

XENON, AC power or Battery power

STROBOSCOPE

Model : DT-2289



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.

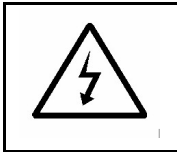
OPERATION MANUAL

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.

Caution Symbol



Caution :

- * Risk of electric shock !



Caution :

- * Do not use fingers or any tool to touch the FLASH TUBE.
- * The instrument contains no user serviceable parts and should not be opened by the user.
- * Repair or after service should be done by a qualified technician only.
- * Power plug should apply the correct ACV power voltage
- * Operating duty cycle should be adhered to.
- * Cleaning - Only use the dry cloth to clean the plastic case !

Environmental Condition

- * Comply with EN61010 Installation category II 300 Vac.
- * Pollution Degree 2.
- * Altitude up to 2000 meters.
- * Indoor use.
- * Relative humidity 80% max.

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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.
- * 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.
- * Xenon flash tube with plug and socket, easy to make
the tube replacement.
- * Use an exclusive one chip MICRO-PROCESSOR
LSI-circuit and crystal time base to offer high accuracy
measurement & fast measuring time.
- * Wide measuring range.
- * Stroboscope build in external trigger input.
- * Long distance Laser Photo Tachometer build in.
- * Stroboscope use high bright xenon tube.
- * 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)
Operating Humidity	Less than 80% R.H.
Power Supply	AC(100V to 240V) to DC 9V (3A) adapter.
Power Consumption	<i>Stroboscope (3600 FPM) :</i> DC 2.4 A.
	<i>Laser photo Tachometer (3600 RPM) :</i> DC 50 mA.
Weight	1 Kg (2.2 LB).
Dimensions	21 cmx12 cmx12 cm (8.3"x4.8"x4.8").

Accessories Included	Operation manual..... 1 PC.
	AC(100V to 240V) to DC 9V adapter 1 PC.
	Reflective tape..... 1 PC.
Optional Accessories	Contact Tachometer probe Model : TA-35
	Flash Xenon tube..... Model : TBXE-2289
	DC 1.2 V Ni-MH recharge batteries, UM-1/D size (Model : BAUM-1) x 4 PCs.
	DC 1.2 V Ni-MH batteries charger with AC adapter, complete set. Model: BACH-110 (AC 110V power) Model: BACH-220 (AC 230V power)

2-2 Electrical Specifications of Stroboscope

Stroboscope Specification

Stroboscopic Flash Rate	100 to 15,000 flashes per minute (FPM). Low range : 100 to 1,000 RPM/FPM. High range : 1000 to 15,000 RPM/FPM.
Accuracy	± (0.05% + 1 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, 5 to 15,000 RPM/FPM.

Flash Tube Specification

Flash tube	Xenon lamp.
Flash Duration	Approximately 60 to 1,000 microseconds.
Flash color	Xenon white 6,500 K degree.
Flash energy	4 Watts-seconds (joules).
Beam Angle	80 degrees.

Flash tube replacement	It is required to change the flash tube when the instrument start to flash irregularly at speeds of 3600 RPM/FPM or more. Flash tube with plug and socket, easy to make the replacement.
Operating duty Cycle	For prolong life and safety, please adhere to the following operation duty cycle: < 2000 RPM - 2 hours 2000 to 3600 RPM - one hour 3601 to 8000 RPM - 30 minutes > 8000 RPM - 10 minutes. <i>* 10 min. cooling off period between cycles.</i>

2-3 Electrical Specifications of Laser Photo Tachometer

Range	10 to 99,999 RPM
Accuracy	$\pm (0.05\% + 1 \text{ digit })$.
Sampling Time	1 sec. (60 RPM).
Photo Tachometer detecting distance	50 - 2,000 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>

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 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.	\geq 100 m/min.
	0.1 ft/min.	< 1000 ft/min.
	1 ft/min.	\geq 1,000 ft/min.
Accessories Included	RPM adapter (CONE)..... 1 PC. RPM adapter (FUNNEL)..... 1 PC. Surface speed test wheel..... 1 PC.	

