

# DT-311A & DT-315A Stroboscope

**Nidec**

## Operation Manual



**CAUTION**

Do not operate or store instrument in the following places: explosive areas; near water, oil, dust, or chemicals; areas where temperature is above 104°F (40°C).

Do not look at the emitted light for long periods of time; it can be harmful to the eyes.

Do not disassemble or repair unit while in operation.

To prevent getting burned, let lamp cool after use before attempting replacement.



**DT-311A**

**DT-315A**

The DT-311A/DT-315A heavy duty stroboscopes, provide the illusion of “stopped motion” by adjusting the strobe’s flash rate, equipment appear to be standing still or in slow motion. The DT-311A/DT-315A also measure rotational (RPM) or reciprocating (strokes per minute) speeds with the same precision as an electronic digital tachometer. Ideally suited for printing inspection, motion analysis, preventive maintenance and speed measurement of repetitive motion, DT-311A/DT-315A strobes provide timely data on vibrating parts, leaks, spray patterns and a variety of industrial and scientific operations the DT-311A/DT-315A stroboscopes are extremely easy to maneuver and operate via its lightweight and compact design and simplified user interface. Its rugged metal construction provides unequaled reliability in the harshest environments.

### SET-UP

The DT-311A and DT-315A may be operated handheld or else mounted on a tripod or swing arm for added convenience.

To mount the strobe on a tripod (or any other mounting surface), use screw 1/4 -20 UNC, length 0.3” (8 mm) or shorter for the tripod screw hole on the bottom.

### SPECIFICATIONS

**Flashing Range:** 40.0 - 35,000 fpm (flashes per minute)

**Accuracy:** ±0.01 % of reading

**Resolution:** 0.1 fpm: 40.0 - 5,000 fpm / 0.2 fpm: 5,001 - 8,000 fpm / 0.5 fpm: 8,001 - 10,000 fpm / 1 fpm: 10,001 - 35,000 fpm

**Phase Shift:** Use +/- push buttons (360° in 6 seconds)

**Display Update Time:** 0.2 sec approx

**Output Signal:** Synchronous, 400 µsec. Pulse output, 0 to +12 VDC amplitude (approx.), 4.7 KΩ impedance

**Rate Multiplier/Divider:** Multiply by 2, divide by 2

**Flashing Range:** Synchronous Mode: 60.0 ~ 3,000 FPM / Delay mode: 200 ~ 3,000 FPM

**External Mode Accuracy:** ±0.01 % ±1 digit

**Phase Shift:** 0 to 359° with 1° resolution

**Delay Time:** 0 to 2,000 mSec from 40 - 10,000 fpm

**External Trigger Input Signal:** LO level: 0 -0.8 VDC, HI level: 2.5 - 12 VDC or open collector (NPN), pulse width 50 µsec min.

**Input Impedance:** 4.7 KΩ to 12 V / 6.8 KΩ to 0 V

**Display:** 5 digits, 0.4” (10 mm) high, LED

**Flashtube Power/Life:** Xenon, 10 W max. (100 million flashes)

**Flash Duration:** 10 to 40 µs automatically adjusts with flash rate

**Lux Rating:** (20 cm) Distance = 4500 lx @ 1500 fpm, 3375 lx @ 6000 fpm with 4.5” (110 mm) irradiation diameter.

20” (50 cm) Distance = 1300 lx @ 1500 fpm, 930 lx @ 6000 fpm with 10” (250 mm) irradiation diameter.

**Sensor Power Supply:** 12 VDC (40 mA)

**Battery Life:** (DT-315A) 1 - 2 hours depending on flash rate

**Power Requirement:** DT-311A: 115 VAC or optional 220 VAC ±10 % 60/50 Hz, 30 VA (specify voltage); DT-315A: Rechargeable Battery or AC Line Power with included AC adapter

**Operating Temperature:** 32 - 104°F (0 - 40°C)

**Product Weight:** DT-311A: 3.35 lbs (1.52 kg); DT-315A: 4.4 lbs (2 kg)

**Package Weight:** DT-311A: 4.4 lbs (2 kg), DT-315A: 5.5 lbs (2.5 kg)

**Dimensions:** DT-311A: 7.28” L x 4.72” W x 4.72” H (185 mm x 120 mm x 120 mm); DT-315A: 9.84” L x 4.72” W x 4.72” H (250 x 120 x 120 mm)

