

LED Emission Model Stroboscope Digital Tachometer

DT-365E

Instruction Manual

Be sure to read before use.

Before use, please carefully read these safety precautions as well as instructions,
and follow them for proper use.

NIDEC-SHIMPO CORPORATION

Safety Precautions

Be sure to observe

Before operation, maintenance and inspection, please carefully read this instruction manual and follow it for proper use. Please carefully read all information related to this unit and safety, and precautions before use.

This instruction manual provides two grades of safety warnings: "Danger" and "Caution". Each of them is an important description related to safety. Be sure to observe.



DANGER

This indicates the possibility of fire, severe injury, and even death if a user disregards the instruction and operates the unit improperly.



CAUTION

This indicates the possibility of minor injury or property damage if a user operates the unit improperly. However, depending on the circumstances, there is still the possibility that severe injury may result. Be sure to observe.

We categorize the type of those precautions using the following symbols throughout the manual.



A prohibited action you must not do.



A forced action you must always do.

DANGER



Do not use this product in an atmosphere with risk of fire and/or explosion. Failure to follow this could result in fire.



Do not look directly at the light emitting section. Failure to follow this could result in injury to the eyes.

CAUTION



Do not apply strong impact to the unit, or drop it. Failure to follow this could result in abnormal operation.



Do not use and/or store the unit in the following places.

- Places subject to water
- Places subject to direct sunlight
- Places subject to condensation
- Places subject to dust, dirt, salt, and/or iron
- Places subject to oil, water, and/or chemicals
- Places subject to corrosive and/or combustible gases



Never disassemble, repair, and modify the unit. Failure to follow this could result in injury due to abnormal operation.



Use the unit within the proper operating temperature range 32 - 95 F (0 - 35 C). Failure to follow this could result in malfunction.



Wipe clean the unit with a soft dry cloth if it gets dirty. Or immerse a cloth in water diluted neutral detergent, wring it, and wipe clean the unit with it. Do not use any volatile chemicals, such as benzene, thinner, or alcohol.



Use the unit within the proper operating humidity range (35 - 85%RH). (No condensation) Failure to follow this could result in malfunction.



Since continuously emitting light for long time causes the unit's housing to heat up, fix the LED strobe using a tripod, etc. and use the unit (avoid direct skin contact with the unit, such as holding it by hand). Failure to follow this could result in mild burns.

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1 Overview of this product

A stroboscope tachometer is a measurement instrument to measure the speed (cycle) of rotating objects that rotate at a constant speed, or moving objects that repeatedly operate at a constant cycle. When the rotation (motion) cycle matches with the flash cycle while the strobe flash is periodically applied on a rotating or moving object, the rotating (moving) object image appears to stand still. This stroboscope tachometer is the non-contact type, and can be used to read the flash frequency when such a still image appears. Also, a stroboscope can be used to make images of rotating or moving objects stand still or that slightly move in order to observe their appearances.

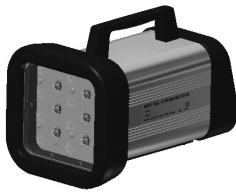

Main features

- The wide-range measurement of 60 fpm to 120,000 fpm is available
⇒ **Refer to "4.3.2.1 Emission count setting" for details**
- Simply pressing the "x2" or "÷2" key can change the emission count (frequency) to double or half respectively
⇒ **Refer to "4.3.2.2 Changing the emission count (frequency) to double or half" for details**
- The emission time (duty) can be changed by 0.1° within the range between 0.1°/360° and 3.6°/360°
⇒ **Refer to "4.3.3 Emission duration mode"**
- The emission timing (phase) can be adjusted
⇒ **Refer to "4.3.4 Phase mode" for details**
- The external I/O function is implemented (which enables emission in synchronization with the external trigger pulse, and enables the pulse signal in synchronization with the strobe emission to be output)
⇒ **Refer to "4.4 External synchronous emission" for details**

2 Before use

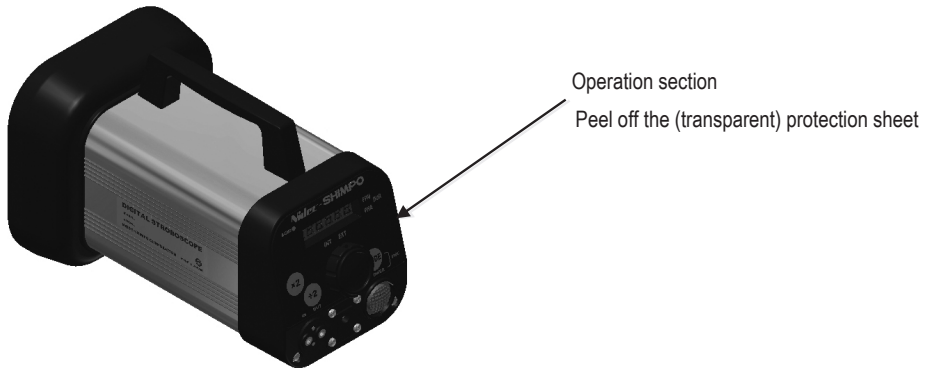
2.1 Checking the supplied items

Check that the three items below are supplied.

Main unit	DT-365E x 1 
AC adapter	Dedicated AC adapter x 1 
Instruction Manual	This document x 1

2.2 Peeling off the protection sheet

Peel off the protection sheet on the operation section.



2.3 Charging

Be sure to charge the battery before initial use. Before charging, be sure to check that the power is turned OFF.

2.3.1 Charging method

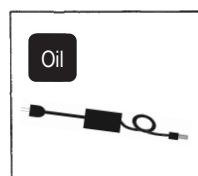
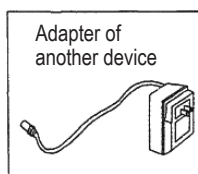
Turn the power OFF, and connect the supplied AC adapter's connector to the main unit. Next insert the AC adapter's AC plug into an outlet. The battery lamp lights up, and charging starts. Charging is complete in approximately 2.5 hours, and then the charging lamp goes off.



- Note 1)** Since the battery current is automatically shut off when charging is complete, there is no need to worry about overcharging.
- Note 2)** When the power is turned ON during charging, charging is canceled and emission starts. When the unit uses the AC adapter as its power source, it is not charged. (Note that emission and charging cannot be performed simultaneously.)
- Note 3)** Though the unit can be charged while battery power still remains, charging will still end when fully charged. It is recommended, however, that the unit be charged when the battery has run out ("LLLLLL" is indicated on the number display) to avoid reducing the battery life itself.
- Note 4)** If the unit is charged immediately after a long emission time at a high ambient temperature, the temperature rise protection circuit will turn on, and the charging lamp may not light up. In that case, disconnect the AC adapter, and let the unit cool. When the product temperature is decreased, connect the AC adapter again, and start charging.
- Note 5)** Never charge the unit under the following conditions.

• Using another AC adapter than supplied

• Charging near flammable materials

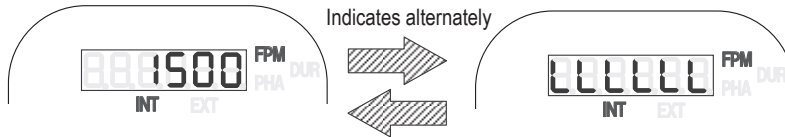


2.3.2 Indication of low battery voltage

If the remaining battery decreases below the specified amount, the battery voltage is lowered and the number display is changed to indicate the current setting value and "LLLLLL" alternately. Emission can be performed even when the battery voltage is low.