4. FRONT PANEL & LAYOUT DESCRIPTION

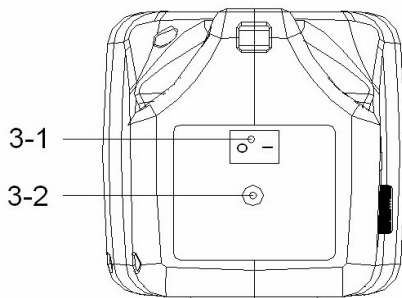
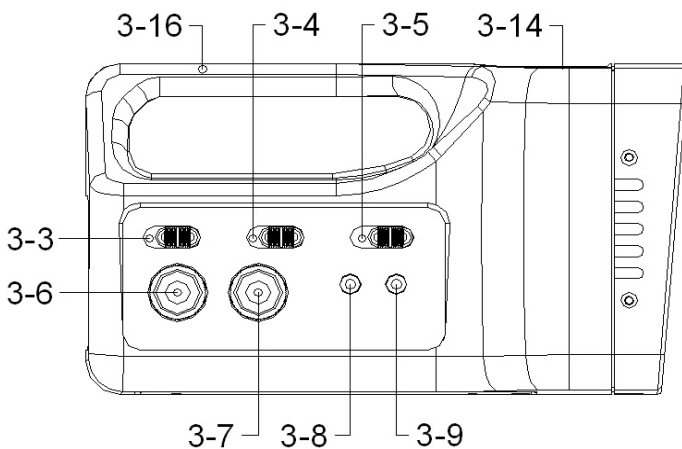


Fig. 1



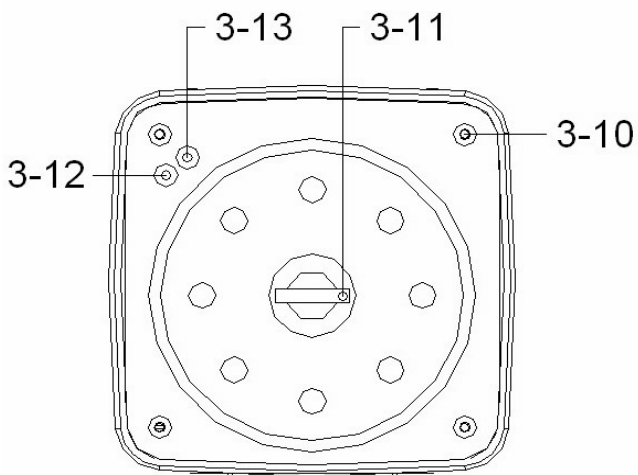
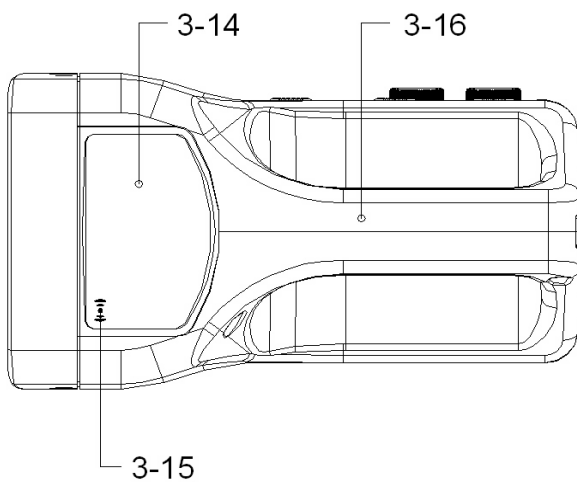


Fig. 1



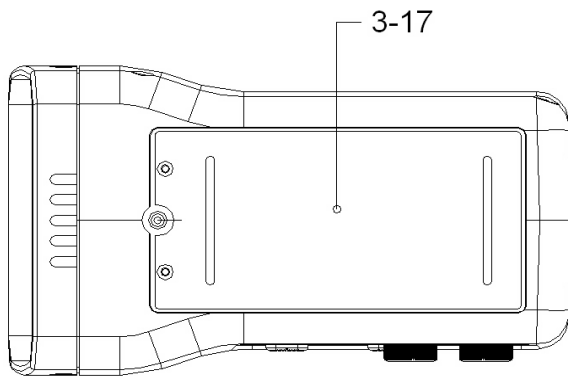


Fig. 1

- 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
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- 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. POWER SUPPLY CONSIDERATION

- 1)The instrument is shipped along with an ACV (100V to 240V) to DC 9V (3A) adapter.
- 2)When operate the instrument, it should insert the DCV output plug of DC adapter into the " DC 9V Power Adapter Input Socket " (3-2, Fig. 1). Connect the ACV input plug of DC adapter into the a properly 110V AC, 220V AC or 240V AC outlet.

