

ENGLISH


Instruction manual



Index:

1. PRELIMINARY AND SAFETY	2
1.1. PRELIMINARY INSTRUCTION	2
1.2. DURING USE	2
1.3. AFTRE USE.....	2
2. INSTRUMENT DESCRIPTION.....	3
3. PREPARING TO USE	3
3.1. INITIAL	3
3.2. SUPPLY VOLTAGE.....	3
3.3. CALIBRATION.....	3
3.4. STORAGE	3
4. INSTRUMENT DESCRIPTION.....	4
4.1. FRONT PANEL.....	4
4.2. KEYS DESCRIPTION.....	4
4.3. AUTOPOWEROFF FUNCTION.....	5
4.4. EMITTING/RECEIVING UNIT.....	5
5. OPERATING INSTRUCTIONS.....	6
5.1. SPEED MEASURE WITHOUT CONTACT	6
5.2. SPEED MEASURE WITH CONTACT	7
5.3. SPEED MEASURES ON SURFACES (M/MIN, FT/MIN, YD/MIN)	8
5.4. EVENTS COUNTER WITH EXTERNAL LIGHT SOURCE	9
5.5. EVENTS COUNTER WITH INTERNAL EMITTING UNIT	10
5.6. MEASURES ON SLOW ROTATING OBJECTS	10
6. MAINTENANCE	11
6.1. GENERAL INFORMATION.....	11
6.2. BATTERIES REPLACEMENT	11
6.3. CLEANING	11
6.4. END OF LIFE.....	11
7. TECHNICAL SPECIFICATIONS.....	12
7.1. TECHNICAL CHARACTERISTICS.....	12
7.2. GENERAL CHARACTERISTICS.....	12
7.3. ACCESSORIES.....	12
8. SERVICE.....	13
8.1. WARRANTY CONDITION	13
8.2. AFTER-SALE SERVICE	13

1. PRELIMINARY AND SAFETY


This instrument conforms with safety Standard EN 61010-1 related to electronic measuring instruments. For your own safety and to avoid damaging the instrument follow the procedures described in this instruction manual and read carefully all notes preceded by this symbol .

When taking measurements:

- Avoid doing that in rooms where explosive gas, combustible gas, steam or excessive dust is present.
- Avoid doing that if you notice anomalous conditions such as breakages, deformations, fractures, leakages of battery liquid, blind display etc.



CAUTION

For your own safety as well as that of the apparatus you are recommended to follow the procedures described in this instruction manual and carefully read all the notes preceded by the symbol .

1.1. PRELIMINARY INSTRUCTION

- Only the accessories supplied with the instrument guarantee compliance with the safety standards. They must be in good conditions and must be replaced, if necessary, with identical models.
- Do not effect any measurement under conditions beyond the limits specified in chapter 7.
- Check that batteries have been placed correctly.

1.2. DURING USE

Carefully read the following recommendations and instructions:




CAUTION

No compliance with the Warnings and/or Instructions may damage the apparatus and/or its components or injure the operator.



CAUTION

If the symbol "" is displayed during use interrupt testing and replace batteries following the procedure described under paragraph 6.2.

1.3. AFTRE USE

- When the measurements are completed switch OFF the instrument.
 - Remove batteries when the apparatus remains unused for long periods.

2. INSTRUMENT DESCRIPTION

The HT2234N meter performs the hereunder tests:

- RPM and RPS speed measures with and without contact
- m/min, ft/min and yd/min surface speed measures
- Events counter
- MAX/MIN/AVE functions

3. PREPARING TO USE

3.1. INITIAL


This instrument has been checked mechanically and electrically prior to shipment. Every care has been taken to ensure that the instrument reaches you undamaged.

However, it is wise to carry out a rapid check in order to detect any possible damage which might have been caused during transport. Should this be the case, immediately enter the usual claims with courier.

Check the packaging contained according to packaging list reported in paragraph 7.3. In case of discrepancies contact the dealer.

