

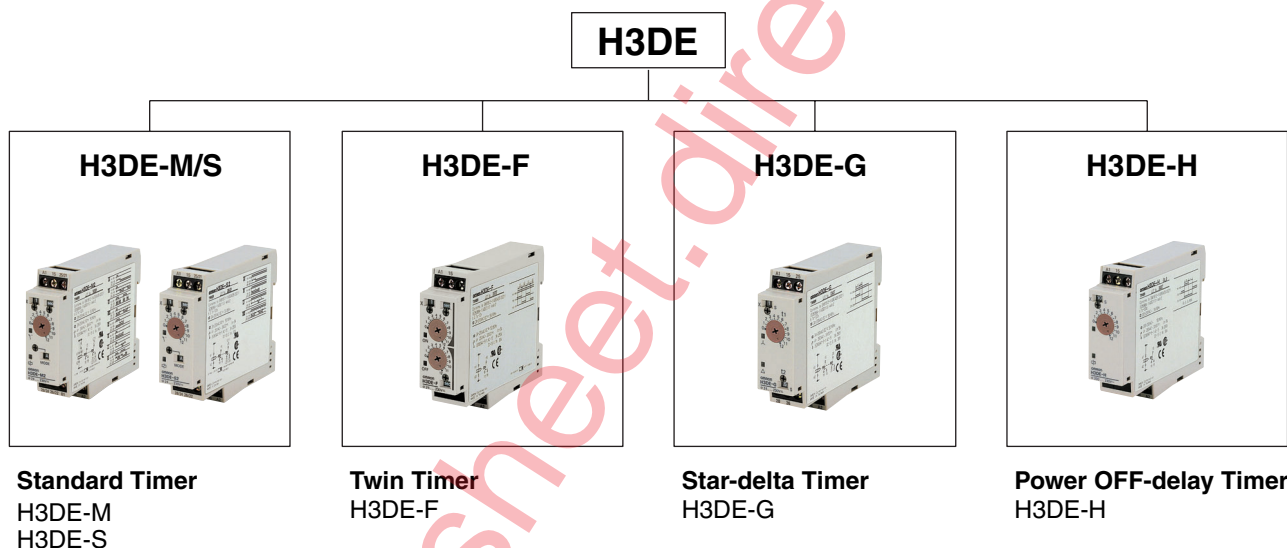
Solid-state Timer H3DE

CSM_H3DE_DS_E_3_1

DIN Track Mounted, Standard 22.5-mm Width Timer Range

- A wide AC/DC power supply range (24 to 230 VAC/DC) reduces the number of timer models kept in stock. (except for H3DE-H)
- 12-VDC model available for a specific application. (H3DE-M2)
- Nameplate provided for easy timer identification and management.
- Terminal clamp left open when delivered.
- Finger protection terminal block to meet VDE0106/P100.
- Enables easy sequence checks through instantaneous outputs for a zero set value at any time range.
- Incorporates environment-friendly, cadmium-free contacts. (except for H3DE-H)
- High immunity to inverter noise.
- Approved by UL and CSA.
- Conforms to EN61812-1 and IEC60664-1 4 kV/2 for Low Voltage, and EMC Directives.

■ Broad Line-up of H3DE Series

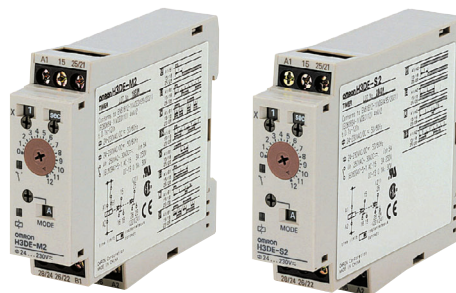


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Solid-state Multi-functional Timer H3DE-M/-S

- Eight operating modes (H3DE-M) and four operating modes (H3DE-S) cover a wide range of applications.
- Programmable contact enables the building of a self-holding relay circuit (-□2 models).
- A wide time setting range of 0.10 s to 120 h.



