

Battery power, LED array + photo tach.

STROBOSCOPE

Model : DT-2299



Your purchase of this STROBOSCOPE marks a step forward for you into the field of precision measurement. Although this METER is a complex and delicate instrument, its durable structure developed. Please read the following instructions carefully and always keep this manual within easy reach.

OPERATION MANUAL

Warning

Do not look directly at strobe/reflector.
Light pulses at the frequency greater than 5 Hz may cause photosensitive epilepsy in some individuals if directly viewed.

A feature of the instrument is to make moving objects appear to be stationary. Precaution should therefore be taken to ensure that there is no physical contact made with objects being viewed.

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1. FEATURES

- * Combination Stroboscope with 3 functions :
Digital Stroboscope, Laser Photo Tachometer,
Contact Tachometer (optional probe), 3 in 1 ,
intelligent function.
- * Battery power Stroboscope, use high intensity LED
array, long life.
- * Stroboscope, wide measuring range up to 99,999 RPM.
- * The Digital Stroboscope is used the microprocessor
circuit design, high accuracy, digital readout, light duty,
that is ideal for inspecting and measuring the speed of
moving gears, fans, centrifuges, pumps, motors and
other equipment used in general industrial
maintenance, production, quality control, laboratories
and as well as for schools and colleges for
demonstrating strobe action.
- * Back light high visible LCD display gives exact reading
with no guessing or error and saves battery energy.
- * High precision both for Stroboscope and Tachometer
measurement.
- * Use an exclusive one chip MICRO-PROCESSOR
LSI-circuit and crystal time base to offer high accuracy
measurement & fast measuring time.
- * Stroboscope build in external trigger input.
- * Long distance Laser Photo Tachometer build in.
- * Optional Contact Tachometer probe is available.
- * Compact and heavy duty housing case.

2. SPECIFICATIONS

2-1 General Specifications

Display	5 digits (0 to 99999) LCD display.
Circuit	Exclusive one-chip design microprocessor LSI circuit.
Measurement	<i>Stroboscope</i> Unit : FPM (rotation per minute). build in external trigger input.
	<i>Laser Photo Tachometer</i> Unit : RPM (rotation per minute).
	<i>Contact Tachometer</i> Unit : RPM (rotation per minute). Surface speed (ft/min., m/min) * It should cooperate with optional contact probe (TA-35).
Sampling Time	Approx. 1 second.
Calibration	Crystal time base and microprocessor circuit, no external calibration process required.
Operating Temperature	0 to 50 °C (32 to 122°F)
Humidity	Less than 80% R.H.
Power Supply	DC 1.5 V, UM-1 (D type) battery x 4 PCs * DC 9V adapter input is built, AC/DC adapter is optional, not in included.
Power Consumption	<i>Stroboscope (3600 FPM) :</i> DC 160 mA.
	<i>Laser photo Tachometer (3600 RPM) :</i> DC 130 mA.
Weight	800 g (1.76 LB).
Dimensions	21 cmx12 cmx12 cm (8.3"x4.8"x4.8").

Accessories Included	Operation manual.....1 PC. Reflective tape..... 1 PC.
Optional Accessories	Contact Tachometer probe (TA-35). ACV 110V, 220/230V to DC 9V adapter.

2-2 Electrical Specifications of Stroboscope

Stroboscope Flash Rate	100 to 99,999 flashes per minute (FPM). Low range : 100 to 1,000 RPM/FPM. High range : 1000 to 99,999 RPM/FPM.
Accuracy	$\pm (0.05\% + 1 \text{ digit })$.
Resolution	0.1 FPM/RPM (less than 1,000 FPM/RPM) 1 FPM/RPM (> 1,000 FPM/RPM).
External Trigger Input	Input signal : 5V to 30 V rms, 100 to 99,999 RPM/FPM.
Light Source	Long life high intensity LED array.