In the event of re-shipment of the equipment please follow the instructions reported in chapter 8.

3.2. SUPPLY VOLTAGE

The instrument is battery supplied. It uses four battery model 1.5V AA UM3 type included in the packaging. When the batteries are low the symbol " " is displayed. To replace batteries follow the instructions indicated in chapter 6.2.

3.3. CALIBRATION

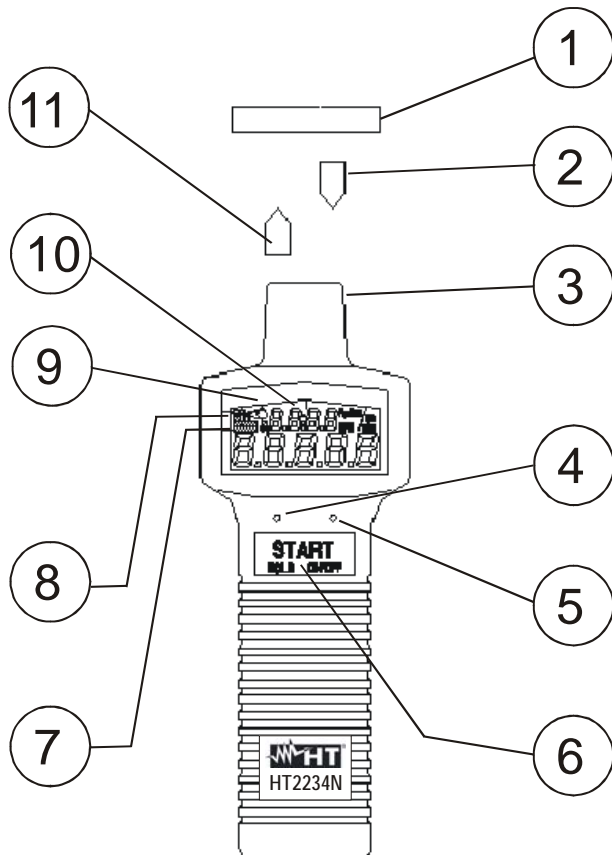
The instrument fulfils the technical characteristics listed in this manual. The performance of the specifications are guaranteed for one year.

3.4. STORAGE

In order to guarantee the accuracy of the measurements, after a period of storage in extreme environment condition, wait for the time necessary so that the apparatus returns to normal measuring conditions (see environments specifications paragraph 7.2).

4. INSTRUMENT DESCRIPTION

4.1. FRONT PANEL



LEGEND:

1. Reflecting tape.
2. Reflecting signal light beam.
3. Emitting / Receiving units.
4. **UNIT** key.
5. **FUNCTION** key.
6. **START / STOP / HOLD** key.
7. MAX/MIN/AVE symbols.
8. Low battery indication.
9. Start measure symbol.
10. Results display (bottom) and clock display (top) for Hours:Minutes.
11. Emitting signal light beam.

Fig. 1: front panel

4.2. KEYS DESCRIPTION

• UNIT key

Press ciclycally **UNIT** key to select the followed units:

RPM:	speed measure without contact
RPM /:	speed measure with contact
m/min:	meter/minute
ft/min:	feet/minute
yd/min:	yards/minute
R/S:	frequency (Hz)
NO.:	events counter with external or internal light source

- **FUNCTION key**


Press cyclically **FUNCTION** key to select the Maximum (MAX), Minimum (MIN) and Average (AVE) values of measured parameters at display, except for events counter results. **MAX**, **MIN** and **AVE** are shown at display. These functions allow users to analyze the stability of rotational speed. Average value is calculated as:

$$\text{RPM}_{\text{AVE}} = \frac{1}{n} \sum (rpm)_n \quad \sum (rpm)_n < 2^{32}; n < 65535$$

If the sum of average value is overrange, or number of counting values $n > 65535$, the last average RPM will be used as initial value for successive calculation and n will be reset to 1. Pressing **HOLD** key the MAX/MIN/AVE values are still stored in memory. Press **FUNCTION** key to review the values at display.

