

# Multi-range, Multi-mode Timer

## H3DT-N/H3DT-L

- Multiple time ranges and operating modes let you cover a wide range of applications.
- The time-limit DPDT output contacts can be changed to time-limit SPDT and instantaneous SPDT output contacts using a switch.
- Sequence checks are easily performed by setting an instantaneous output to 0.
- Start signal control for some operating modes.



\* CSA conformance evaluation by UL.



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

## Ordering Information

### List of Models

| Supply voltage   |                                                                                                            |       | H3DT-N/H3DT-L             |                            |
|------------------|------------------------------------------------------------------------------------------------------------|-------|---------------------------|----------------------------|
|                  |                                                                                                            |       | Standard Eight-mode Timer | Expansion Eight-mode Timer |
| 24 to 240 VAC/DC | Contact output, DPDT (time-limit DPDT, or time-limit SPDT + instantaneous SPDT)<br>Changed using a switch. | Model | H3DT-N2                   | H3DT-L2                    |
|                  | Contact output, SPDT (time-limit SPDT)                                                                     |       | H3DT-N1                   | H3DT-L1                    |

### Model Structure

| Model   | Operating modes                                                                                                                                                     | Terminal block | Input type    | Output type | Mounting method    | Safety standards                                                                   |
|---------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------|---------------|-------------|--------------------|------------------------------------------------------------------------------------|
| H3DT-N2 | A2: ON Delay (Power ON Delay)<br>B3: Flicker OFF Start (Power ON Start)<br>B4: Flicker ON Start (Power ON Start)<br>D: Signal OFF Delay                             | 10 terminals   | Voltage input | Relay, DPDT | DIN Track mounting | cULus<br>(UL 508 CSA C22.2 No.14)<br>CCC<br>LR<br>EN 61812-1<br>IEC 60664-1 4 kV/2 |
| H3DT-N1 | E2: Interval (Power ON Start)<br>E3: Signal OFF Interval<br>F2: Cumulative (ON Delay)<br>F3: Cumulative (Interval)                                                  | 8 terminals    |               | Relay, SPDT |                    |                                                                                    |
| H3DT-L2 | A: ON Delay (Signal ON Delay)<br>B: Flicker OFF Start (Signal Start)<br>B2: Flicker ON Start (Signal Start)<br>C: Signal ON/OFF Delay<br>E: Interval (Signal Start) | 10 terminals   |               | Relay, DPDT |                    |                                                                                    |
| H3DT-L1 | G: Signal ON/OFF Delay<br>J: One-shot Output (Signal Start)<br>J2: One-shot Output (Power ON Start)                                                                 | 8 terminals    |               | Relay, SPDT |                    |                                                                                    |

## Specifications

### Time Ranges

| Time range setting | 0.1 s        | 1 s       | 10 s        | 1 min       | 10 min        | 1 h       | 10 h        | 100 h          |
|--------------------|--------------|-----------|-------------|-------------|---------------|-----------|-------------|----------------|
| Set time range     | 0.1 to 1.2 s | 1 to 12 s | 10 to 120 s | 1 to 12 min | 10 to 120 min | 1 to 12 h | 10 to 120 h | 100 to 1,200 h |
| Scale numbers      | 12           |           |             |             |               |           |             |                |

### Ratings

|                                     |             |                                                                                                                                                                                                                                                                                                                                                                                       |
|-------------------------------------|-------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Power supply voltage *1             |             | 24 to 240 VAC/DC, 50/60 Hz *2                                                                                                                                                                                                                                                                                                                                                         |
| Allowable voltage fluctuation range |             | 85% to 110% of rated voltage                                                                                                                                                                                                                                                                                                                                                          |
| Power reset                         |             | Minimum power-OFF time: 0.1 s                                                                                                                                                                                                                                                                                                                                                         |
| Reset voltage                       |             | 10% of rated voltage                                                                                                                                                                                                                                                                                                                                                                  |
| Voltage input                       |             | 24 to 240 VAC/DC<br>High level: 20.4 to 264 VAC/DC, Low level: 0 to 2.4 VAC/DC                                                                                                                                                                                                                                                                                                        |
| *3<br>Power consumption             | H3DT-N2/-L2 | At 240 VAC: 2.3 VA max., at 240 VDC: 1.0 W max.,<br>at 24 VDC: 0.3 W max.                                                                                                                                                                                                                                                                                                             |
|                                     | H3DT-N1/-L1 | At 240 VAC: 2.0 VA max., at 240 VDC: 0.9 W max.,<br>at 24 VDC: 0.3 W max.                                                                                                                                                                                                                                                                                                             |
| Rated Insulation Voltage            |             | 250 VAC                                                                                                                                                                                                                                                                                                                                                                               |
| Control output                      |             | Contact output: 5 A at 250 VAC with resistive load ( $\cos\phi = 1$ ),<br>5 A at 30 VDC with resistive load *5,<br>0.15 A max. at 125 VDC with resistive load,<br>0.1A max. at 125 VDC with L/R of 7 ms.<br>The minimum applicable load is 10 mA at 5 VDC (P reference value).<br>Contact materials : Ag-alloy + Gold plating<br>(Recommended fuse: BLN5 (Littelfuse) or 0216005MXEP) |
| Ambient operating temperature       |             | −20 to 60°C (with no icing)                                                                                                                                                                                                                                                                                                                                                           |
| Storage temperature                 |             | −40 to 70°C (with no icing)                                                                                                                                                                                                                                                                                                                                                           |
| Surrounding air operating humidity  |             | 25% to 85%                                                                                                                                                                                                                                                                                                                                                                            |

\*1. When using a 24-VDC power supply voltage, there will be an inrush current of approximately 0.5 A. Allow for this inrush current when turning ON and OFF the power supply to the Timer with device with a solid-state output, such as a sensor.