If the remaining battery decreases further, the number display indicates only "LLLLLL", which provides the emission stop status. Press the power switch, and shut off the power immediately. In either case, charge the unit according to the procedure in **"2.3.1 Charging method"**.

•Indication of low battery voltage



•Indication of emission stop



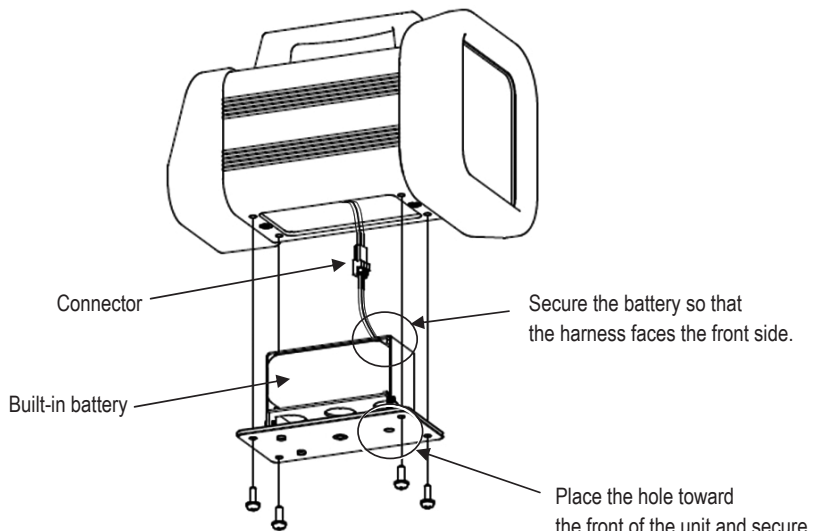
2.3.3 Battery replacement



When replacing the battery, be sure to turn off the stroboscope main unit. Do not touch the metal part of the connector.

If the battery-life duration becomes short, replace the battery with one that is specified. For a new battery, contact our dealer where you purchased this unit.

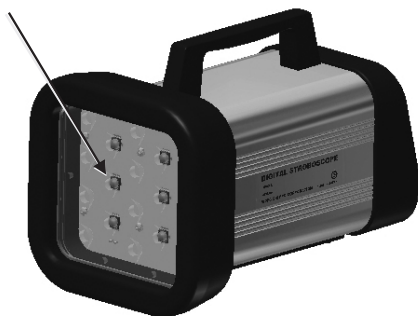
- (1) Remove the four screws on both ends of the bottom of the DT-365E main unit, and take out the built-in battery.
- (2) Remove the connector and battery fixing screws, and replace with a new battery.
- (3) Secure the new battery using fixing screws and connect the connector to it.
- (4) Mount the built-in battery in the main unit.



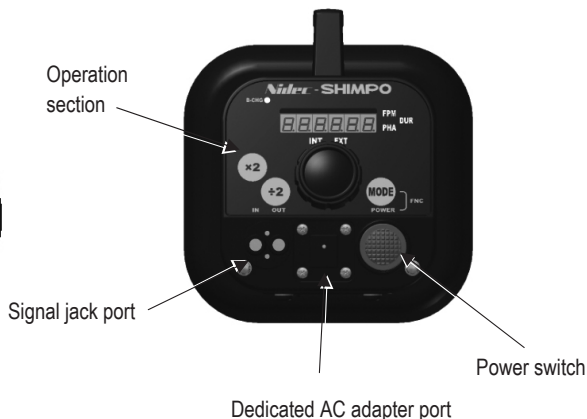
3 Part names and functions

3.1 Main unit

Super luminosity LED (6 lights)



Operation section



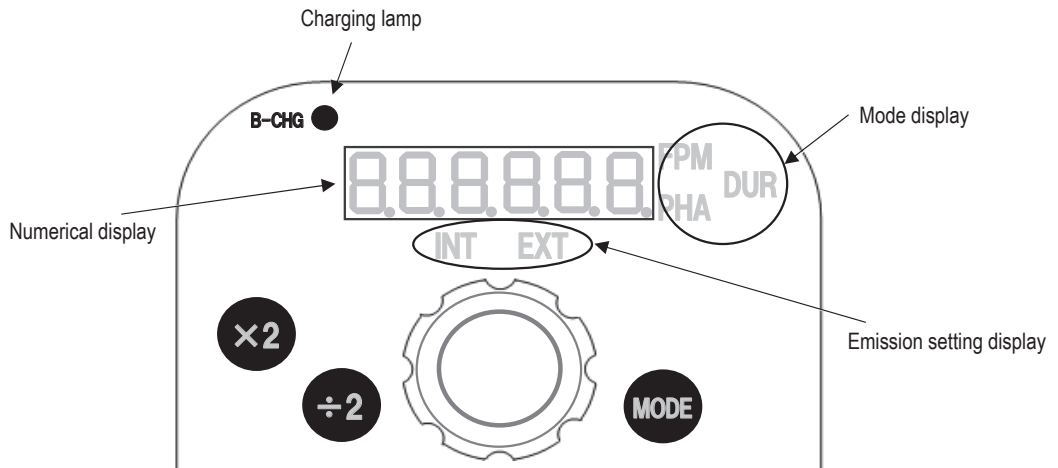
3.2 Operation section



No.	Name	Function description
①	Power switch	Turns the power ON/OFF.
②	Dial	Used to change the emission frequency or emission duration.
③	MODE key	Each press of this key switches the number display in the following order: Emission frequency (FPM), Emission duration, Emission delay duration (PHA), Emission frequency (FPM)...
④	x2 key	Each press of this key on internal oscillation emission allows the performance of emission by the double count as the current set emission count (frequency).
⑤	+2 key	Each press of this key on internal oscillation emission allows the performance of emission by the half count as the current set emission count (frequency).

3.3 Display

3.3.1 Part names

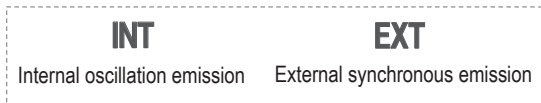


3.3.2 Number display

- Indicates the setting value (of the emission count (frequency)) on internal oscillation emission.
- Indicates the external signal frequency while on external synchronous emission.
- Each setting value is indicated in the function setting mode.
 - * For details about the function setting mode, refer to "4.5 Function mode".

3.3.3 Emission setting display

Indicates the emission setting.



3.3.4 Mode display

Indicates the mode on the number display.



3.3.5 Charging lamp



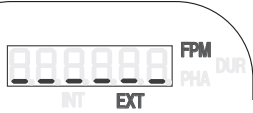
Lights up while charging, and goes off when charging is complete.

4 Functions and operations

4.1 Power ON/OFF





Press the power switch when the power is OFF to turn the power ON.

When the power is turned ON, the model is indicated, followed by internal oscillation emission or external synchronous emission.

Operation	Display
<p>When the power is OFF</p>  <p>Press the power switch</p>	<p>When the power is previously turned OFF Internal oscillation emission</p>  <p>When the power is previously turned OFF External synchronous emission</p>  <p>The screen of internal oscillation emission is indicated, and emission starts.</p> <p>The screen of external synchronous emission is indicated, and the unit enters the standby mode for the external signal.</p>





* The indication may go off immediately after the power is turned ON. In that case, charge the unit because the remaining battery level becomes low. For details about charging, refer to "2.3 Charging".