Press **FUNCTION** key at least 2s to return to normal mode.

- **START/STOP/HOLD key**

- Press **ON/OFF** key to turn ON the meter.
- Press **START** key to activate any measures. “” symbol is shown at display.
- Press **START** key again to stop measures and hold the data at display. “**H**” symbol is shown at display.
- Press and hold **ON/OFF** key at least 2s to turn OFF the meter. “**OFF**” symbol is shown for a while.

4.3. AUTOPOWEROFF FUNCTION

- With AutoPowerOFF mode is enabled the clock meter shows Minutes only and the instruments is automatically OFF after about 30 minutes from last operation. When the meter is turn ON AutoPowerOFF is always enabled.
- To disable AutoPowerOFF function press and hold **UNIT** key at least 2s. Internal clock meter shows Hours and Minutes.

4.4. EMITTING/RECEIVING UNIT

The HT2234N meter is composed by two internal units which performing all measurements. The Emitting unit emits a light from a red LED (left side) which is reflected by reflecting tape applied on the surface of the object on test and is received by Receiving unit (right side). It is recommended that the reflecting surface is perpendicular to the emitting/receiving unit for best measurement.

5. OPERATING INSTRUCTIONS

5.1. SPEED MEASURE WITHOUT CONTACT

1. Cut off a piece of reflective tape of size 1.0 cm x 1.4 cm (optimal size).
2. Wipe off oil or stains from the surface where reflective tape will be adhered.
3. Stick the self-adhesive reflective tape on the object whose rotational speed is to be measured. The reflective tape should be attached as close to the outer edge of the object to be measured as possible.
4. Press **ON/OFF** key to turn ON the meter.
5. Press **UNIT** key to select unit, RPM or R/S.
6. Aim the meter to the object on test (see Fig. 2):

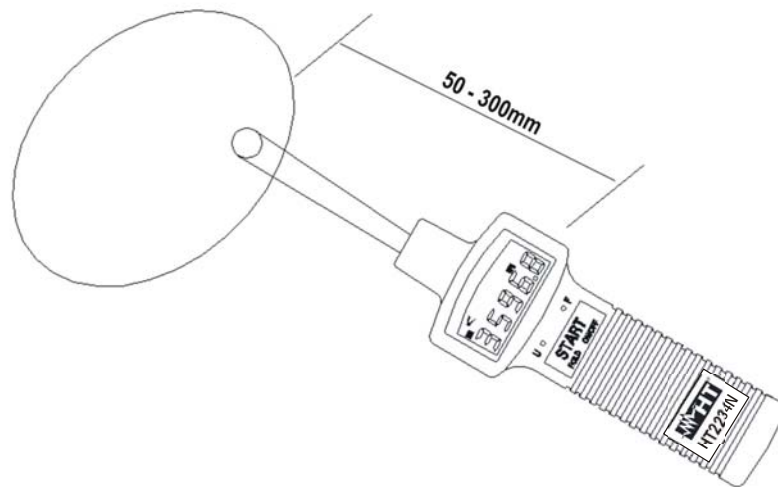



Fig. 2: speed measure without contact (RPM)

7. Press **START** key once and confirm that the red emitting LED lamp lights up and aimed to reflective tape.  symbol is shown at display.
8. Press **START** key again to stop the measure. "H" symbol is shown at display.
9. The result of test and his duration is shown at display.

CAUTION



- If the rotational speed is less than 60 rpm, it may take about 1 to 6 seconds to measure (60 rpm takes 1 second, and 10 rpm takes 6 seconds).
- The reading will be held for 6 seconds, if you aim the photoelectric probe at a 0 speed object right after one measurement.
- If the speed is less than 999.99 rpm, the red LED is turned on all the time to detect speed. If the speed is great than 999.99, the unit goes into power-saving mode. The LED is turned on for a very short period of time, then turned off for most of the time to save power.