\*2. DC ripple: 20% max.

\*3. The power consumption is for after the Timer times out in mode F2 for the H3DT-N and mode A for the H3DT-L.  
The maximum power consumption is given, including the current consumed by the input circuit.

## Characteristics

|                                |             |                                                                                               |
|--------------------------------|-------------|-----------------------------------------------------------------------------------------------|
| Accuracy of operating time     |             | ±1% of FS max. (±1% ±10 ms max. at 1.2-s range)                                               |
| Setting error                  |             | ±10% of FS ±0.05 s max.                                                                       |
| Minimum input signal width     |             | 50 ms (start input)                                                                           |
| Influence of voltage           |             | ±0.5% of FS max. (±0.5% ±10 ms max. at 1.2-s range)                                           |
| Influence of temperature       |             | ±2% of FS max. (±2% ±10 ms max. at 1.2-s range)                                               |
| Insulation resistance          |             | 100 MΩ min. at 500 VDC                                                                        |
| Dielectric strength            |             | Between charged metal part and operating section: 2,900 VAC 50/60 Hz for 1 min.               |
|                                |             | Between control output terminals and operating circuit: 2,000 VAC 50/60 Hz for 1 min.         |
|                                |             | Between contacts not located next to each other: 1,000 VAC 50/60 Hz for 1 min.                |
| Impulse withstand test voltage |             | 5 kV between power terminals, 7.4 kV between conductor terminal and operating section         |
| Noise immunity                 |             | Square-wave noise generated by noise simulator (pulse width: 100 ns/1 μs, 1-ns rise): ±1.5 kV |
| Static immunity                |             | Malfunction: 4 kV, Destruction: 8 kV                                                          |
| Vibration resistance           | Destruction | 0.75-mm single amplitude at 10 to 55 Hz for 2 h each in 3 directions                          |
|                                | Malfunction | 0.5-mm single amplitude at 10 to 55 Hz for 10 min each in 3 directions                        |
| Shock resistance               | Destruction | 1,000 m/s <sup>2</sup> 3 times each in 6 directions                                           |
|                                | Malfunction | 100 m/s <sup>2</sup> 3 times each in 6 directions                                             |
| Life expectancy                | Mechanical  | 10 million operations min. (under no load at 1,800 operations/h)                              |
|                                | Electrical  | 100,000 operations min. (5 A at 250 VAC, resistive load at 360 operations/h)                  |
| Degree of protection           |             | IP30 (Terminal block: IP20)                                                                   |
| Weight                         |             | Approx. 100 g                                                                                 |

## Applicable standards

|                  |                                                                  |                  |
|------------------|------------------------------------------------------------------|------------------|
| Safety standards | cULus: UL 508/CSA C22.2 No. 14                                   |                  |
|                  | EN 61812-1: Pollution degree 2, Overvoltage category III         |                  |
| EMC              | CCC: GB/T 14048.5 Pollution degree 2, Overvoltage category III * |                  |
|                  | LR: Category ENV1.2                                              |                  |
| EMC              | (EMI)                                                            | EN 61812-1       |
|                  | Radiated Emissions:                                              | EN 55011 class B |
|                  | Emission AC Mains:                                               | EN 55011 class B |
|                  | Harmonic Current:                                                | EN 61000-3-2     |
|                  | Voltage Fluctuations and Flicker:                                | EN 61000-3-3     |
|                  | (EMS)                                                            | EN 61812-1       |
|                  | Immunity ESD:                                                    | EN 61000-4-2     |
|                  | Immunity RF-interference:                                        | EN 61000-4-3     |
|                  | Immunity Burst:                                                  | EN 61000-4-4     |
|                  | Immunity Surge:                                                  | EN 61000-4-5     |
|                  | Immunity Conducted Disturbance:                                  | EN 61000-4-6     |
|                  | Immunity Voltage Dip/Interruption:                               | EN 61000-4-11    |

\* CCC certification requirements

|                                                                                  |                                                                                                                                                                          |
|----------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Rated operating voltage U <sub>e</sub><br>Rated operating current I <sub>e</sub> | AC-15: U <sub>e</sub> : 250 VAC, I <sub>e</sub> : 3 A<br>AC-13: U <sub>e</sub> : 250 VAC, I <sub>e</sub> : 5 A<br>DC-13: U <sub>e</sub> : 30 VDC, I <sub>e</sub> : 0.1 A |
| Rated impulse withstand voltage<br>(altitude: 2,000 m max.)                      | 4 kV (at 240 VAC)                                                                                                                                                        |
| Conditional short-circuit current                                                | 1,000 A                                                                                                                                                                  |

## I/O

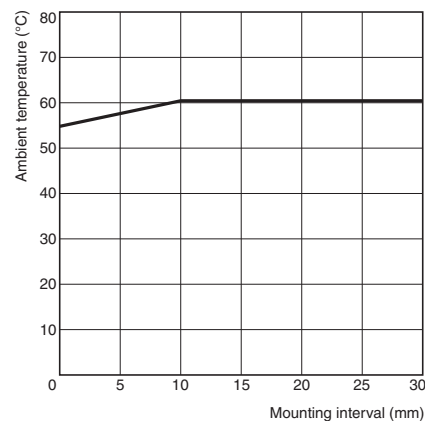
| Item   | Model          | H3DT-N/L                                                                                                         |
|--------|----------------|------------------------------------------------------------------------------------------------------------------|
| Input  | Start          | Functions to start timing.                                                                                       |
| Output | Control output | The output is turned ON/OFF according to the operating mode when the value that is set on the dial is reached. * |

\* If the INST/TIME switch on the front of the Timer is set to INST, relay R2 will operate as instantaneous contacts and will turn ON/OFF in synchronization with the power supply.