2-3 Electrical Specifications of Laser Photo Tachometer

Range	10 to 99,999 RPM
Photo Tachometer detecting distance	50 - 1,500 mm typically. <i>* Spec. of detecting distance are that under the size of reflecting tape is 10 mm square & the measuring RPM value is 1,800 PPM. The max. & min. detecting distance may change under different environment, different reflecting tape or the measuring RPM beyond 1800 PRM.</i>

Accuracy	$\pm (0.05\% + 1 \text{ digit })$.	
Sampling Time	1 sec. (60 RPM).	
Resolution	0.1 RPM	< 1,000 RPM
	1 RPM	$\geq 1,000$ RPM
Time base	Quartz crystal	
Laser light source	* Less than 1 mW. * Class 2 laser diode. Red. Wave length is 645 nm approximately.	

2-4 Electrical Specifications of Contact Tachometer (Optional Probe, TA-35)

Range	<i>Contact Tachometer :</i> 0.5 to 19,999 RPM <i>Surface Speed (m/min.) :</i> 0.05 to 1,999.9 m/min. <i>Surface Speed (ft/min.) :</i> 0.2 to 6,560 ft/min.	
Accuracy	$\pm (0.05\% + 1 \text{ digit })$.	
Sampling Time	1 sec. (6 RPM).	
Resolution	0.1 RPM	< 1,000 RPM
	1 RPM	$\geq 1,000$ RPM
	0.01 m/min.	< 100 m/min.
	0.1 m/min.	≥ 100 m/min.
	0.1 ft/min.	< 1000 ft/min.
	1 ft/min.	$\geq 1,000$ ft/min.
Accessories Included	RPM adapter (Cone type)..... 1 PC. RPM adapter (Funnel type)..... 1 PC. Surface speed test wheel..... 1 PC.	

Remark :

* *Spec. tested under the environment RF Field Strength less than 3 V/M & frequency less than the 30 MHz only.*

3. FRONT PANEL & LAYOUT DESCRIPTION

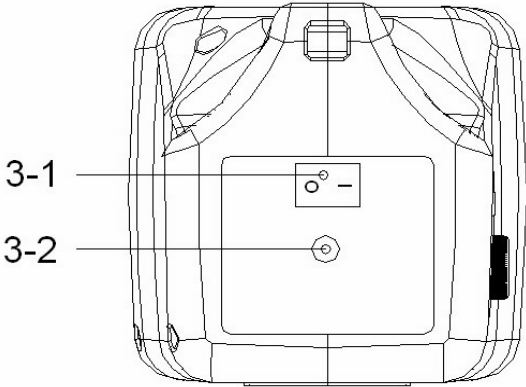
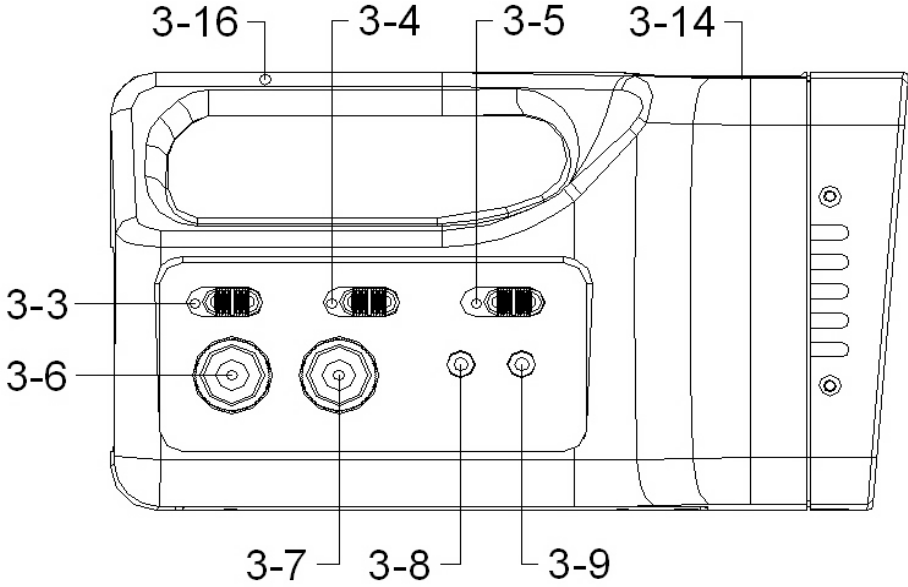