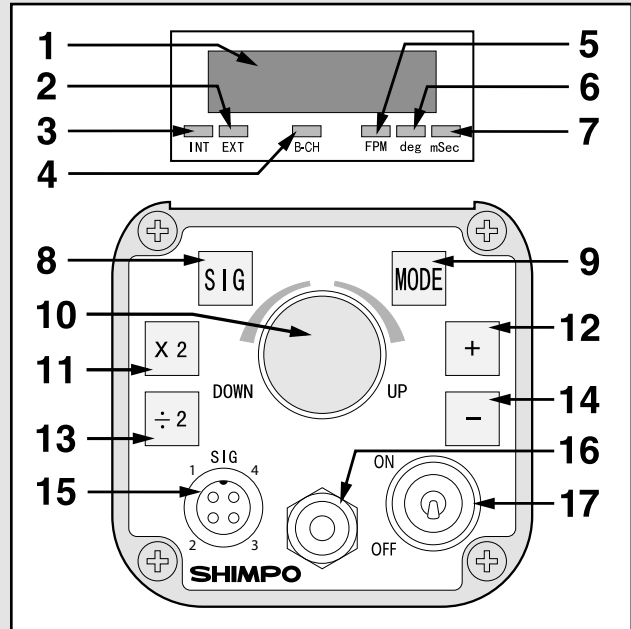
**Warranty:** 2 year

**Certifications:** CE

**Included Accessories:** Handle, flash tube removal tool. AC Charger/Adapter (DT-315A only)

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## Display Panel



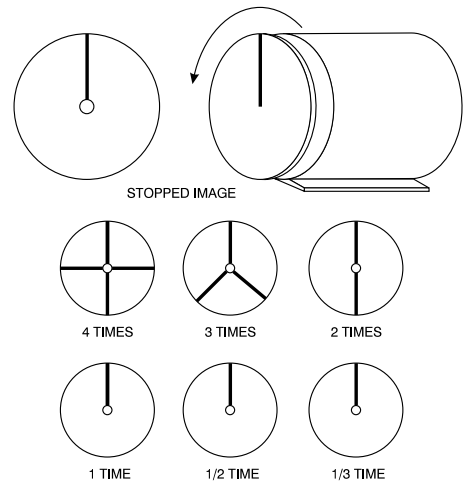
- LED display:** Displays function and value
  - EXT:** External mode indicator
  - INT:** Internal mode indicator
  - B-CH:** Battery charge indicator (DT-315A only)
  - FPM:** Flash per minute indicator
  - deg:** Phase shift degree indicator
  - mSec:** Millisecond delay time indicator
  - Signal switch:** Switches the unit from the external mode to the internal mode (and vice-versa)
  - Display mode switch:** When unit is set to the external mode, the strobe will switch to RPM (FPM)/deg/msec each time "MODE" is depressed
- RPM (FPM) Displays flashes per minute  
External input 0-35,000 RPM (FPM)
- deg Displays flash delay in degrees
- msec Displays flash delay in msec
- Setter:** Changes the flashing rate
  - (x2) Switch:** In the internal mode, pressing "x2" doubles the flashing rate
  - (+) Switch:** In the internal mode, when object appears to be standing still, pressing "+" will give the illusion that the object is moving towards the rotating direction at a speed of 1 rotation in 6 seconds
  - (÷2) Switch:** In the internal mode, pressing "÷2" divides the flashing rate by two
  - (-) Switch:** In the internal mode, when object appears to be standing still, pressing "-" will give the illusion that the object is moving in reverse at a speed of 1 rotation in 6 seconds
- 15 **Input and output connector:**

## Operation

### True RPM Measurement

To measure true revolutions per minute (RPM):

- "Mark" the object to be measured by either visually noting an inherent distinguishing characteristic (such as a label, scratch, etc.) or physically marking the object with a small piece of tape, pencil mark, etc.
- Firmly plug in power cord.
- Turn power switch on.
- Turn setter from highest FPM downward.
- The true RPM can be noted once the action appears frozen **and** the first **single** image of the "mark" appears (see chart below and accompanying diagram for further explanation).
- To verify RPM reading, press "÷2"; a single image should appear again.



Shaft Rotation (RPM)	Flashes (RPM)	Flashes/ RPM Shaft	Stopped Images
At 1,500 RPM	6,000	4 times	4
	4,500	3 times	3
	3,000	2 times	2
	1,500	1 time	1
	750	1/2 time	1
	500	1/3 time	1

### Internal Triggering Mode

To operate the stroboscope in internal triggering mode:

- Firmly plug in power cord.
- Turn power switch on.
- If internal indicator is not on, press "SIG"; the INT light will then turn on.
- Aim light beam at object under observation. The optimal distance between the strobe and moving object is approximately 2 feet.
- Measure RPM by turning the setter to adjust the flashing rate to the rotational speed of the object.

"÷2" switches and then the setter for fine tuning.

**NOTE:** Once the internal timer has expired, the strobe will stop flashing and the display will flash rapidly. To restart the strobe, turn power switch off, then on, and the cycle will repeat.

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PIN #3: Input signal  
PIN #4: 0V

16. **Power cord (DT-311A) / AC adapter (DT-315A)**

17. **Power switch**

# Operation

## External Triggering Mode

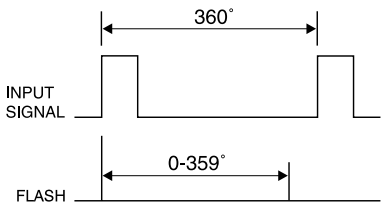
To operate the stroboscope in external triggering mode:

1. Connect external trigger or sensor wires according to connector pin designation:
  - 1 +12V (for powering sensor)
  - 2 Synch output signal
  - 3 External input signal
  - 4 0V (common)
2. Firmly plug in power cord.
3. Turn power switch on.
4. If INT lamp is on, press "SIG" until EXT lamp turns on.
5. Press "MODE" to select proper mode:

**FPM** Light will flash in correspondence with input signal; the input signal will be calculated into FPM and displayed.