## Relation between H3DT Ambient Temperature and Mounting Interval (Reference Values)

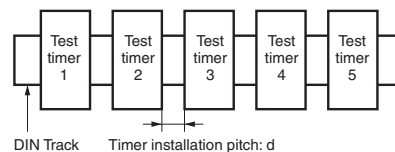
The relation between the ambient temperature and mounting interval is shown in the following graph.

If the Timer is used at 55°C or higher with a mounting interval that is smaller than that shown in the following diagram, the temperature inside the Timer will increase, reducing the life expectancy of internal parts.



### Testing Method

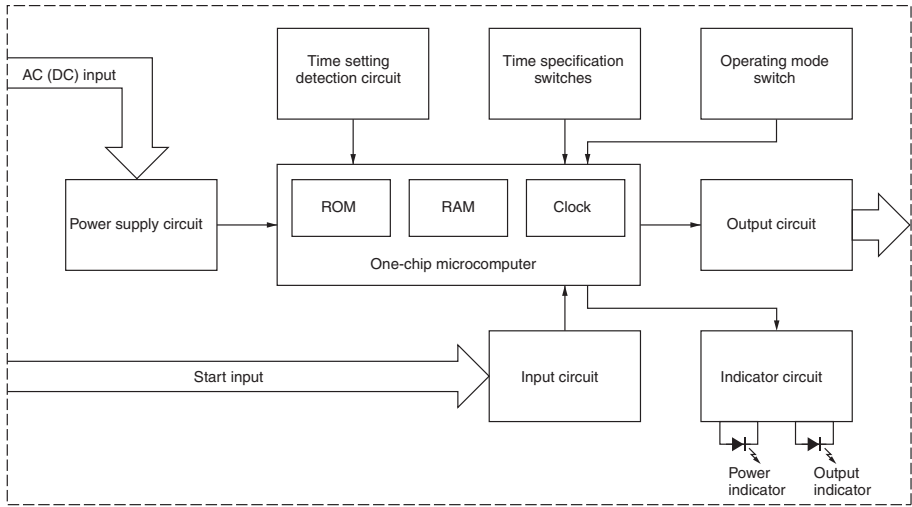
Tested Timer: H3DT-N/L  
Applied voltage: 240 VAC  
Installation pitch: 0 and 10 mm  
Load current: 5 A



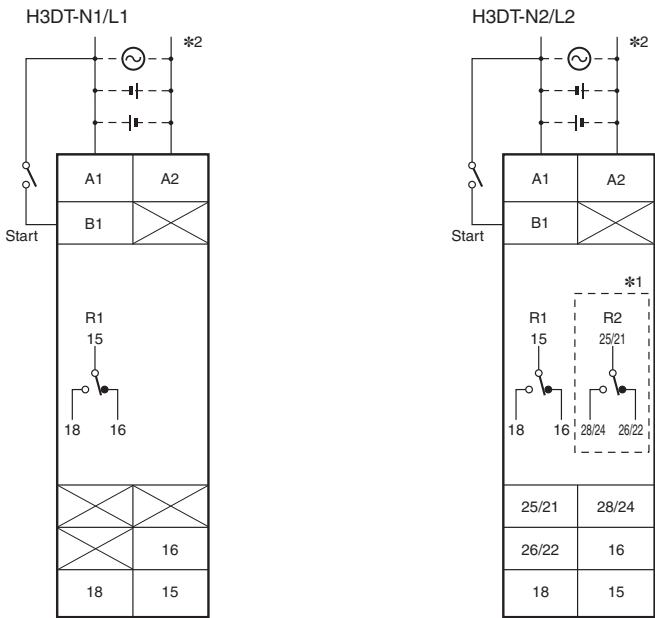
Connections

Block Diagrams

H3DT-N/L



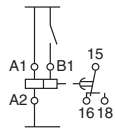
Terminal Arrangement



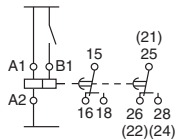
\*1. The relay R2 can be set to either instantaneous or time-limit contacts using the switch on the front of the Timer.

\*2. The power supply terminals do not have polarity.

(DIN notation)



(DIN notation)

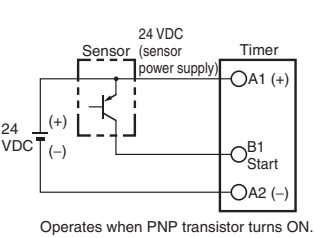


# H3DT-N/H3DT-L

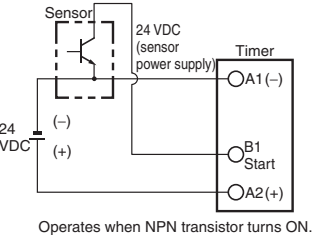
## Input Connections

The start input is a voltage input.

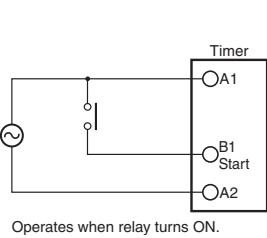
### PNP Transistor Input



### NPN Transistor Input



### Relay Input



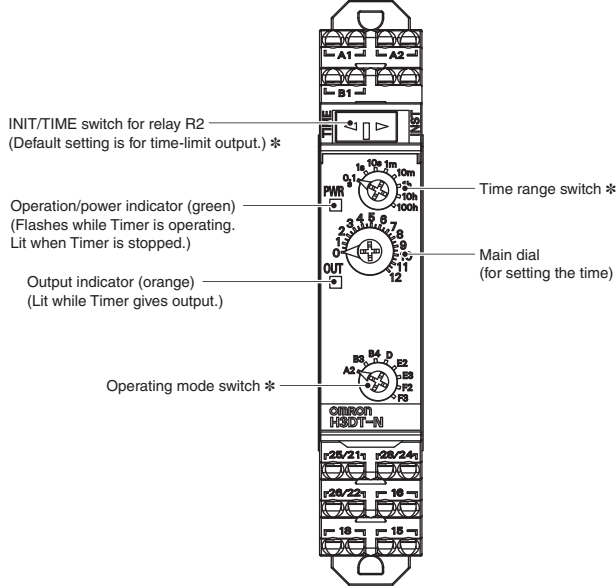
Consider the minimum load of the relay. (See signal levels on the right.)