Fig. 1



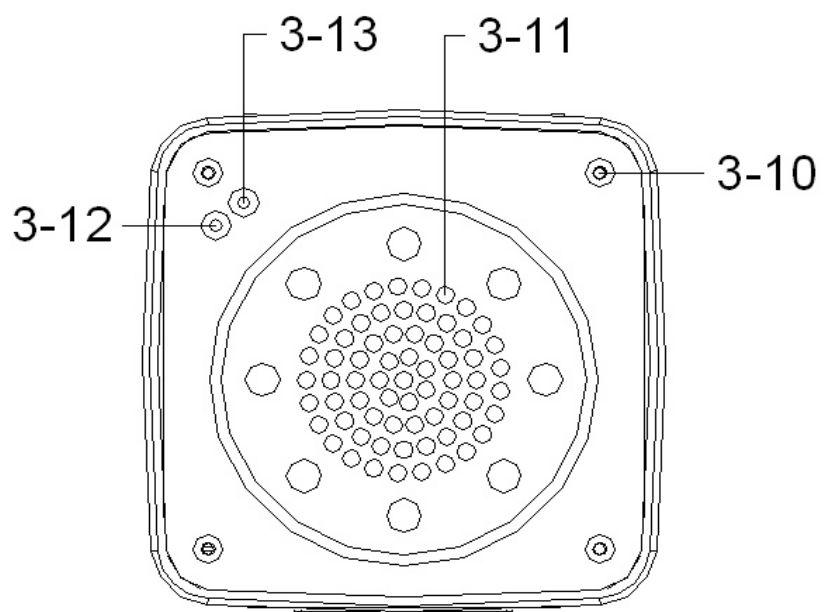
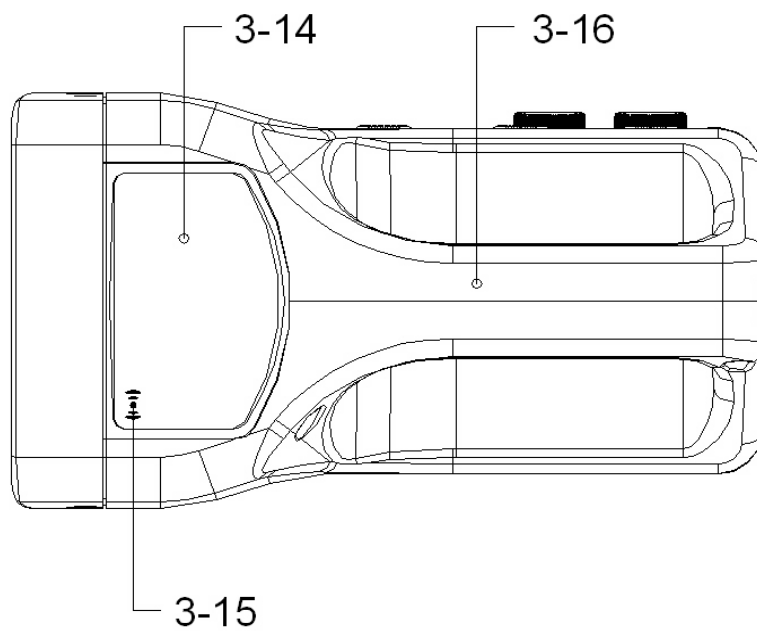