**deg** One cycle of input signal is 360°. A delayed angle will be displayed from 0 up to 359°. (The delayed angle can be changed by turning the knob setting as previously described).

**msec** The above delayed angle will be displayed in msec.

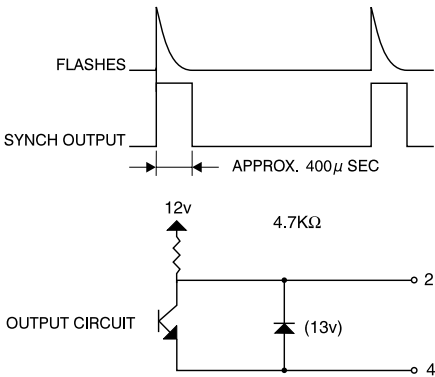


**NOTE:** If the input signal frequency exceeds upper or lower limits, the alarm dashes (-----) will be displayed and the strobe will stop flashing.

**NOTE:** Once the internal timer has expired, the strobe will stop flashing and the display will flash rapidly. To restart the strobe, turn power switch off, then on, and the cycle will repeat.

## Synchronous Output Signal

For triggering and controlling additional stroboscopes, the synchronous output signal appears on pin #2 (see below).



## FPM Display Mode

If the input signal exceeds 585Hz, the upper dashes on the digital display will be flashing:

----- upper dashes

If the input signal is lower than 0.67Hz, the lower dashes on the digital display will be flashing:

----- lower dashes

## Deg/msec Display Mode

If the input signal exceeds 167Hz, the upper dashes on the digital display will be flashing:

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If the input signal is lower than 0.67Hz, the lower dashes on the digital display will be flashing:

(deg) ----- lower dashes ----- (msec)

## Memory

The following parameters are set at the factory:

- *Decimal point: autorange*
- *Internal timer: continuous*
- *External trigger edge: L-H (Lo to Hi)*

These parameters can be changed in the field to facilitate different situations. To change any of the above parameters, follow these steps:

1. Turn power on.
2. Make sure that INT lamp is on. If not, press "SIG" until it turns on.
3. Change the desired memory parameter:
  - a. *To change the decimal point*  
Press "+2" and "-4" at the same time for approximately 2 seconds until display alternates between —1— and 0.0. Press "+". The display will freeze and show 0.0. Change decimal point accordingly by pressing "+". If 0.0 is selected the decimal point is in the autorange mode. If 0 is selected the decimal point is eliminated throughout the entire range.
  - b. *To change the internal timer*  
Press MODE. The display will alternate between —2— and 0; press "+". The display will freeze to 0. Use the setter to set timer anywhere between 1 and 120 minutes.
  - c. *To change the trigger edge or the external mode*  
Press MODE. The display will alternate between —3— and L-H. The external trigger edge is set from the factory to occur during the positive transition of the incoming pulse. To change it to the negative transition, press "+". Display will change from L-H to H-L.
4. Press "SIG" to go back to normal operation.

**NOTE:** the above settings can be checked quickly by performing steps A to C as described above and then pressing "SIG".

## Battery Charge (DT-315A Only)

If battery is low, "LLLLL" is displayed and display will eventually disappear. Charge battery as follows:

1. Turn power off.
2. Insert AC adapter/charger plug into the strobe receptacle (**CAUTION:** charge the unit only with the provided AC adapter/charger).
3. B-CH lamp will be lit during battery charge; within 2 hours the battery should be charged completely.

**NOTE:** The adapter/charger may be used as a power supply to power the strobe continuously.

## Battery Replacement (DT-315A Only)

The life of the built-in battery should last for approximately 300 charges. If the time period between recharges becomes increasingly shorter, then replace battery with a new one.

## Flash Tube Replacement

When FPM reading is displayed but unit is not flashing, flash tube may need to be replaced:

1. Unplug line cord from power line.
2. Turn power switch off (wait a few minutes until stroboscope is cool before proceeding).
3. Remove protective window.
4. Use tube removing tool provided: insert tool all the way and turn clockwise until tool locks. Pull out tube.
5. Install new flash tube using the removing tool.
6. Replace protective window.
7. Mount reflector in the center so that the reflector will not interfere with the screw spacer on the corners.

# Troubleshooting

FPM reading is displayed but unit is not flashing:

- Flash tube may need to be replaced (see "Flash Tube Replacement" section)

Stroboscope is in external trigger mode, no flash:

- Check flash tube. Replace if necessary
- Check for damaged wiring and/or loose pin connections

Stroboscope is in internal trigger mode, no flash:

- Check flash tube. Replace if necessary
- Check for damaged wiring and/or loose pin connections

# Dimensions