Model Number Structure

Model Number Legend

H3DE -
 1 2

1. M: Multi-function type
 S: Standard type
2. 2: DPDT
 1: SPDT

Ordering Information

List of Models

| Supply voltage | Control output | Model | |
|------------------|---|-----------------------|---------------|
| | | Multi-function type | Standard type |
| 12 VDC | Contact output: DPDT (time-limit output SPDT and switchable SPDT (time-limit ←→ instantaneous)) | H3DE-M2 (see note) | --- |
| 24 to 230 VAC/DC | Contact output: DPDT (time-limit output SPDT and switchable SPDT (time-limit ←→ instantaneous)) | H3DE-M2 (see note) | H3DE-S2 |
| | Contact output: SPDT (time-limit output SPDT) | H3DE-M1 | H3DE-S1 |

Note: Specify both the model number and supply voltage when ordering H3DE-M2.
Example: H3DE-M2 24 to 230 VAC/DC

Supply voltage

Accessories (Order Separately)

| | | |
|----------------|------------------------|-----------|
| Mounting Track | 50 cm (l) x 7.3 mm (t) | PFP-50N |
| | 1 m (l) x 7.3 mm (t) | PFP-100N |
| | 1 m (l) x 16 mm (t) | PFP-100N2 |
| End Plate | PFP-M | |
| Spacer | PFP-S | |

Specifications

General

| Item | H3DE-M2 | H3DE-M1 | H3DE-S2 | H3DE-S1 |
|----------------------------------|--|-------------|---|-------------|
| Operating mode | A: ON-delay (Signal or Power) B: Flicker OFF start (Signal or Power) B2: Flicker ON start (Signal or Power) C: Signal ON/OFF-delay D: Signal OFF-delay E: Interval (Signal or Power) G: Signal ON/OFF-delay J: One-shot (Signal or Power) | | A: ON-delay B2: Flicker ON start E: Interval J: One-shot | |
| Terminal block | Clamps two 2.5 mm ² max. bar terminals without sleeves. | | | |
| Terminal screw tightening torque | 0.98 N·m max. {approx. 10 kgf·cm max.} | | | |
| Input type | Voltage input | | --- | |
| Output type | Relay: DPDT | Relay: SPDT | Relay: DPDT | Relay: SPDT |
| Mounting method | DIN track mounting (see note) | | | |
| Attachment | Nameplate | | | |
| Approved standards | UL508, CSA 22.2 No.14 Conforms to EN61812-1, IEC60664-1 4 kV/2, VDE0106/P100 Output category according to IEC60947-5-1 (AC-13; 250 V 5A/AC-15; 250 V 3 A/DC-13; 30 V 0.1 A) | | | |

Note: Can be mounted to 35-mm DIN track with a plate thickness of 1 to 2.5 mm.

Time Ranges

| Time scale display | Time unit display | | | |
|--------------------|-------------------|----------------|--------------|-------------|
| | sec | min | hrs | 10 h |
| x 0.1 | 0.1 to 1.2 s | 0.1 to 1.2 min | 0.1 to 1.2 h | 1 to 12 h |
| x 1 | 1 to 12 s | 1 to 12 min | 1 to 12 h | 10 to 120 h |

Note: When the main dial is set to "0" for all settings, the output will operate instantaneously.

Ratings

| | | | |
|--|--|--|--|
| Rated supply voltage (see notes 1 and 2) | 24 to 230 VAC/DC (50/60 Hz) 12 VDC (H3DE-M2 model only) | | |
| Operating voltage range | 85% to 110% of rated supply voltage | | |
| Power reset | Minimum power-off time: 0.1 s | | |
| Reset voltage | 2.4 VAC/DC max. | | |
| Power consumption (see note 3) | H3DE-M1 | AC: approx. 4.3 VA (2.2 W) at 230 VAC DC: approx. 0.7 W at 24 VDC | |
| | H3DE-M2 | AC: approx. 4.8 VA (2.4 W) at 230 VAC DC: approx. 1.0 W at 24 VDC | |
| | H3DE-S1 | AC: approx. 2.7 VA (1.6 W) at 230 VAC DC: approx. 0.7 W at 24 VDC | |
| | H3DE-S2 | AC: approx. 3.2 VA (1.9 W) at 230 VAC DC: approx. 1.0 W at 24 VDC | |
| Voltage input | Max. permissible capacitance between input lines (terminals B1 and A2): 2000 pF Load connectable in parallel with inputs (terminals B1 and A2) H-level: 20.4 to 253 VAC/DC L-level: 0 to 2.4 VAC/DC | | |
| Control output | Contact output: 5 A at 250 VAC with resistive load ($\cos\phi = 1$) 5 A at 30 VDC with resistive load ($\cos\phi = 1$) | | |
| Ambient temperature | Operating: -10°C to 55°C (with no icing) Storage: -25°C to 65°C (with no icing) | | |
| Ambient humidity | Operating: 35% to 85% | | |

Note: 1. DC ripple rate: 20% max.

2. Since an inrush current of 0.25 A will occur when using the power supply voltage at 24 VDC, pay careful attention when turning on or off the power supply to the Timer with a solid-state output such as a sensor.