Press the power switch when the power is ON to turn the power OFF, then the indication goes off.

Operation	Display
<p>When the power is ON</p>  <p>Press the power switch</p>	   <p>Indicated letters go off.</p>

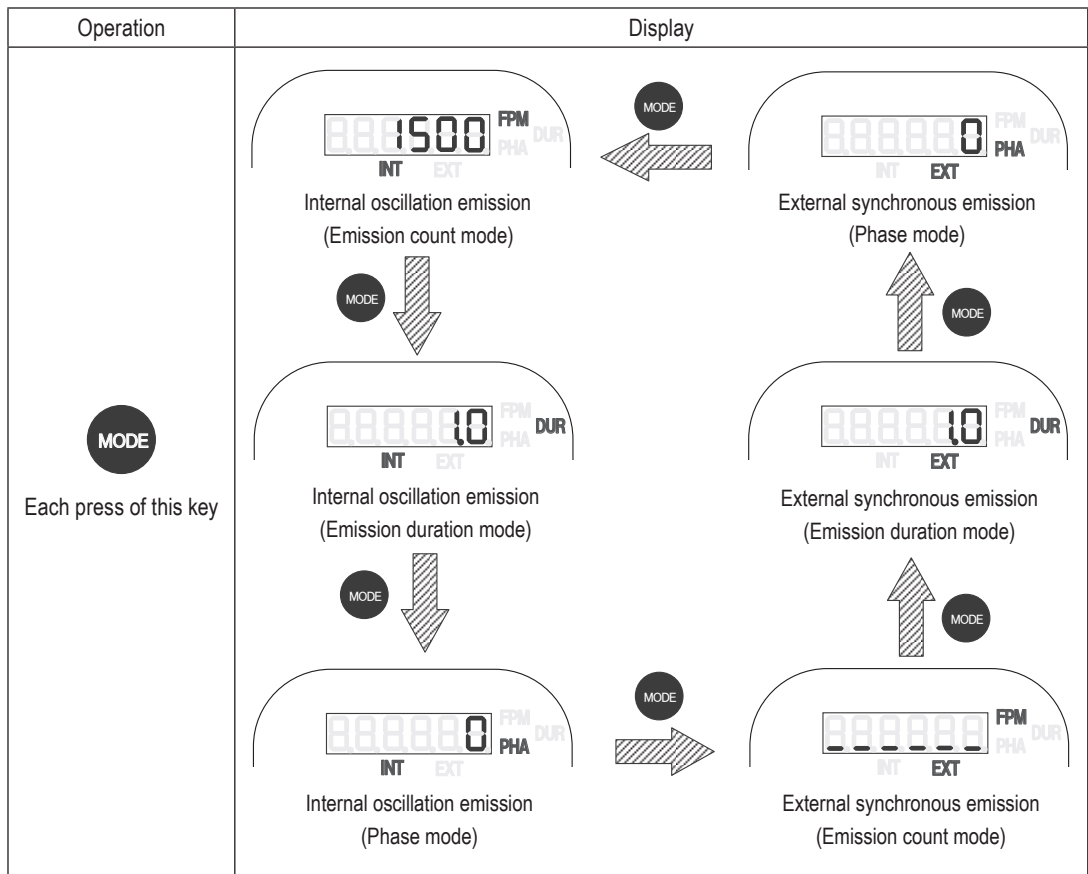
* When the power is turned ON, the following indication may be displayed.

The following indication is an error message when reading the previously used setting value fails. Press the "x2" key to reset the previously used setting value, and return to the normal emission screen from the error message display.

Operation	Display
 <p>Press the x2 key</p>	   <p>Error display Failure to read the previously used setting value</p> <p>Returns to the normal setting screen</p>

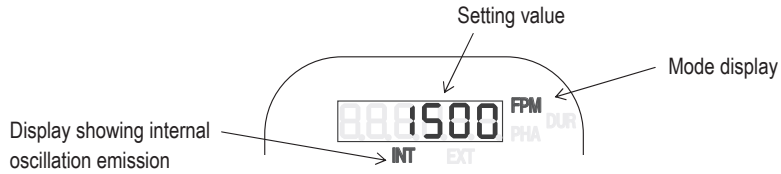
4.2 Emission and mode settings

Each press of the "MODE" key switches emission types and modes.



4.3 Internal oscillation emission

4.3.1 Display of internal oscillation emission



4.3.2 Emission count mode










The emission count (frequency) can be set in the emission count mode (FPM).

4.3.2.1 Emission count setting

Turn the dial in a CW direction to increase the emission count (frequency), and in a CCW direction to decrease it. (Turn the dial fast to change the setting value greatly, and slowly to change it slightly.)

The emission count (frequency) you can set depends on the measurement range. For details about the measurement range, refer to "**4.5.2 Measurement range setting**".

Press the "MODE" key to switch to the emission duration mode (DUR).

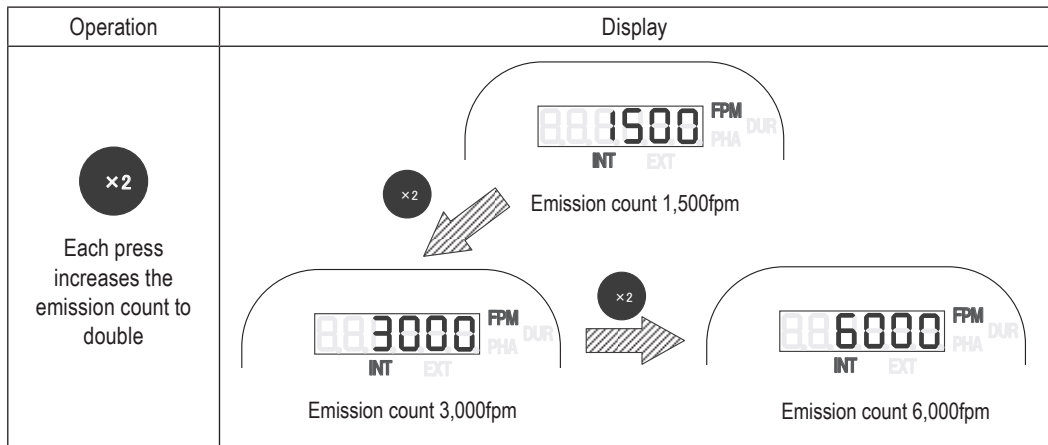
Operation	Display	
 <p>Increase/decrease the emission count (frequency)</p>	   <p>Decrease</p>	 <p>Increase</p>
 <p>Press the key to switch to the emission duration mode</p>	 <p>Emission count mode</p>	  <p>Emission duration mode</p>

4.3.2.2 Changing the emission count (frequency) to double or half

The emission count (frequency) can be changed to double or half of the current setting value using the key operation on internal oscillation emission.