Fig. 1



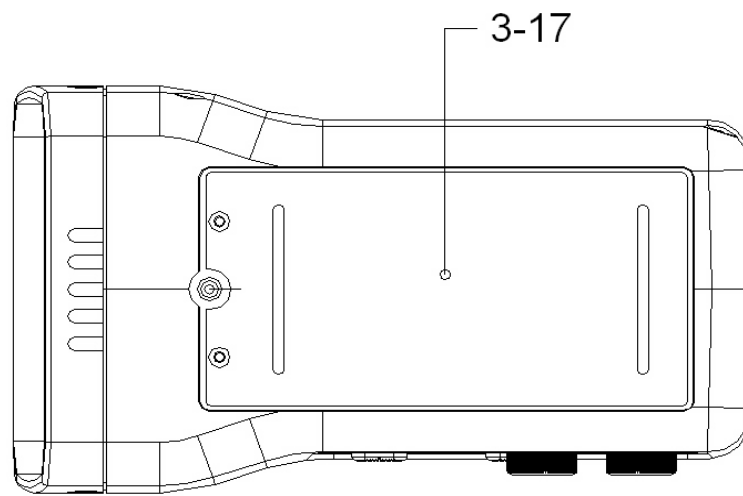


Fig. 1

- 3-1 Power On/Off Switch
- 3-2 DC 9V Power Adapter Input Socket
- 3-3 High, Low Range Switch
- 3-4 Stroboscope, Ext. Trigger, Tachometer Switch
- 3-5 Photo Tach, Contact Tach, ft/min.. m/min Switch
- 3-6 Coarse Adjust Knob
- 3-7 Fine Adjust Knob
- 3-8 Ext. Trigger Input Socket
- 3-9 Contact Tach. Probe Input Socket
- 3-10 Front Cover Screws
- 3-11 High Intensity LED array
- 3-12 Laser Light Beam for Photo Tachometer
- 3-13 Sensing Sensor for Photo Tachometer
- 3-14 Display
- 3-15 Target Indicator
- 3-16 Handle
- 3-17 Battery Cover/Battery Compartment

4. STROBOSCOPE MEASURING PROCEDURES

4-1 Preparation

- 1) Install the batteries (UM1/D type, 4 PCs) into the Battery Compartment (3-17, Fig. 1)
** Please make attention the polarity of the battery.*
- 2) Turn the power switch to " Power On/Off Switch " (3-1, Fig. 1) to the " On " position.
- 3) Select the " Stroboscope, Ext. Trigger, Tachometer Switch " (3-4, Fig. 1) to the " Stroboscope " position.
- 4) Determine the range switch to "Low" or "High" position.

If the measured FPM (flashes per minute) is < 1,000, then set the " Range Switch " to Low (Lo) position.

** If the measured FPM (flashes per minute) is $\geq 1,000$, then set the " Range Switch " to High (Hi) position.*

4-2 Checking Speed (RPM/FPM)

- 1) Power off the installation to be measured, make a " mark " on the rotation area where it is intended to measure the RPM. Then power on the installation to be measured.
- 2) When checking the speed, care must be taken to ensure that the strobe is flashing in unison (one to one) with the object being monitored. Turn the " Fine Adjust Knob " (3-7, Fig. 1) or " Coarse Adjust Knob " (3-6, Fig. 1) until the mark look like " Stop " (synchronize).

Consideration :

- * During the measurement, If the object mark look like rotating as the counterclockwise direction, the stroboscope's flash speed is higher than the object' s RPM typically. It should decrease the Stroboscope's FPM value will get synchronize (mark stop).
 - * During the measurement, If the object mark look like rotating as the clockwise direction, the stroboscope's flash speed is lower than the object's RPM. It should increase the Stroboscope's FPM value will get synchronize (mark stop).
 - * If intend to tune the stroboscopesingle to make the synchronize (mark stop) with the object quickly, it recommend to know the measured RPM approximately at first, then tune the stroboscope FPM start from the object RPM value nearly. For example if the measured RPM is 1792 RPM, then start the stroboscope's signal from the 1500 FPM. For the unknown object's RPM, then start from the lower FPM signal, increase the FPM value until the object mark is synchronized.
- 3) The Stroboscope will also stop motion at 2:1, 3:1, 4:1 et., this is normally referred to as harmonics. To ensure unison, turn the dial until two images appear - this will double the actual speed. Then lower the flashing rate until a single and stationary image appears - this is the actual true speed.

4-3 Checking Motion

For motion analysis, simply locate the actual speed as mentioned above and then turn the dial slowly up or down. This will give a slow motion effect allowing complete inspection.

4-4 External trigger

The stroboscope can accept the external trigger signal instead of the internal trigger (setting the value by knobs).

- 1) Select the " Stroboscope, Ext. Trigger, Tachometer Switch " (3-4, Fig. 1) to the " Ext. Trigger " position.
- 2) Connect the external signal to the " Ext. Trigger Input Socket " (3-8, Fig. 1) via the earphone plug.
- 3) The display will show the value of the external trigger signal in the same time the LED array (3-11, Fig. 1) will be flashed according the external trigger signal.