### Voltage Input Signal Levels

|                  |                                                                                                                                                                                                                                                                                  |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Transistor input | 1. Transistor ON<br>• Residual voltage: 1 V max.<br>Voltage between terminals B1 and A2 must be equal to or higher than the rated high level voltage (20.4 VDC min.).                                                                                                            |
|                  | 2. Transistor OFF<br>• Leakage current: 0.01 mA max.<br>Voltage between terminals B1 and A2 must be equal to or below the rated low level voltage (2.4 VDC min.).                                                                                                                |
| Relay input      | Use relays that can adequately switch 0.1 mA at the imposed voltage.<br>When the relay is ON or OFF, the voltage between terminals B1 and A2 must be within the following ranges:<br>• 24 to 240 VAC/DC<br>When relay is ON: 20.4 to 264 VAC/DC<br>When relay is OFF: 0 to 2.4 V |

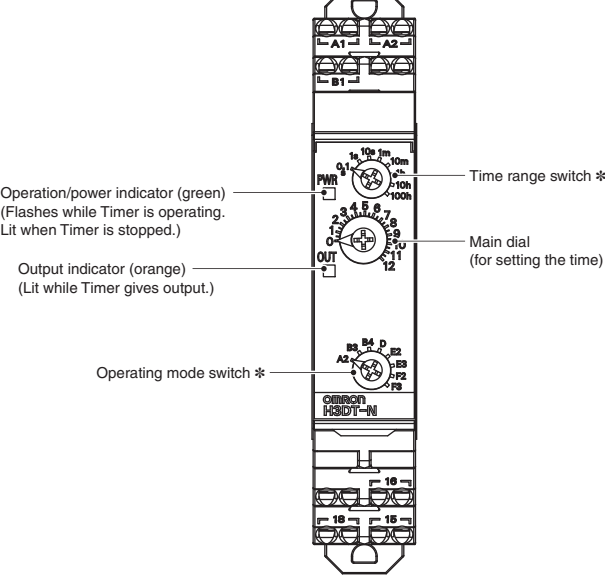
## Nomenclature

### H3DT-N2/L2



\* If the switch is left between settings, proper operation may not be possible.  
Make sure that the switch is set properly.  
Note: The default settings are for 0.1 s in mode A2 for the H3DT-N and mode A for the H3DT-L.

### H3DT-N1/L1



\* If the switch is left between settings, proper operation may not be possible.  
Make sure that the switch is set properly.  
Note: The default settings are for 0.1 s in mode A2 for the H3DT-N and mode A for the H3DT-L.

## Dimensions

(Unit: mm)

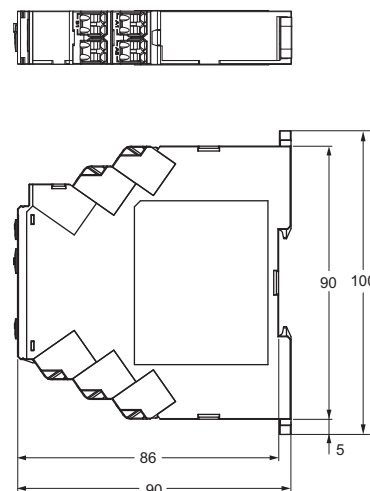
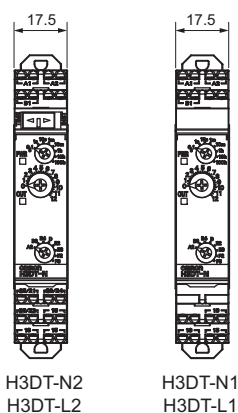
### Timers

H3DT-N  
H3DT-L



H3DT-N2  
H3DT-L2

H3DT-N1  
H3DT-L1



## Track Mounting Products (Sold Separately)

Refer to page 29 for details.

## Options (Order Separately)

### Front Cover

Refer to page 29 for details.

## Operating Procedures

### Basic Operation

#### Setting Switches

- Each switch has a snap mechanism that secures the switch at given positions. Set the switch to one of these positions. Do not set it midway between two positions. Malfunction could result from an improper setting.

#### Setting the Operating Mode

##### Setting the Operating Mode

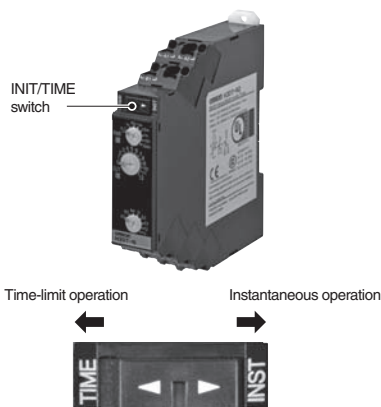
The H3DT-N/L can be set to any of eight operating modes. Turn the operating mode switch with a flat-blade or Phillips screwdriver.



#### Setting the INIT/TIME Switch

##### Switching Relay R2 between Instantaneous and Time-limit Contacts (H3DT-N2/-L2 Only)

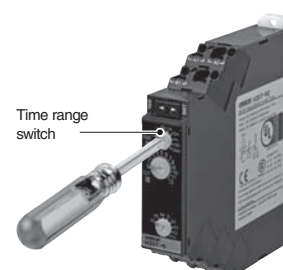
The INIT/TIME switch can be used to switch relay R2 between instantaneous and time-limit operation.