1) To change the emission count (frequency) to double of the current setting value

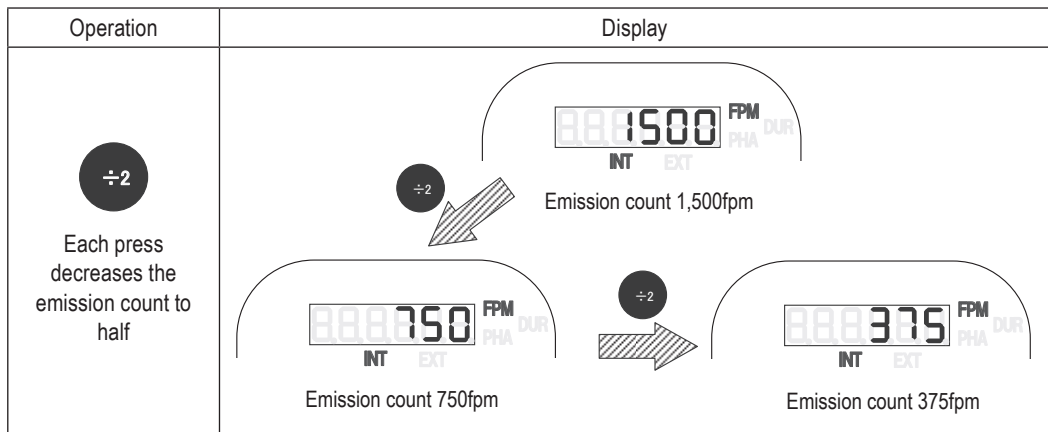
Each press of the "x2" key changes the emission count (frequency) to double of the current setting value on internal oscillation emission.



* If the doubled emission count (frequency) goes beyond the value in the measurement range, the key operation will be disabled. The emission count (frequency) after change provides the value according to the setting display resolution (for details about the setting display resolution, refer to "**5 Specifications**"). For this reason, after pressing the "x2" key and doubling the emission count (frequency), the value may not be returned to the initial value even by pressing the "+2" key and halving it.

2) To change the emission count (frequency) to half of the current setting value

Each press of the "+2" key changes the emission count (frequency) to half of the current setting value on internal oscillation emission.



* If the half of the emission count (frequency) goes below the value in the measurement range, the key operation will be disabled. The emission count (frequency) after change provides the value according to the setting display resolution (for details about the setting display resolution, refer to "**5 Specifications**"). For this reason, after pressing the "+2" key and halving the emission count (frequency), the value may not be returned to the initial value even by pressing the "x2" key and doubling it.

4.3.3 Emission duration mode

The emission duration (ratio) can be set by 0.1° within the range between 0.1°/ 360° and 3.6°/ 360° in the emission duration mode (DUR).

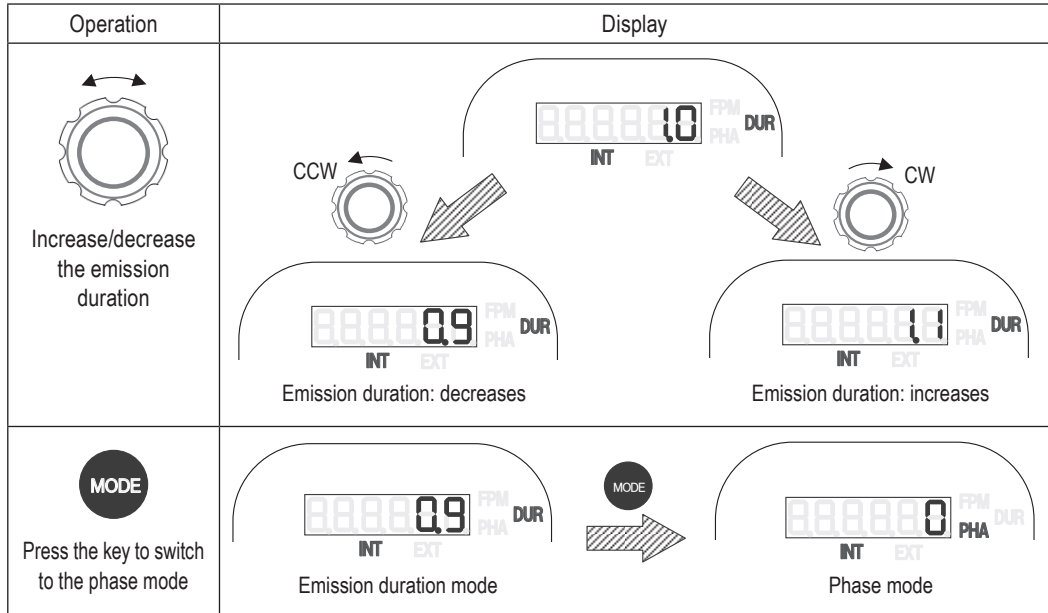
(The emission duration setting value shows the strobe emitting time by angle while a rotating object rotates one revolution (360°).)

A longer emission duration increases the brightness, but a measured object appears to be moving.

Also, a shorter duration time decreases the brightness, but a measured object appears to stand more still.

Adjust the appropriate emission duration according to your application and conditions and use the unit.

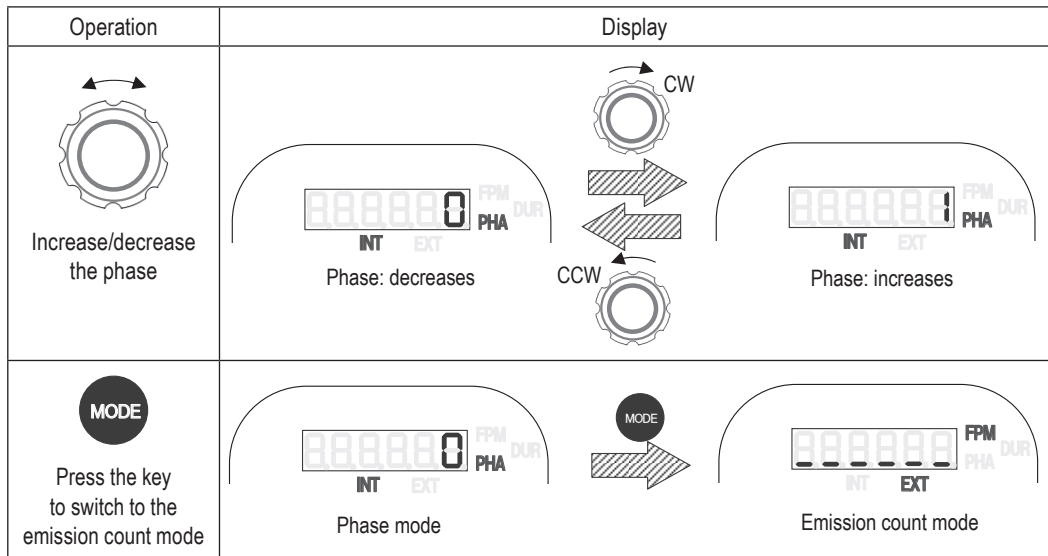
Press the "MODE" key to switch to the phase mode (PHA).



4.3.4 Phase mode

When the rotation (motion) cycle of a measured object matches with the strobe flash cycle, the measured object appears to stand still. To change the angle (position) to make the object stand still, use the phase mode. The phase can be changed by 0.1° using the dial within the range between 1° and 359° in the phase mode (PHA).

Press the "MODE" key to switch to the emission count mode (FPM) of external synchronous emission.

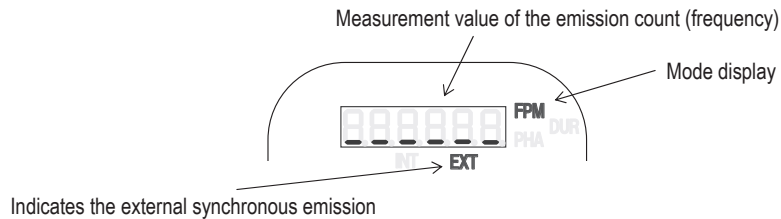


4.4 External synchronous emission

External synchronous emission is the function to emit a strobe flash in synchronization with the external trigger pulse.