5. LASER PHOTO TACHOMETER MEASURING PROCEDURES

- 1) Select the " Stroboscope, Ext. Trigger, Tachometer Switch " (3-4, Fig. 1) to the " Tachometer " position.
- 2) Select The " Photo Tach, Contact Tach, ft/min., m/min Switch " (3-5, Fig. 1) to the " Photo Tach " position.
- 3) Adhesive a reflecting mark to the object being measured. Align the " Laser light beam " (3-12, Fig. 1) with the applied target. Verify that the " Monitor Indicator " (3-15, Fig. 1) lights when the target pass through the light beam.

Note :

If the measured RPM values is very low (for example less than 50 RPM), recommend to attach more " Reflecting Marks " average to the object. It will get the real RPM with high resolution, precisely & fast sampling time when divided the reading values by the no. of the " Marks ".



Caution :

LASER RADIATION -

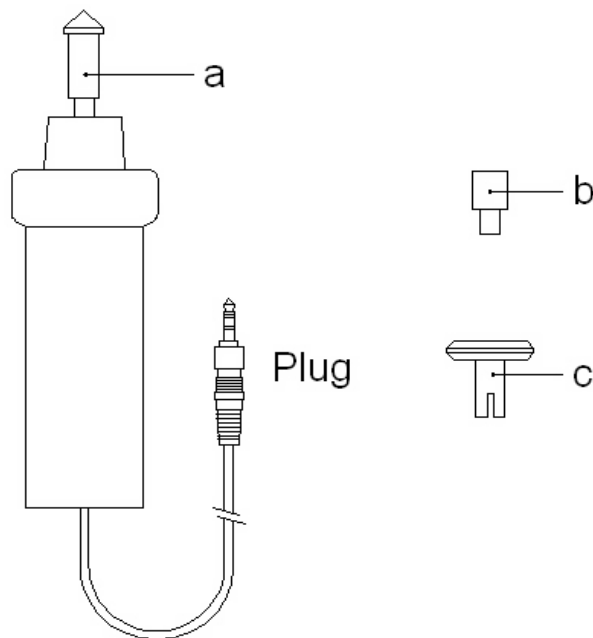
**DO NOT STARE INTO
LASER BEAM**

* Class II laser products.

6. CONTACT TACHOMETER MEASURING PROCEDURES

1) Prepare a optional Contact Tachometer Probe " Model : TA-35 ".

- TI RPM adapter (Cone type)..... a*
- RPM adapter (Funnel type).....b*
- Surface speed test wheel.....c*



- 2) Insert the output plug of the " Contact Tachometer Probe " into " Contact Tach. Probe Input Socket " (3-9, Fig. 1)
- 3) Select the " Stroboscope, Ext. Trigger, Tachometer Switch " (3-4, Fig. 1) to the " Tachometer " position.

Contact RPM measurement

- 4) Select The " Photo Tach, Contact Tach, ft/min., m/min Switch " (3-5, Fig. 1) to the " Contact Tach " position.
- 5) Pressing the " RPM Adapter " lightly against the center hole on the hole of the measured rotating axis.

Note :

Making the contact RPM measurement due to different kind measured rotating axis, it may changed the rubber for RPM adapter from " Cone " type to " Funnel " type (Refer page 12).

Surface Speed Measurement

- 1) Select The " Photo Tach, Contact Tach, ft/min., m/min Switch " (3-5, Fig. 1) to the " m/min. " or " ft/min. " position.
- 2) Change the " RPM Adapter " instead of the " Surface Speed Test Wheel " (Refer page 12).
- 3) Simply attaching the surface speed test wheel to the detector.

7. BATTERY REPLACEMENT

- 1) When the LCD display (3-14, Fig. 1) show " LO ", it is necessary to replace the battery. However, in-spec measurement may still be made for several hours after low battery indicator appears before the instrument become inaccurate.
- 2) Open the " Battery Cover " (3-17, Fig. 1) away from the instrument and remove the battery.
- 3) Install the 4 PCs batteries (UM1/D type, Akaline or heavy duty) and replace the cover.
** When change batteries, it should make attention the polarity of the battery.*