3. The power consumption is for mode A after the Timer counts the time-up time and for the AC input at 50 Hz. The power consumption of the H3DE-M□ includes the input circuit with the B1 and A1 terminals short-circuited.

■ Characteristics

| | |
|-----------------------------------|---|
| Accuracy of operating time | ±1% max. of FS (±1% ±10 ms max. at 1.2-s range) (see note 1) |
| Setting error | ±10% ±50 ms max. of FS (see note 1) |
| Signal input time | 50 ms min. (see note 1) |
| Influence of voltage | ±0.5% max. of FS (±0.5% ±10 ms max. at 1.2-s range) |
| Influence of temperature | ±2% max. of FS (±2%±10 ms max. at 1.2-s range) |
| Insulation resistance | 100 MΩ min. at 500 VDC |
| Dielectric strength | Between current-carrying metal parts and exposed non-current-carrying metal parts: 2,000 VAC for 1 min. Between control output terminals and operating circuit: 2,000 VAC for 1 min. Between contacts of different polarities: 2,000 VAC for 1 min. Between contacts not located next to each other: 1,000 VAC for 1 min. |
| Vibration resistance | Malfunction: 0.5-mm single amplitude at 10 to 55 Hz Destruction: 0.75-mm single amplitude at 10 to 55 Hz |
| Shock resistance | Malfunction: 100 m/s ² Destruction: 1,000 m/s ² |
| Contact material | AGNi+gold plating (Use the G6RN-1 at 12 VDC.) |
| Impulse withstand voltage | 3 kV (between power terminals) 4.5 kV (between current-carrying metal parts and exposed non-current-carrying metal parts) |
| 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 |
| 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) (see note 2) |
| EMC | (EMI) Emission Enclosure: EN61812-1 EN55011 Group 1 class B Emission AC Mains: EN55011 Group 1 class B Harmonic Current: EN61000-3-2 Voltage Fluctuation and Flickering: EN61000-3-3 (EMS) Immunity ESD: EN61812-1 EN61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power port and output port (level 3) 1 kV control port with capacitive clamp (level 3) Immunity Surge: EN61000-4-5: 2 kV common mode (level 3) 1 kV differential mode (level 3) |
| Degree of protection | IP30 (Terminal block: IP20) |
| Weight | 120 g |

Note: 1. With the H3DE-M□, if the voltage exceeds 26.4 VAC/DC, the following hold at signal OFF for C, D, and G modes:

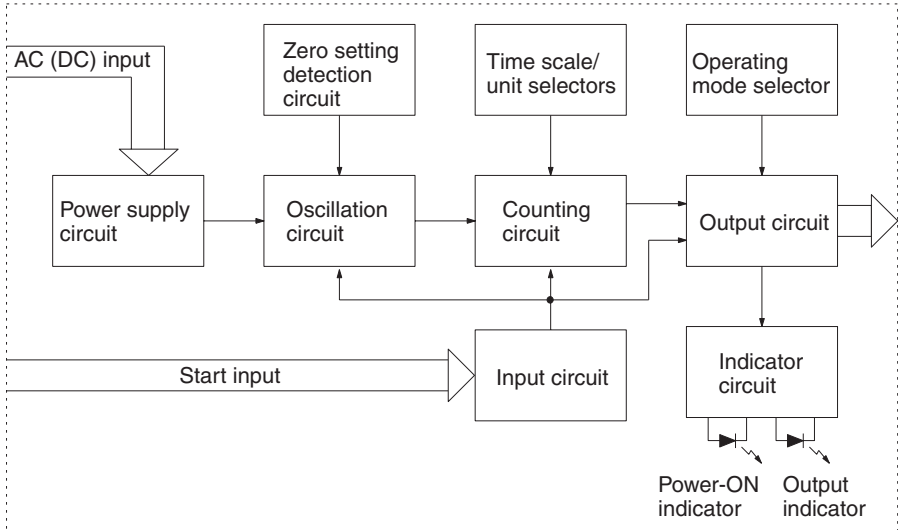
Accuracy of operating time: ±1% ±50 ms max. at 1.2-s range
Setting error: ±10% ±100/-50 ms max.
Signal input time: 100 ms min.

- 2.** For reference: A maximum current of 0.15 A can be switched at 125 VDC (cosφ=1).
A maximum current of 0.1 A can be switched if L/R is 7 ms.
In both cases, a life of 100,000 operations can be expected.
The minimum applicable load is 10 mA at 5 VDC (failure level: P).