- To activate external synchronous emission, refer to "**4.2 Emission setting**".
- You can set which edge of the external trigger pulse triggers emission, the rising edge or falling edge. Refer to "**4.5.3 Trigger edge setting**".
- Timing (delay) from the external trigger pulse entry to strobe flash emission can be optionally set using time and angle.

4.4.1 Emission count mode



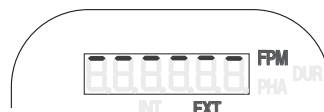
- * The external trigger pulse frequency is measured per cycle and indicated (averaging procedure is applied in every 200 ms to update the measurement value and indicate the latest one).
If the external trigger pulse cycle is beyond the specifications range, the following letters are indicated.

[Without the delay angle setting]

Measurable range 40 to 35,000



When the external input pulse frequency goes below 40 fpm



When the external input pulse frequency goes beyond 35,000 fpm

[With the delay angle setting]

Measurable range 60 to 10,000


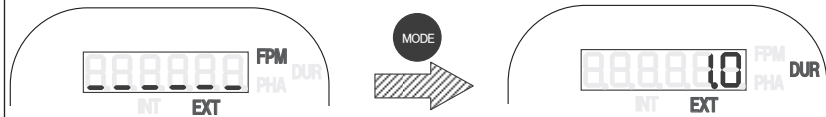


When the external input pulse frequency goes below 60 fpm



When the external input pulse frequency goes beyond 10,000 fpm

Press the "MODE" key to switch to the emission duration mode (DUR).

Operation	Display
 Press the key to switch to the emission duration mode	 Emission count mode → Emission duration mode

4.4.2 Emission duration mode

The emission duration (ratio) can be set by 0.1° within the range between 0.1°/ 360° and 3.6°/ 360° in the emission duration mode (DUR).

(The emission duration setting value shows the strobe emitting time by angle while a rotating object rotates one revolution (360°).)

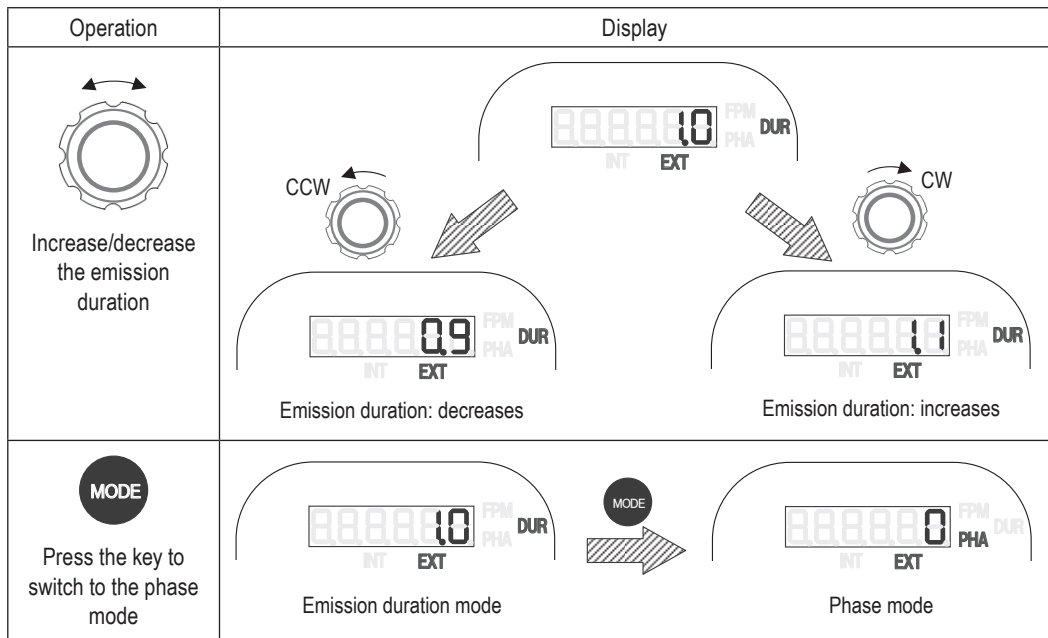
A longer emission duration increases the brightness, but a measured object appears to be moving. Also, a shorter duration time decreases the brightness, but a measured object appears to stand more still.

Adjust the appropriate emission duration according to your application and conditions and use the unit.

Press the "MODE" key to switch to the phase mode (PHA).

* When the external trigger pulse has not been entered, [_ _ _ _ _] and the emission duration are indicated alternately.

When the external trigger pulse has been entered, only the emission duration is indicated.



4.4.3 Phase mode

Delay emission can be set within the input signal range between 60 fpm and 10,000 fpm.


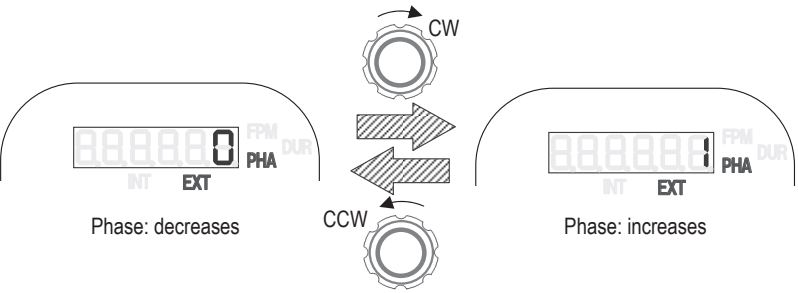

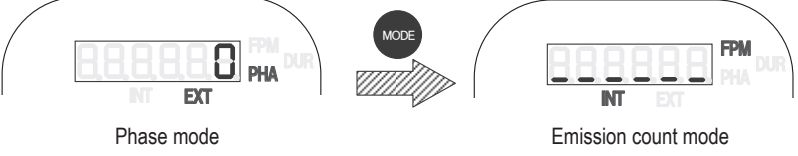
In the phase mode (PHA), the phase from the external trigger pulse entry to strobe flash emission can be changed by 0.1° using the dial within the range between 1° and 359°.

When time is used for setting, a time longer than the emission cycle cannot be set.

Press the "MODE" key to switch to the emission count mode (FPM) of internal oscillation emission.

* When the external trigger pulse has not been entered, [_ _ _ _ _] and the phase are indicated alternately.

When the external trigger pulse has been entered, only the phase is indicated.