5.2. SPEED MEASURE WITH CONTACT

1. Insert the proper rubber head on the mechanical adapter.
2. Attach the mechanical adaptor to the unit **and fasten the screw** (see Fig. 3):

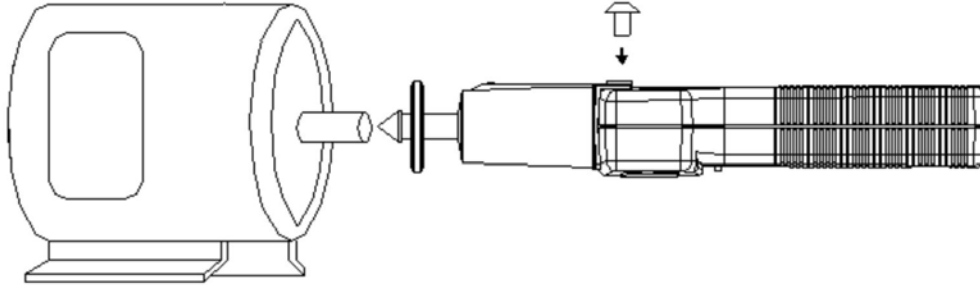



Fig. 3: attach of mechanical adaptor

3. Press **ON/OFF** key to turn ON the meter.
4. Press **UNIT** key to select RPM / unit.
5. Press against the shaft of the object to be measured. Do not press against the shaft too hard to avoid hazardous situation for operator.
6. Press **START** key once to enable measure.  symbol is shown at display.
7. Press **START** key again to stop measure. "H" symbol is shown at display.
8. The result of test and his duration is shown at display.



CAUTION

- Do not exceed the speed limit of 29999 rpm when using mechanical adaptor.

5.3. SPEED MEASURES ON SURFACES (m/min, ft/min, yd/min)

1. Attach the mechanical adaptor to the unit **and fasten the screw**.
2. Press **ON/OFF** key to turn ON the meter.
3. Press **UNIT** key to select the desired m/min, ft/min or yd/min unit .
4. Place the mechanical adaptor in contact with the surface on test, like is shown on Fig. 4:

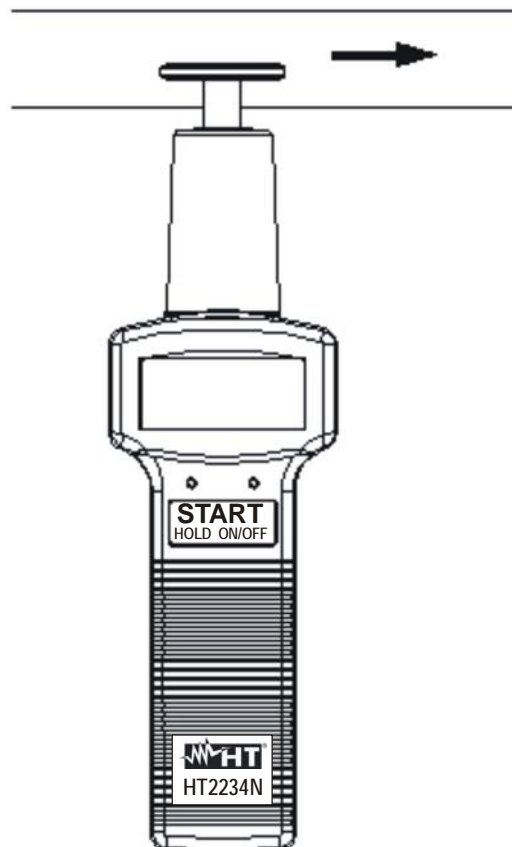


Fig. 4: speed measure on surfaces

5. Press **START** key once to enable measure. \sphericalangle symbol is shown at display.
6. Press **START** key again to stop measure. "H" symbol is shown at display.
7. The result of test and his duration is shown at display.