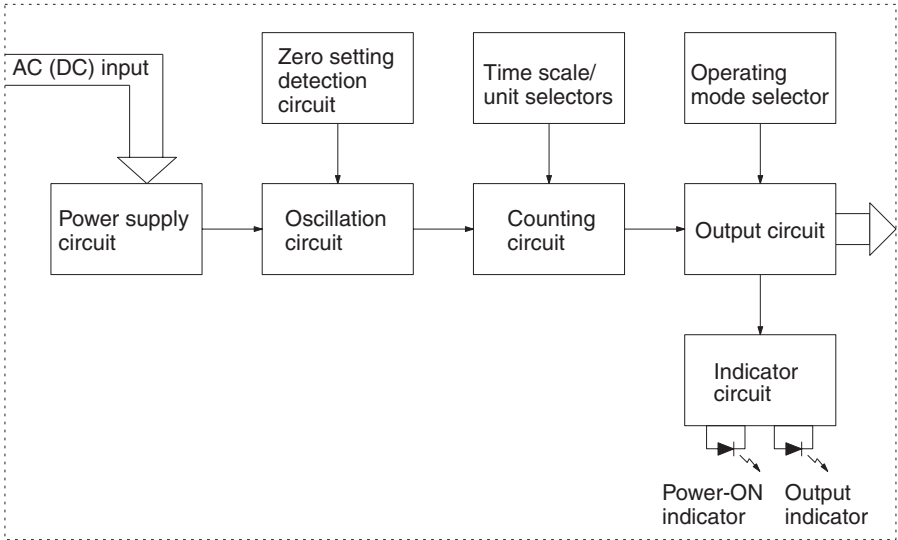
Connections

■ Block Diagram

H3DE-M1/-M2



H3DE-S1/-S2

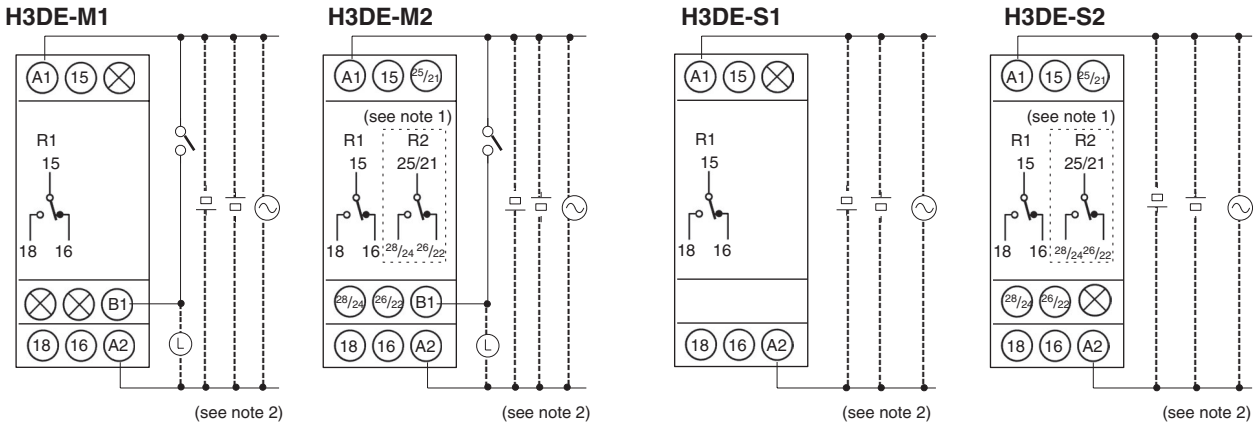


■ I/O Functions

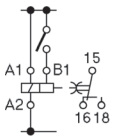
| Item | | H3DE-M1/-M2 | H3DE-S1/-S2 |
|--------|----------------|---|---|
| Input | Start | Starts operation. | No input is available. |
| Output | Control output | Outputs are turned ON according to designated output mode when preset value is reached. (See note.) | Outputs are turned ON according to designated output mode when preset value is reached. (see note.) |

Note: When the output type selector switch on the bottom of the Timer is set to the instantaneous side, the relay R2 (terminal numbers 21/25, 22/26, and 24/28) becomes an instantaneous contact and turns ON/OFF in synchronization with the changes in the power supply.