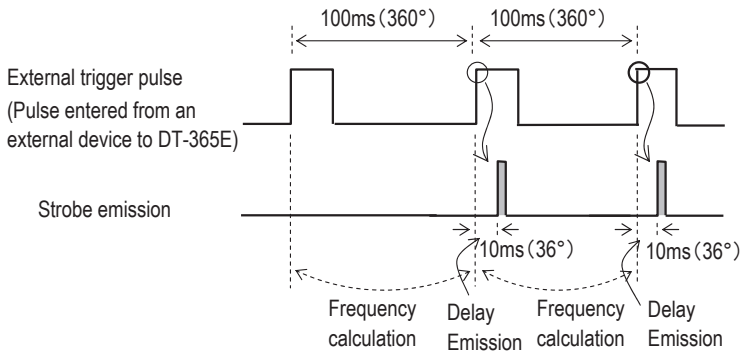
Operation	Display
 <p>Increase/decrease the phase</p>	 <p>Phase: decreases</p> <p>Phase: increases</p>
 <p>Press the key to switch to the phase mode</p>	 <p>Phase mode</p> <p>Emission count mode</p>

4.4.3.1 How to set the delay

The delay angle from the pulse input to emission can be set by 0.1° within the range between 1° and 359° by setting one cycle of the external trigger pulse to 360°. Measure the external trigger pulse frequency per cycle, and calculate the delay angle based on the measured frequency to perform the delay emission. Since a delay of approximately 20 μs always occurs for the internal calculation, the actual delay time is calculated as follows:

$$\frac{\text{Delay setting angle}}{360^\circ} \times \text{External trigger pulse cycle} + \text{Approximately } 20 \mu\text{s}$$

[Example 1] When setting the input frequency to 10 Hz (600 fpm), trigger edge to "rising", and delay angle to 36°



- Since the delay angle is calculated based on the previously entered external trigger pulse cycle, if the external trigger pulse frequency changes, emission cannot be performed at a precise angle. Also, since the external trigger pulse cycle becomes shorter than the previous pulse cycle, if the next external trigger pulse is entered before delay angle emission, the delay angle setting will be disabled, and emission is performed simultaneously(*) with the external trigger pulse.
- When the delay angle is set to 0°, emission is performed simultaneously(*) with the external trigger pulse.

(*Since there is a delay caused by the internal calculation process, the strobe actually emits light in approximately 20 μs after the external trigger pulse is entered.)

Turn the dial to the right to increase the delay angle setting value. Increasing the setting value from 359° will be 0°.

4.4.4 Saving the setting values

While using the unit while on internal oscillation emission and external synchronous emission, press the power switch and turn the power OFF to save the setting value to that which it was before turning the power OFF.

When the power is turned ON again, operation starts from the previous setting value.

When the power is OFF, the following setting values are saved.

	During internal oscillation emission	During external synchronous emission
Emission setting	○	○
Mode setting	○	○
Frequency setting	○	-
Emission duration	○	○
Delay angle	○	○

4.5 Function mode

The following settings in the table can be configured in the function mode.

	Setting item	Default setting value
Function mode 1	Measurement range setting	120,000
Function mode 2	Trigger edge setting	L-H
Function mode 3	Auto emission stop time setting	0

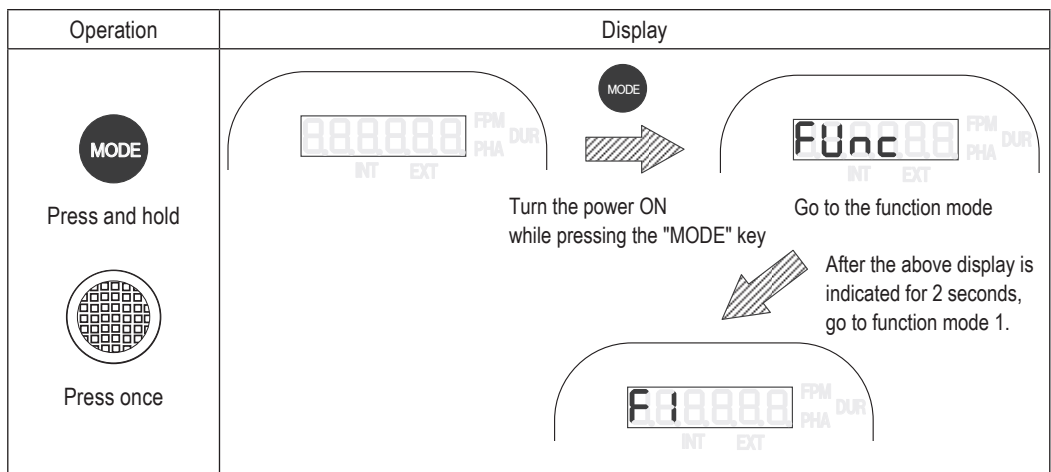
4.5.1 Moving to the function mode

Turn the power ON while pressing the "MODE" key to enter the function mode.

During the function mode, press the "MODE" key to indicate the next setting item.

Press the "POWER" key in function mode 3 to save the specified items collectively and move to the emission screen.

If the power is turned OFF in the middle of the function mode, the setting value will not be saved in the memory.



4.5.2 Measurement range setting (Function mode 1)

This function is used to set the measurement range on internal oscillation emission. The measurement range has two levels. The indicated contents depend on the measurement unit setting.

Measurement unit	*Measurement range	
fpm	60 to 12,000 (Available setting range: 60.0 to 12,000.0)	60 to 120,000 (Available setting range: 60.0 to 120,000)

* The emission count saved in the memory will be x10 or 1/10 by changing the measurement range.

Example: Save the emission count (frequency) of 6000 fpm in the range between 60 fpm and 120,000 fpm. After that, the saved value of the emission count (frequency) will be 600.0 fpm by changing the measurement range to between 60 fpm and 12,000 fpm.


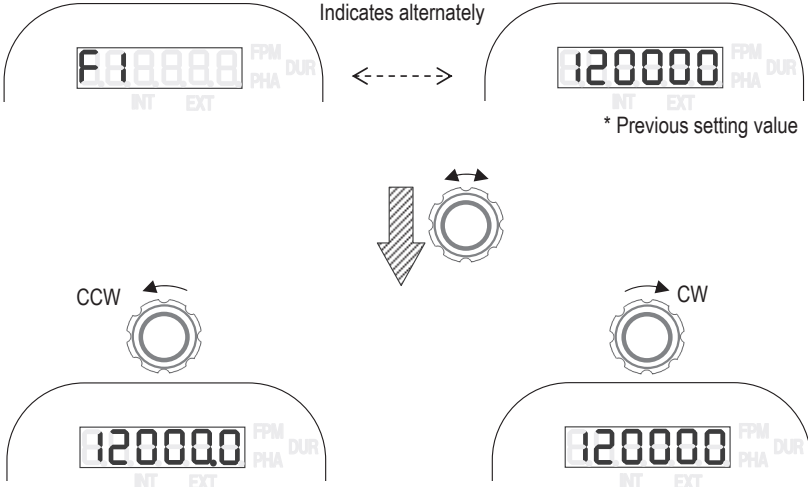

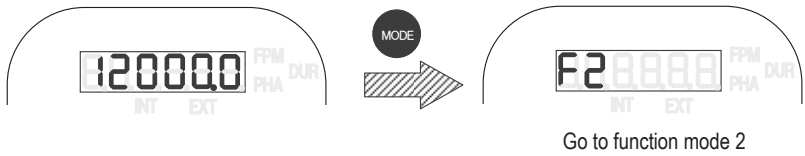
* If the emission count (frequency) setting value is set to the one beyond (or below) the range when changing the measurement range, the value will be limited to the maximum (or minimum) value within the range.

Example 1: Save the emission count (frequency) of 60,000 fpm in the range between 60 fpm and 120,000 fpm. After that, the saved value of the emission count (frequency) will be 12,000.0 fpm by changing the measurement range to between 60 fpm and 12,000 fpm.