#### Setting the Time Range

##### Setting the Time Range

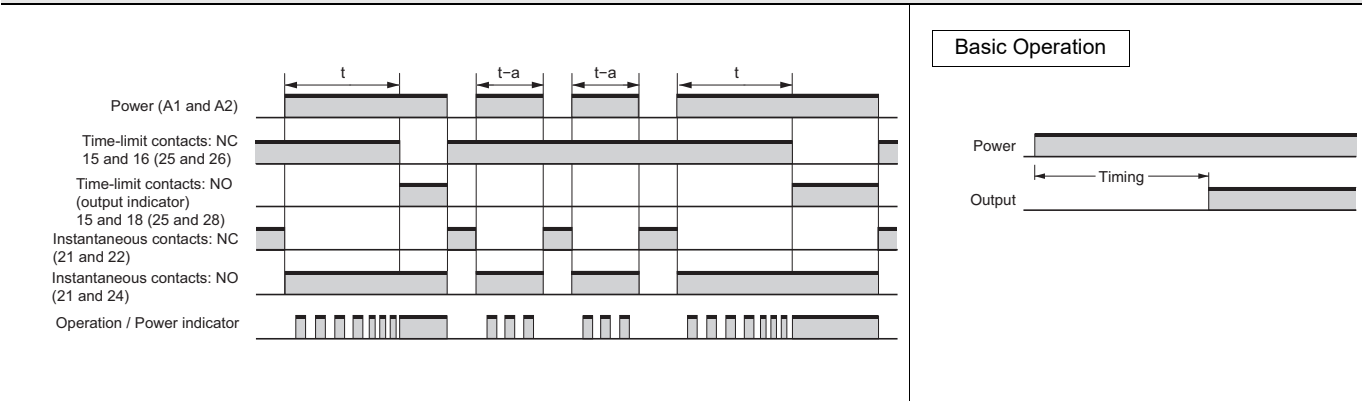
The time range switch can be used to set the time range. Turn the switch with a flat-blade or Phillips screwdriver.



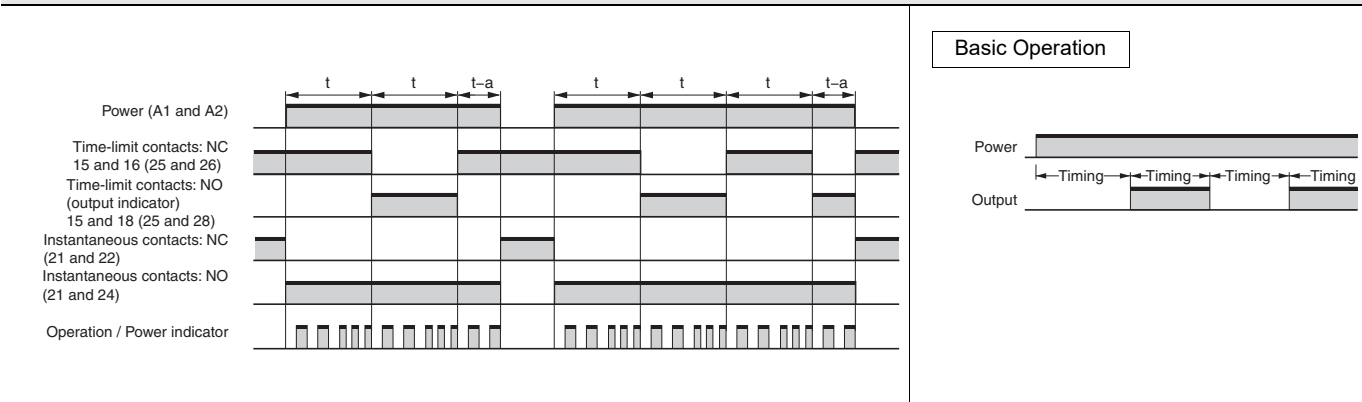
Timing Charts

- There is no instantaneous output with the H3DT-N1/L1.

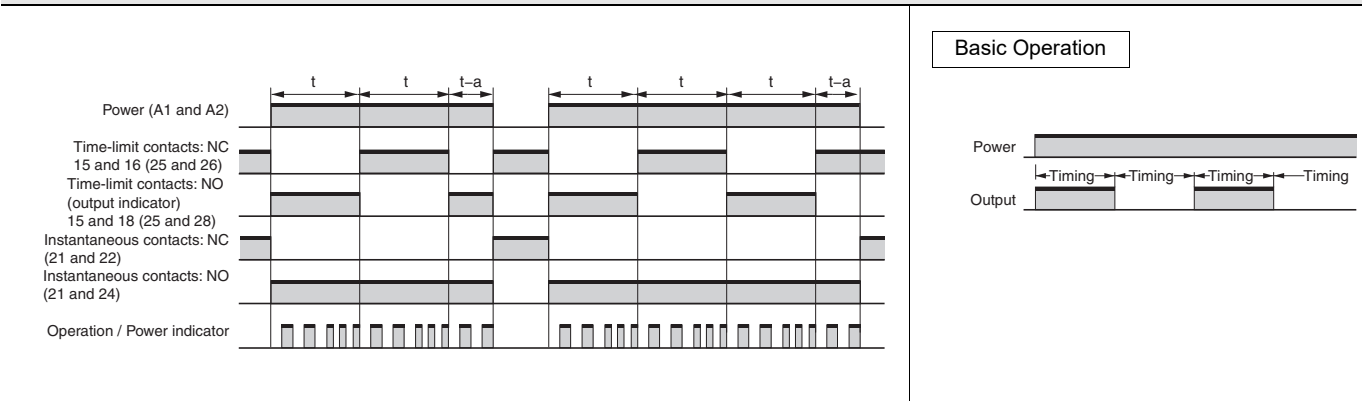
A2: ON Delay (Power ON Delay)