5.4. EVENTS COUNTER WITH EXTERNAL LIGHT SOURCE

1. Place the external light source strictly close to Receiving unit (right side) like is shown in Fig. 5:

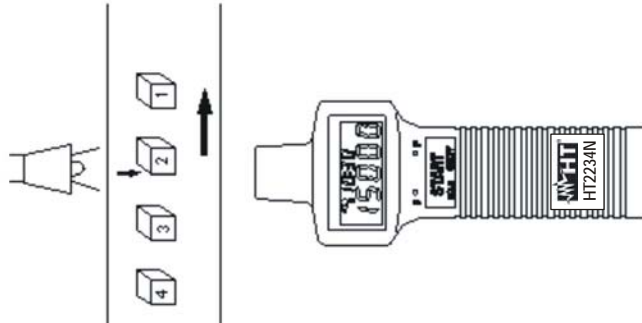


Fig. 5: events counter with external light source

2. Press **ON/OFF** key to turn ON the meter.
3. Press cyclically **UNIT** key until selecting "NO." unit at display. On this condition the meter shows values clear for each displays. Internal clock (with Hours and Minutes) start the counter and AutoPowerOFF function is automatically disabled.
4. Press **START** key once to enable counter. \angle symbol is shown at display.
5. Press **START** key again to stop counter. "H" symbol is shown at display.
6. The result of counters and his duration is shown at display.
7. Press **FUNCTION** key to reset counter.

5.5. EVENTS COUNTER WITH INTERNAL EMITTING UNIT

1. Place, if necessary, a piece of reflective tape on external surface which should be interested by red LED and place the meter like shown in Fig. 6:

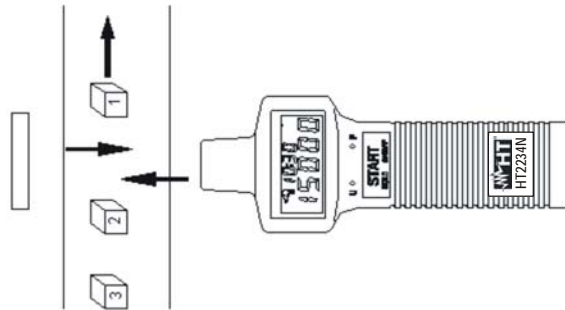



Fig. 6: events counter with Emitting unit

2. Press **ON/OFF** key to turn ON the meter.
3. Press cyclically **UNIT** key until selecting "NO." unit at display. On this condition the meter shows values clear for each displays. Internal clock (with Hours and Minutes) start the counter and AutoPowerOFF function is automatically disabled.
4. Press **START** key once to enable counter.  symbol is shown at display.
5. Press **START** key again to stop counter. "H" symbol is shown at display.
6. The result of counters and his duration is shown at display.
7. Press **FUNCTION** key to reset counter.

5.6. MEASURES ON SLOW ROTATING OBJECTS

- If the rotating speed of the object on test is very slow, it is recommended that you use a tripod to hold the tachometer in place and use multiple pieces of tape for more accurate result.
- If multiple pieces of tape are used, each piece of tape should be located at the same distance to each other on the object. Any number of pieces of tape are acceptable. But you need to divide the reading by the number of pieces to obtain the correct result.


Example: 4 pieces of tape and reading is 12 rpm
 Correct Speed is $12 / 4 = 3$ rpm

6. MAINTENANCE

6.1. GENERAL INFORMATION

1. This meter is a precision instrument. Whether in use or in storage, please do not exceed the specifications to avoid any possible damage or danger during use.
2. Do not keep this meter at high temperatures and/or humidity or expose to direct sunlight.
3. Be sure to turn the meter off after use. For long term storage, remove the battery to avoid leakage of battery fluid that can damage the internal components.

6.2. BATTERIES REPLACEMENT

When battery is low, the symbol " B" is displayed to require replacement. Consider the followed steps:

1. Turn OFF the meter with **ON/OFF** key.
2. Open the battery cover.
3. Replace the old batteries.
4. Insert new ones of the same 1,5V AA UM-3 type.
5. Reposition the battery cover.