Example 2: Save the emission count (frequency) of 100 fpm in the range between 60 fpm and 120,000 fpm. After that, the saved value of the emission count (frequency) will be 60.0 fpm by changing the measurement range to between 60 fpm and 12,000 fpm.

Turn the dial to the CW direction to set the range to between "60 fpm and 12,000 fpm", and to the CCW direction to set the range to between "60 and 12,000".

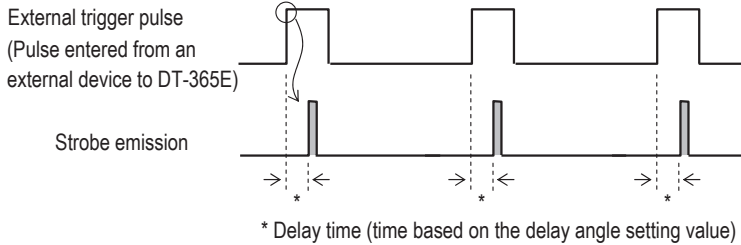
Operate the dial to stop the alternate display, and the only the measurement range setting value is indicated.

Operation	Display
 <p>Change the setting value</p>	<p>Indicates alternately</p>  <p>* Previous setting value</p>
 <p>Go to function mode 2</p>	 <p>Go to function mode 2</p>

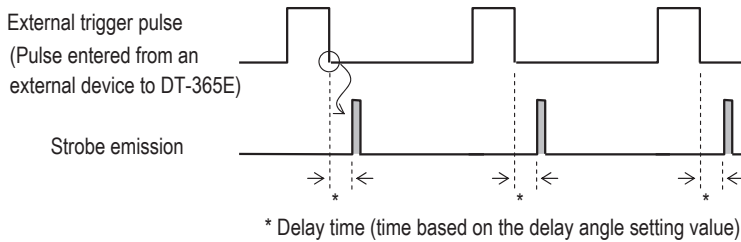
4.5.3 Trigger edge setting (Function mode 2)

In the external trigger mode, in which the edge of the external pulse triggers emission, the rising edge or falling edge, can be set.


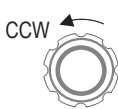
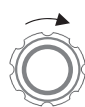





●When the trigger edge is set to "L-H"



●When the trigger edge is set to "H-L"



Turn the dial to the CW direction to set the trigger edge to H-L (falling).
Turn the dial to the CCW direction to set the trigger edge to L-H (rising).
Operate the dial to stop the alternate display, and only the trigger edge setting value is indicated.

Operation	Display
 Change the setting value	Indicates alternately  CCW  CW * Previous setting value
	 Rising
 Go to function mode 3	   Go to function mode 3


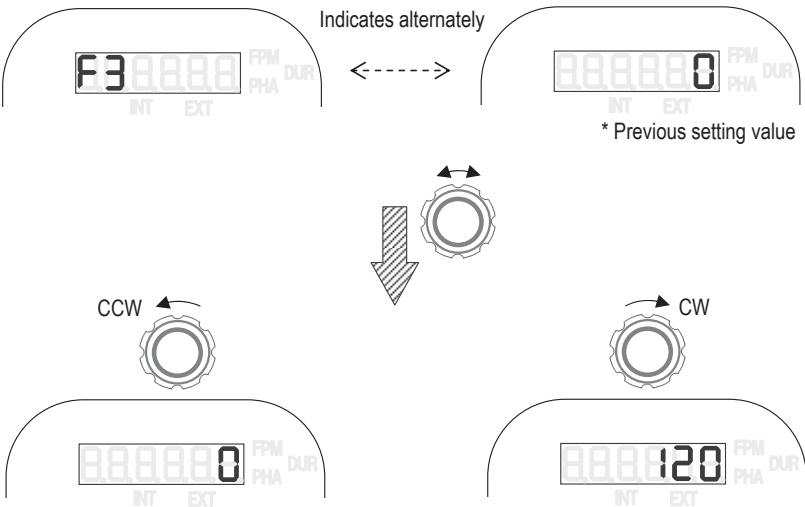

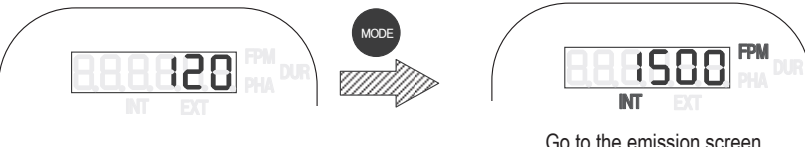
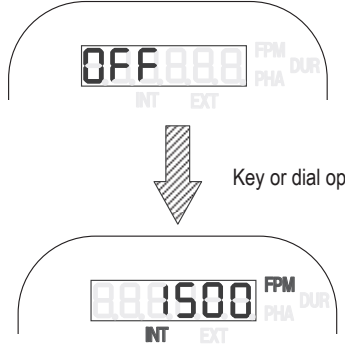
4.5.4 Auto emission stop time setting (Function mode 3)

This setting is used to stop emission automatically when no operation is performed for a certain period of time.

The available setting time is within the range between 0 min and 120 min, which can be changed by 1 minute.

When it is set to 0, the auto emission stop function is turned OFF, and emission is performed continuously.

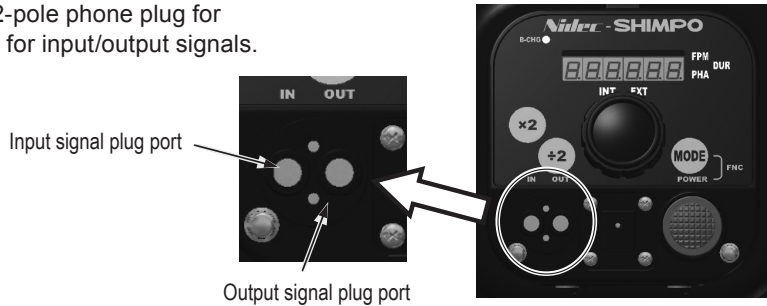
When emission is stopped by the auto emission stop function, use the key or dial operations to restart emission.

Operation	Display
 <p>Change the setting value</p>	<p>Indicates alternately</p>  <p>* Previous setting value</p>
 <p>Go to the emission screen</p>	 <p>Go to the emission screen</p>
	<p>Display when emission is stopped by the auto emission stop function</p>  <p>Key or dial operations</p> <p>Restart emission</p>

4.6 External I/O (phone jack)

4.6.1 Interface specifications

On the DT-365E main unit: Phone jack ($\phi 3.5\text{mm}$ - 2 poles)
Use the $\phi 3.5\text{mm}$ 2-pole phone plug for connection cables for input/output signals.



4.6.2 External trigger pulse input

Connect the unit to external devices (sensors, etc.) to allow the strobe to emit light using the pulse signal from the devices on external synchronous emission. (For details, refer to "4.4 External synchronous emission")

* Since there is a delay caused by the internal calculation process, the strobe emits light in approximately $20\ \mu\text{s}$ after the external trigger pulse is entered.

