# 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 photosensitvie 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.

# TABLE OF CONTENTS

1 FEATURES	1
2 SPECIFICATIONS	2
3 FRONT PANEL DESCRIPTION	6
3-1 Power On/Off Switch	8
3-2 DC9V Power Adapter Input Socket	8
3-3 High, Low Range Switch	8
3-4 Stroboscope, Ext. Trigger, Tachometer Switch	8
3-5 Photo Tach, Contact Tach, ft/min m/min SW	8
3-6 Coarse Adjust Knob	8
3-7 FINE AUJUSI KNOD	ŏ
3-9 Contact Tach Probe Input Socket	o 8
3-10 Front Cover Screws	8
3-11 Flash Tube and Tube Socket	8
3-12 Laser Light Beam for Photo Tachometer	8
3-13 Sensing Sensor for Photo Tachometer	8
3-14 Display	8
3-15 Target Indicator	8
3-16 Handle	8
3-17 Battery Cover/Battery Compartment	8
4. POWER SUPPLY CONSIDERATION	9
5. STROBOSCOPE MEASURING PROCEDURES	10
5-1 Preparation	10
5-2 Checking Speed	11
5-3 Checking Motion	12
6. LASER PHOTO TACHOMETER MEASURING	
PROCEDURES	13
7. CONTACT TACHOMETER ( Optional probe )	
MEASURING PROCEDURES	14
8. FLASH TUBE REPLACEMENT	16
9 THE ADDRESS OF AFTER SERVICE CENTER	
CONSIDERATION	17

# **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	Stroboscope	
	Unit : FPM ( rotation per minute ).	
	build in external trigger input.	
	Laser Photo Tachometer	
	Unit : RPM ( rotation per minute ).	
	Contact Tachometer	
	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	O to 50 $^\circ\!{ m C}$ ( 32 to 122 $^\circ\!{ m F}$ )	
Temperature		
Operating	Less than 80% R.H.	
Humidity		
Power Supply	AC( 100V to 240V ) to DC 9V ( 3A )	
	adapter.	
Power	Stroboscope(3600 FPM):	
Consumption	DC 2.4 A.	
	Laser photo Tachometer ( 3600 RPM ) :	
	DC 50 mA.	
Weight	1 Kg ( 2.2 LB ).	
Dimensions	21 cmx12 cmx12 cm (8.3"x4.8"x4.8").	
	2	

Accessories Included	Operation manual1 PC. AC( 100V to 240V ) to DC 9V adapter
	Reflective tape1 PC.
Optional	Contact Tachometer probe
Accessory	
-	Flash Xenon tubeModel : TBXE-2289

#### 2-2 Electrical Specifications of Stroboscope

Stroboscope Specification

Stroboscopic	100 to 15,000 flashes per minute (FPM).	
Flash Rate	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	Input signal : 5V to 30 V rms,	
Trigger	5 to 15,000 RPM/FPM.	
Input		

#### 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	It is required to change the flash tube		
replacement	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	For prolong life and safety, please		
Cycle	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.		
	* 10 min. cooling off period between cycles.		

#### 2-3 Electrical Specifications of Laser Photo Tachometer

Range	10 to 99,999 RPM
Accuracy	± ( 0.05% + 1 digit ).
Sampling Time	1 sec. ( 60 RPM ).
Photo	50 - 2,000 mm typically.
Tachometer	* Spec. of detecting distance are that
detecting	under the size of reflecting tape is 10
distance	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.

Resolution	0.1 RPM	< 1,000 RPM	
	1 RPM	≥1,000 RPM	
Time base	Quartz cryst	Quartz crystal	
Laser light	* Less than	* Less than 1 mW.	
source	* Class 2 las	* Class 2 laser diode. Red. Wave length	
	is 645 nm	is 645 nm approximately.	

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

Damas			
капде	Contact Tachometer :		
	0.5 to 19,999 RPM		
	Surface Speed ( m/min. ) :		
	0.05 to 1,999.9 m/min.		
	Surface Speed ( ft/min. ) :		
	0.2 to 6,560 ft/min.		
Accuracy	± ( 0.05% + 1 digit ).		
Sampling Time	1 sec. ( 6 RPM ).		
Resolution	0.1 RPM	< 1,000 RPM	
	1 RPM	≧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.	≥ 1,000 ft/min.	
Accessories	RPM adapter (CONE) 1 PC.		
Included	RPM adapter (FUNNEL) 1 PC.		
	Surface speed test wheel 1 PC.		







# 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 : Below 2,000 RPM - 30 Minutes. Above 2,000 RPM - 5 Minutes.

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

- 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



0411-DT2289