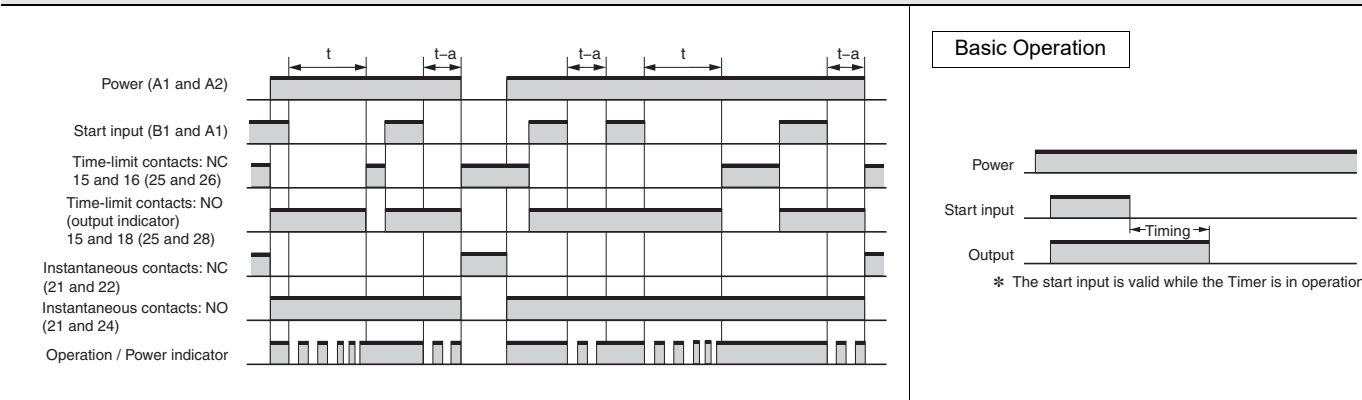
B3: Flicker OFF Start (Power ON Start)



B4: Flicker ON Start (Power ON Start)

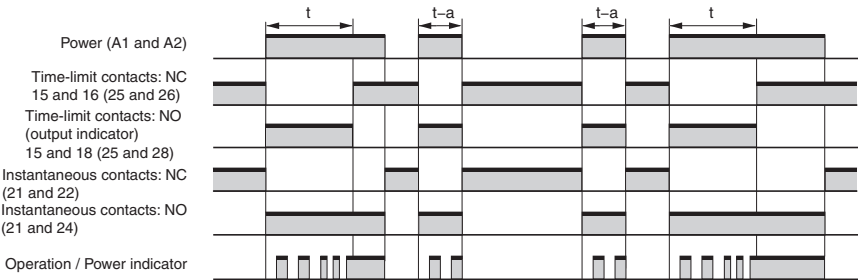


D: Signal OFF Delay

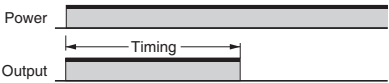


**Note:** 1. The reset time is 0.1 s min. Make sure the signal input time is 0.05 s or longer.  
2. "t" is the set time. "t-a" is a time that is less than the set time.

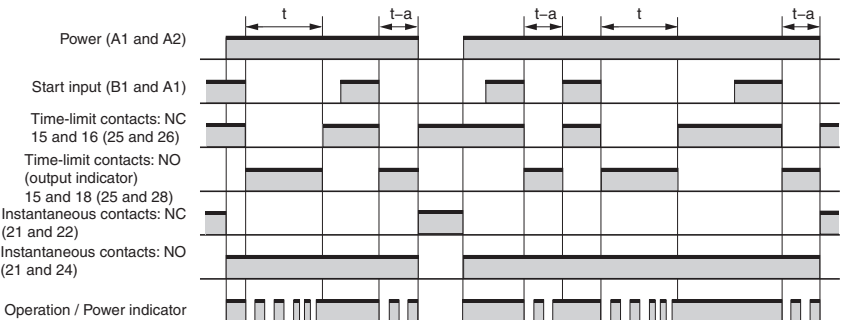
E2: Interval (Power ON Start)



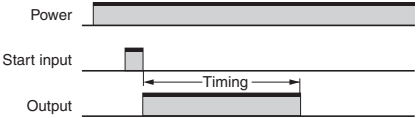
Basic Operation



E3: Signal OFF Interval

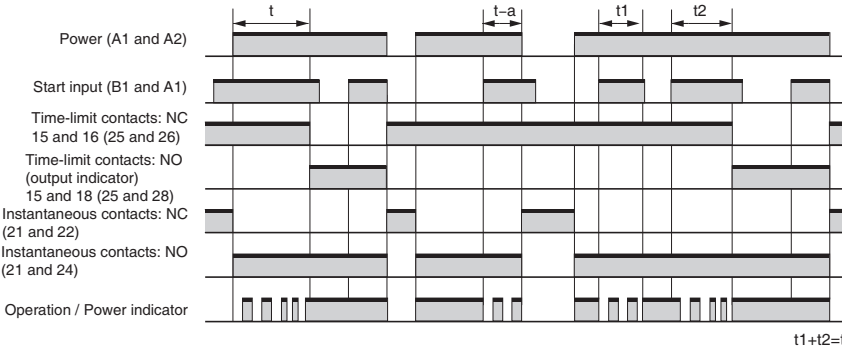


Basic Operation

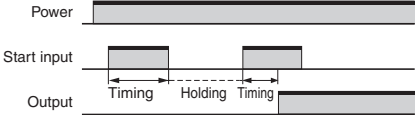


\* The start input is valid while the Timer is in operation.