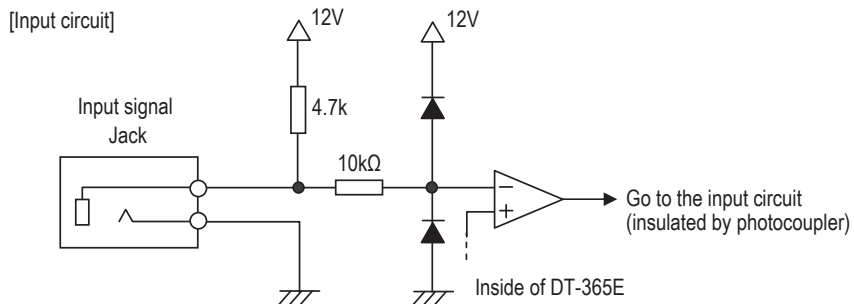
Available input frequency : Available measurement range 40 to 35,000 fpm
Available delay emission range 60 to 10,000 fpm

Available input signal : NPN open collector signal

Available input pulse width : $50\ \mu\text{s}$ or more

Available delay setting angle : within the range between 0 and 359° , available to set by 1°

Available delay setting time : within the range between 0 and 999 (max.) ms, available to set by 1 ms



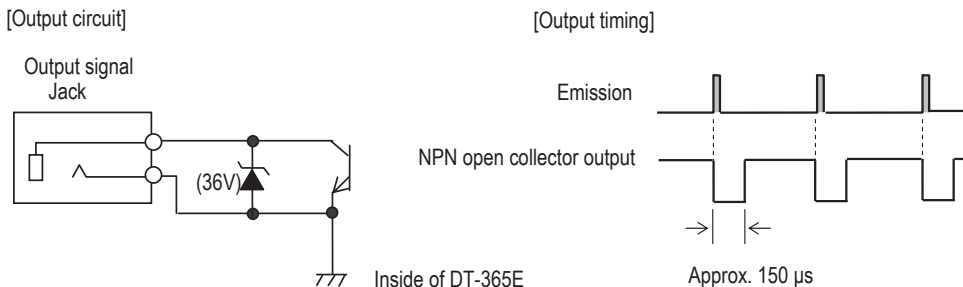
4.6.3 External trigger pulse output

Output the signal to external devices simultaneously with emission while emission is performed in the internal oscillation mode or external trigger mode.

* Since there is a delay caused by the internal calculation process, the signal is output in approximately $10\ \mu\text{s}$ after emission.

Output circuit specifications : NPN open collector signal

Output pulse width : Approx. $150\ \mu\text{s}$

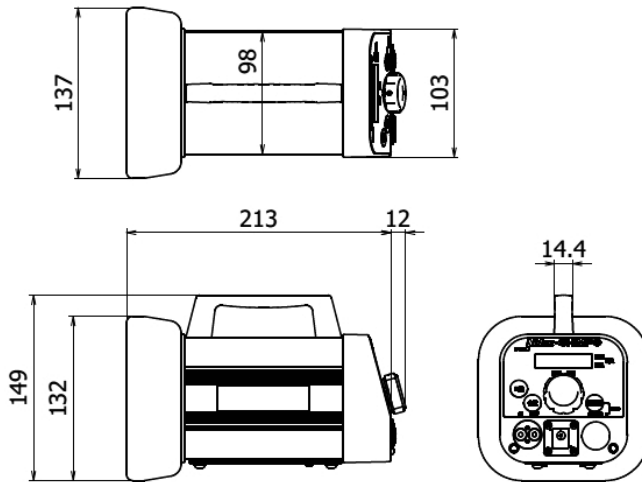


5 Specifications

Model		DT-365E	
Application		Charging battery built-in model	
Internal oscillation emission	Emission count	60 to 120,000 fpm	
	Setting accuracy	±0.02%	
	Measurement range setting	Available to set to the range between 60 fpm and 120,000 fpm, or 60 fpm and 12,000 fpm (Set in function mode 1)	
	Setting display resolution (Internal oscillation)	Measurement range: 60 to 12,000 fpm	60.0 to 3,000.0 : 0.1fpm 3,000.2 to 6,000.0 : 0.2fpm 6,000.5 to 12,000.0 : 0.5fpm
		Measurement range: 60 to 120,000 fpm	60 to 30,000 : 1fpm 30,00.2 to 60,000 : 2fpm 60,00.5 to 100,000 : 5fpm 100,010 to 120,000 : 10fpm
	Function to change the emission frequency setting		Available to change the emission frequency to an optional value Available to change the emission frequency to double or half of the current value (Each press of the key changes the value to double, quadruple..., or half, one-quarter, ...)
	Phase change function		When the angle is set based on the current emission phase: within the range between 0 and 359°, available to set by 1°
External synchronous emission	External trigger pulse input interface	NPN open collector input (input impedance: 4.7 kΩ) Delay caused by the internal calculation process (pulse input to emission): 20 μs	
	External trigger pulse output interface	NPN open collector output pulse width: approx. 150 μs Delay caused by the internal calculation process (emission to pulse output): 10 μs	
	Synchronous edge switch	Available to select either the rising edge or falling edge (Set in function mode 2)	
	Frequency measurement range	40 to 35,000fpm	
	Available delay emission range	60 to 10,000fpm	
	Available phase setting range	Delay angle: by 1° within the range between 0° and 359°	
Emission duration	Angle	Available to set by 0.1° within the range between 0.1° and 3.6° (/360°)	
Display		6-digit red LED	
Setting devices		Multi-turn encoder, tact switch	
Emission source		Ultra luminosity LED 6 lights	
Signal I/O		Phone jack (φ3.5mm, 2 poles)	

Memory function	•Saving the setting value when the power is OFF
Auto emission stop	Available to set continuous emission, or set the time to stop emission by 1 minute within the range between 1 min and 120 min. (Set in function mode 3)
Power	Built-in NiMH battery •Continuous emission time Approx. 3 hours (when the emission duration is set to 3.6°) Approx. 8 hours (when the emission duration is set to 1.0°) •Charging time: Approx. 2.5 hours Supplied AC adapter •Input: AC 100 V to 230 V •Output: DC 24 V
Operating temperature	32 to 95 F (0 - 35 C)
Operating humidity	35% to 85%RH
Operating environment	No dust and/or corrosive gases
Compliance standard	RoHS
Weight	Approx. 4.6 lb (2.1 kg)
Standard accessories	Dedicated AC adapter x 1, Instruction manual (this document)

6 External dimensions



7 Troubleshooting

Symptoms	Factors	Causes	Solution
When the power is turned ON, "LLLLLL" is indicated, and no emission occurs.	The battery voltage is low.	The battery is not charged.	Charge the battery.
Though the battery is fully charged, "LLLLLL" is soon indicated on the display.	The battery capacity is low.	Short battery life Battery malfunction Charging circuit malfunction	Replace the battery. If the problem has not been solved after replacing the battery, ask for repair.
The charging lamp does not light up when the AC adapter is connected.	The power does not reach the main unit.	The AC adapter is not connected.	Check the connection.
		AC adapter malfunction	Ask for repair.
Charging cannot be completed, and the charging lamp remains ON.	Charging failed.	Short battery life Battery malfunction Charging circuit malfunction	Replace the battery. If the problem has not been solved after replacing the battery, ask for repair.
Emission occurs inconsistently. Emission sometimes stops.	Internal circuit malfunction	Internal circuit malfunction	Ask for repair.
Display or emission does not change by turning the dial.	Internal circuit malfunction	Internal circuit malfunction	Ask for repair.
Information appears on the digital display, but no emission occurs.	Internal circuit malfunction	Internal circuit malfunction	Ask for repair.
Nothing is indicated on the display, and no emission occurs.	Internal circuit malfunction	Internal circuit malfunction	Ask for repair.

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