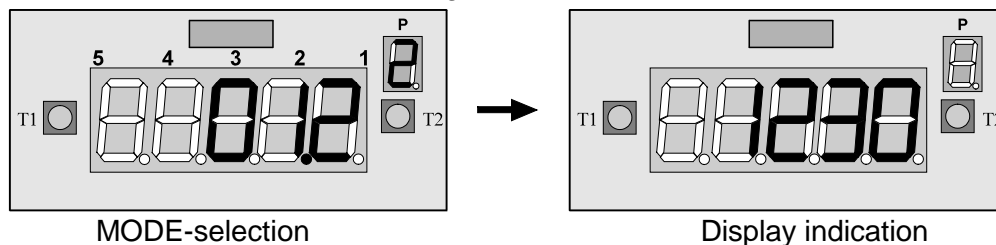
The assignment for the mode selection in the **operating mode 2 "Impulse Counter "** is as follows:

The shown examples relate to 1234 counted pulses.

MODE 0: Indication without any change

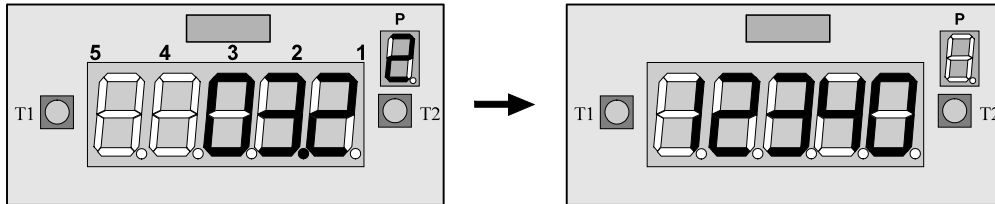


MODE 1: Additional zero on the last digit



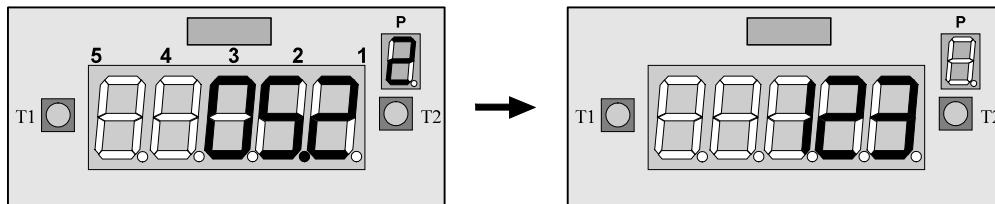
MODE 2: is not used

MODE 3: Shift of the indication one digit to the left and addition of one zero
MODE-selection Display indication

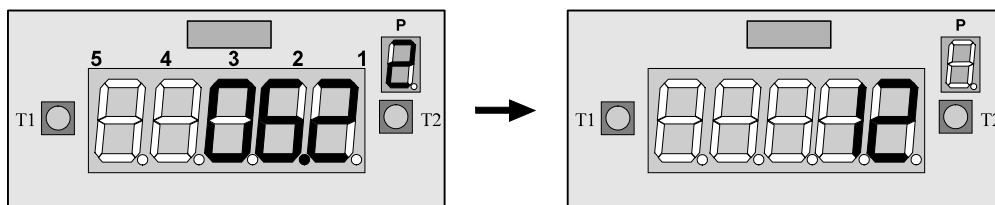


MODE 4: is not used

MODE 5: Shift of the indication one digit to the right
MODE-selection Display indication



MODE 6: Shift of the indication two digit to the right
MODE-selection Display indication



The segment 2 can be activated with key **T1**. The decimal point of the activated segment lights up. The place of the MODE can now be selected with key **T2**. Activating key **T1** will return the system to the parameter counter **P** after the parameter 2 has been completely adjusted.

6.3 Decimal Point

The decimal point can be placed on four different positions of the display. Number 3 of the parameter 2 shows the position of the decimal point:

Example:

Indication 3 of parameter 2	Display indication
0	12345 (no point)
1	1234.5
2	123.45
3	12.345
4	1.2345

The requested segment can be activated with key **T1**. The decimal point of the activated segment lights up. The place of the decimal point can now be selected with key **T2**. Activating key **T1** will return the system to the parameter counter **P** after the parameter 2 has been completely adjusted.

7.0 Measurement Display

In the operating condition it is possible to measure the input frequency to the FM 2000 without reference to the preset multiplier by keeping the key **T1** pressed.

8.0 Example

This example refers to the connection of the FM 2000 to the DC-Brushless-Control Series "TA-BL..." from TAE and can serve as a sample for any other application. The speed (rpm) of the brushless motor is to be indicated on the FM 2000 by using the frequency output.

Assumption: The output frequency of the control is twice as high as the motor speed.

Adjustment: The above mentioned assumption requires a multiplication factor at 0,5. As previously indicated under point 3 the parameter 1 must be set to 00500. The parameter 2 should be adjusted for 000, that means the operating mode, the mode selection and the place of the decimal point are set to 0.

The result from these adjustments is that for instance for an output frequency of 3456Hz the display will indicate 1728 which corresponds to the actual motor speed.