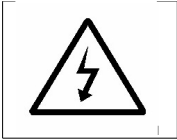
Battery operation

The instrument also can operate by batteries (UM1/D type X 4 PCs).

Due to high power consumption (short battery life) for the Stroboscope function, we do not recommend user operate the STROBOSCOPE function via batteries.

However for the Tachometer function, as the power consumption is lower, so if user intend to use the batteries to operate the TACHOMETER function, it is convenient.

5. STROBOSCOPE MEASURING PROCEDURES



Caution :

- * Do not use fingers or any tool to touch the FLASH TUBE.
- * Risk of electric shock !

5-1 Preparation

- 1) Connect the DCV output plug of DC adapter into the " DC 9V Power Adapter Input Socket " (3-2, Fig. 1)
Connect the ACV input plug of DC adapter into the a properly 110V AC, 220V AC or 240V AC outlet.



Caution :

- * The power plug should be connected to the correct AC power supply.

- 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.

5-2 Checking Speed (RPM/FPM)



Caution :

* Operating duty cycle should be followed.

For prolong life and safety, please adhere to the following operation duty :

- < 2000 RPM - 2 hours
- 2000 to 3600 RPM - one hour
- 3601 to 8000 RPM - 30 minutes
- > 8000 RPM - 10 minutes.

** Always allow a 10 minute cooling off period between cycles.*

- 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).
- 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.

5-3 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.

5-4 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 Xenon tube will be flashed according the external trigger signal.

6. 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.

7. CONTACT TACHOMETER MEASURING PROCEDURES

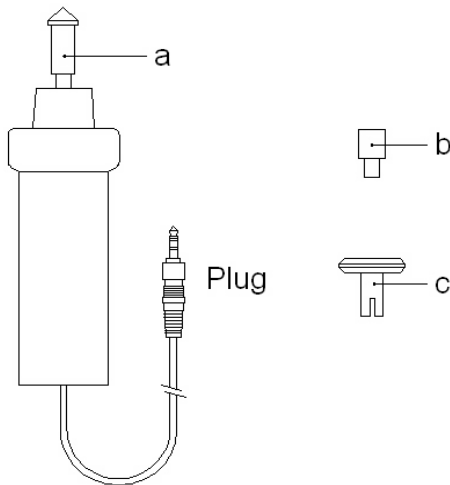
- 1) Prepare a optional Contact Tachometer Probe " Model : TA-35 ".

The standard accessories of TA-35 are included :

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.

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 :

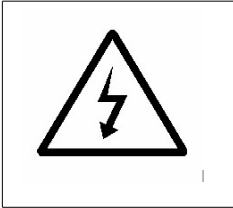
Making the contact RPM measurement due to different kind measured rotating axis, it may changed the rubber for RPM adapter from " Cone " type to " Funnel " type (Refer page 14).

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 14).
- 3) Simply attaching the surface speed test wheel to the detector.

8. FLASH TUBE REPLACEMENT

The flash tube requires changing when the instrument start to flash erratically at speeds of 3600 RPM/FPM or more.



Caution :

- * Change of the Flash Tube should only be done by a qualified technician. As the instrument contains no user serviceable parts.
- * Before replace the tube, should power off the meter, and wait at least 10 minutes until the circuit be discharged,

- 1) Loss the four " Front Cover Screws " (3-10, Fig. 1) and take away the front end protection cover.
- 2) There is a plug and the socket for connecting the the tube with the main instrument.
Take away the tube and replace the new unit.
- 3) Install the front end protection cover and fix the four Front Cover Screws " (3-10, Fig. 1) again

9. THE ADDRESS OF AFTER SERVICE CENTER