F2: Cumulative (ON Delay)

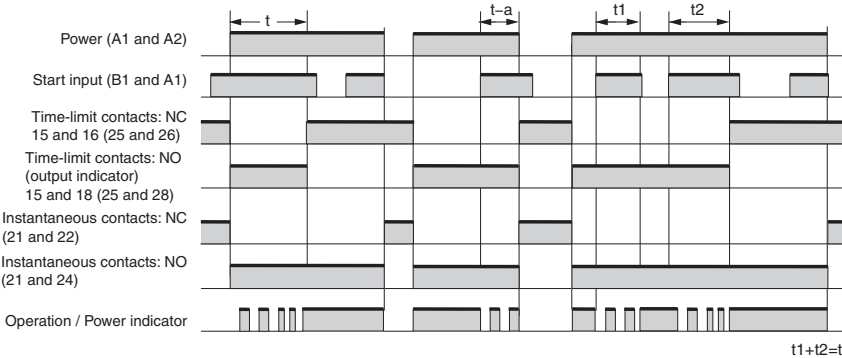


Basic Operation

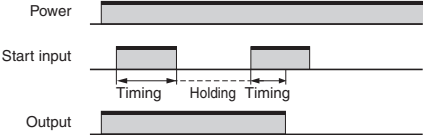


Note: Timing is performed while the start input is ON.

F3: Cumulative (Interval)



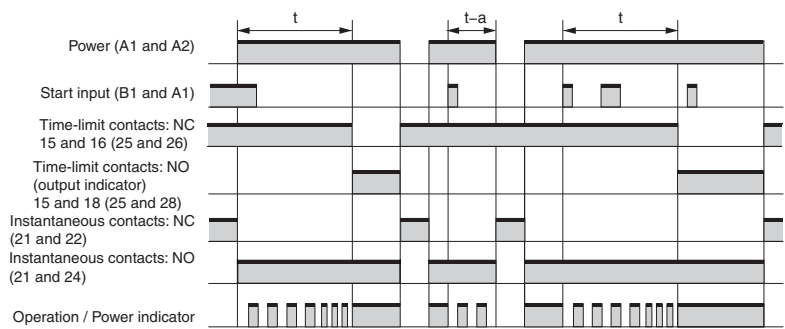
Basic Operation



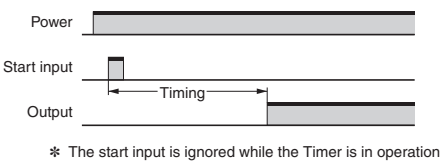
Note: Timing is performed while the start input is ON.

**Note:** 1. The reset time is 0.1 s min. Make sure the signal input time is 0.05 s or longer.  
2. "t" is the set time. "t-a" is a time that is less than the set time.

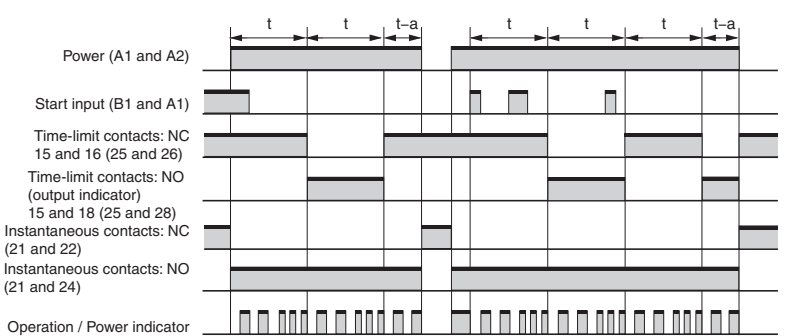
A: ON Delay (Signal ON Delay)



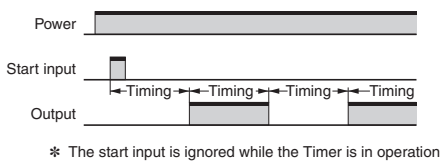
Basic Operation



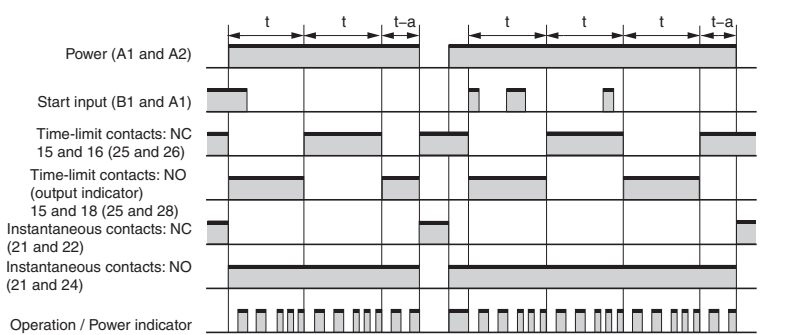
B: Flicker OFF Start (Signal Start)



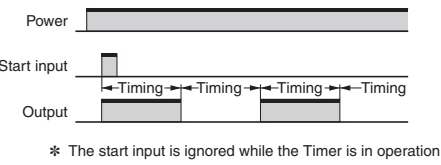
Basic Operation



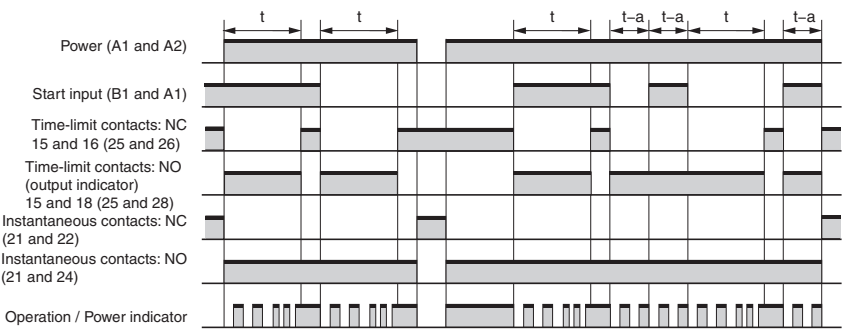
B2: Flicker ON Start (Signal Start)