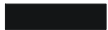
6.3. CLEANING

To clean the instrument use a soft dry cloth. Never use wet clothes, solvents or water, etc.

6.4. END OF LIFE



CAUTION: this symbol indicates that equipment and its accessories shall be subject to a separate collection and correct disposal.



7. TECHNICAL SPECIFICATIONS

7.1. TECHNICAL CHARACTERISTICS

Accuracy is indicated as [% of reading + number of dgts]. It is referred to the following reference conditions: 23°C ± 5°C with RH <75%.

Speed without contact

Function	Range	Resolution	Accuracy
RPM (Giri/min)	10.00 ÷ 99999	0.01 / 0.1 / 1	±(0.04% rdg +2 dgt)
RPS (Hz)	0.200 ÷ 2000.0	0.001 / 0.01 / 0.1	

Speed with contact

Function	Range	Resolution	Accuracy
RPM /	20.00 ÷ 29999	0.01 / 0.1 / 1	±(0.04% rdg +2 dgt)
m/min	2.000 ÷ 2999.9	0.001 / 0.01 / 0.1	
ft/min	6.00 ÷ 10000	0.01 / 0.1 / 1	
yd/min	4.00 ÷ 3000	0.01 / 0.1 / 1	

Events Counter

Range	Maximum input frequency
0 ÷ 99999	10KHz. with 5% duty cycle

7.2. GENERAL CHARACTERISTICS

Display:	5 digits 99999 counts
Sampling Rate:	0.7 second (> 60 rpm) > 1 second (10 to 60 rpm)
Measuring Distance:	50 to 300 mm
Time Base:	4.0 MHz Quartz Crystal
Range Selection:	Automatic
Battery:	4 x 1.5V batteries (type AA, UM-3)
AutoPowerOFF:	30 minutes
Operating temperature:	0 ÷ 50°C (32 to 122°F)
Dimensions:	(172 x 63 x 36) mm
Weight :	190g (included batteries)

7.3. ACCESSORIES

- HT2234N meter
- Mechanical adapter
- Fixed screw for mechanical adapter
- Reflective tape
- Rubber O-ring
- Rubber leads for measures
- Batteries
- Carrying case
- Instruction manual

8. SERVICE

8.1. WARRANTY CONDITION

This instrument is guaranteed against material or production defects, in accordance with our general sales conditions. During the warranty period the manufacturer reserves the right to decide either to repair or replace the product.

Should you need for any reason to return back the instrument for repair or replacement take prior agreements with the local distributor from whom you bought it.

Do not forget to enclose a report describing the reasons for returning (detected fault). Use only original packaging.

Any damage occurred in transit due to non original packaging will be charged anyhow to the customer.

The manufacturer will not be responsible for any damage to persons or things.

The warranty doesn't apply to:

- Accessories and batteries (not covered by warranty).
- Repairs made necessary by improper use (including adaptation to particular applications not foreseen in the instructions manual) or improper combination with incompatible accessories or equipment.
- Repairs made necessary by improper shipping material causing damages in transit.
- Repairs made necessary by previous attempts for repair carried out by non skilled or unauthorized personnel.
- Instruments for whatever reason modified by the customer himself without explicit authorization of our Technical Dept.

The contents of this manual may not be reproduced in any form whatsoever without the manufacturer's authorization.

Our products are patented and our logotypes registered. We reserve the right to modify specifications and prices in view of technological improvements or developments which might be necessary.

8.2. AFTER-SALE SERVICE

Shouldn't the instrument work properly, before contacting your distributor make sure that batteries are correctly installed and working, check the test leads and replace them if necessary. Make sure that your operating procedure corresponds to the one described in this manual.

Should you need for any reason to return back the instrument for repair or replacement take prior agreements with the local distributor from whom you bought it. Do not forget to enclose a report describing the reasons for returning (detected fault). Use only original packaging. Any damage occurred in transit due to non original packaging will be charged anyhow to the customer.

The manufacturer will not be responsible for any damage to persons or things.