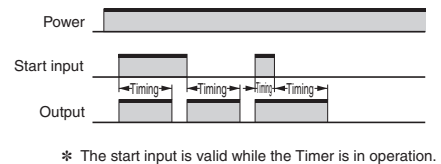
Basic Operation



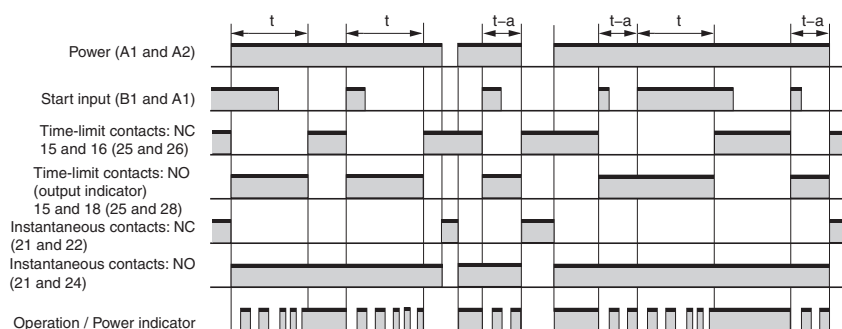
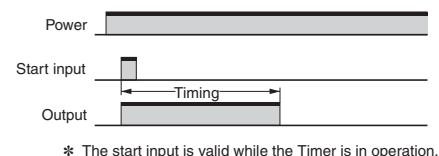
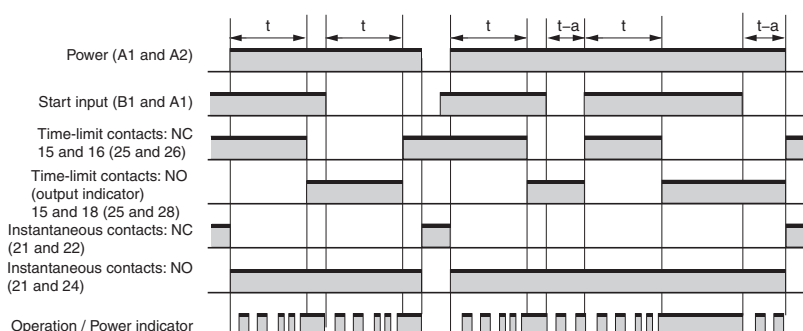
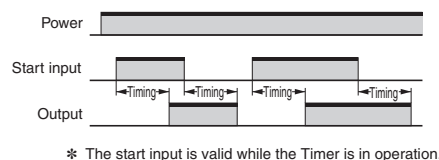
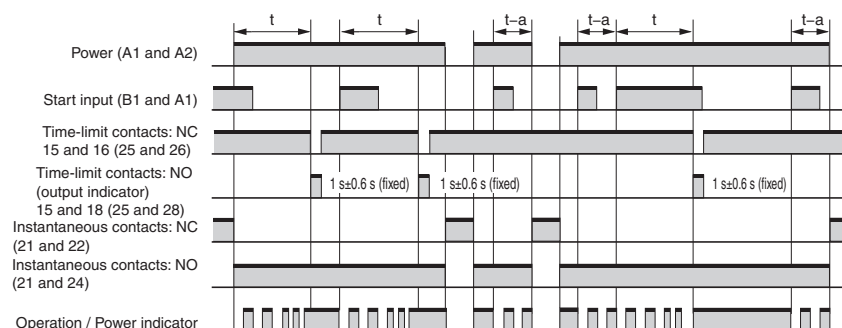
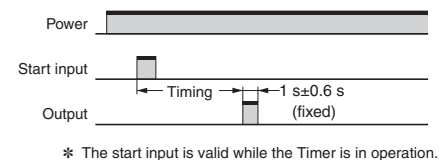
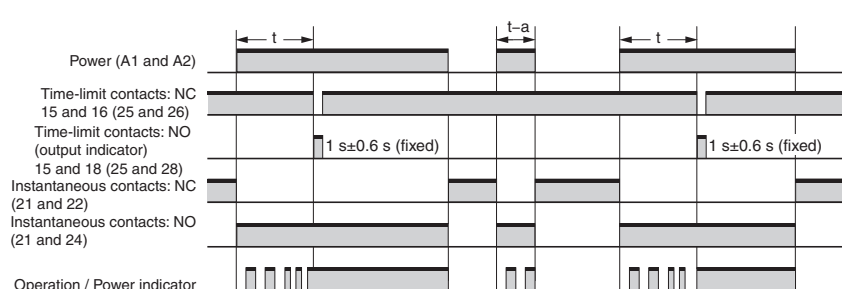
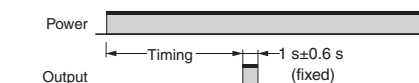
C: Signal ON/OFF Delay



Basic Operation



**Note:** 1. The reset time is 0.1 s min. Make sure the signal input time is 0.05 s or longer.  
2. "t" is the set time. "t-a" is a time that is less than the set time.

**E: Interval (Signal Start)****Basic Operation****G: Signal ON/OFF Delay****Basic Operation****J: One-shot Output (Signal Start)****Basic Operation****J2: One-shot Output (Power ON Start)****Basic Operation**

**Note:** 1. The reset time is 0.1 s min. Make sure the signal input time is 0.05 s or longer.  
 2. "t" is the set time. "t-a" is a time that is less than the set time.