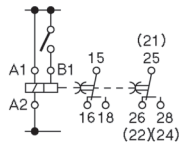
Terminal Arrangement



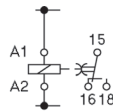
(DIN notation)



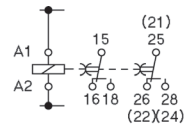
(DIN notation)



(DIN notation)



(DIN notation)



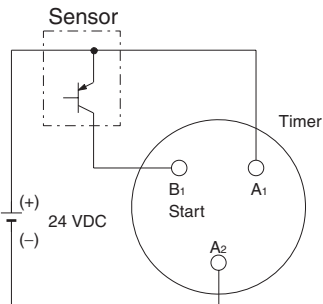
- Note:**
- The relay R2 can be set to either instantaneous or time-limit contact using the switch located on the bottom of the Timer.
 - DC supply voltage does not require the designation of polarity.
 - The contact symbol for the H3DE is indicated with because it offers multiple operating modes and is different from the delayed contact for conventional timers.

Input Connections

The inputs of the H3DE-M1/-M2 are voltage (voltage imposition or open) inputs.

No-contact Input

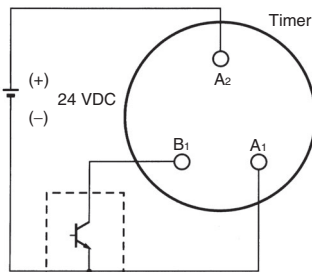
(Connection to PNP output sensor.)



Operates with PNP transistor ON

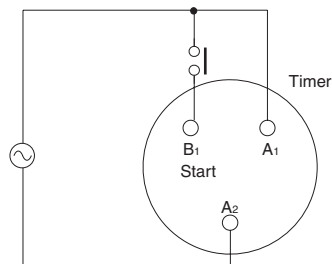
No-contact Input

(Connection to NPN output sensor.)



Operates with NPN transistor ON

Contact Input



Operates with relay ON

Voltage Input Signal Levels

| | |
|------------------|--|
| No-contact input | 1. Transistor ON Residual voltage: 1 V max. (Voltage between terminals B1 and A2 must be more than the rated "H-level" voltage (20.4 VDC min.).) |
| | 2. Transistor OFF Leakage current: 0.01 mA max. (Voltage between terminals B1 and A2 must be less than the rated "L-level" voltage (2.4 VDC max.).) |
| Contact input | Use contacts that can adequately switch 0.1 mA at each voltage to be imposed. (When the contacts are ON or OFF, voltage between terminals B1 and A2 must be within the following ranges: When contacts are ON: 20.4 to 253 VAC/DC When contacts are OFF: 0 to 2.4 VAC/DC |

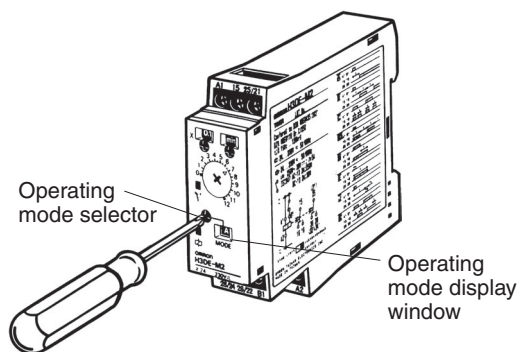
Operation

■ Basic Operation

Setting of Selector

The selectors can be turned clockwise and counterclockwise to select the desired time unit, time scale, or operating mode.

Each selector has a snap mechanism that secures the selector at a given position. Set the selector at a position at which it is secured. Do not set it midway between two securing positions or a malfunction could result from improper setting.

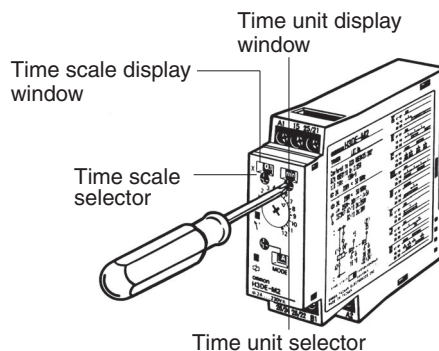


Selection of Operating Mode

The H3DE-M/-S can be set to any one of the operating modes A to J. Turn the operating mode selector with a screwdriver until the desired operating mode (A, B, C, B2, D, E, J, or G for the H3DE-M and A, E, J, or B2 for the H3DE-S) appears in the operating mode display window located below the selector.

Selection of Time Unit and Time Scale

The desired time unit (s, m, h, or 10h) can be displayed in the time unit display window above the time setting dial by turning the time unit selector located at the upper right corner of the front panel. Time scale (0.1 or 1) is selected with the time scale selector at the upper left corner of the front panel, it appears in the time scale display window above the selector.



■ Timing Chart

- Note:**
1. The minimum power reset time is 0.1 s and the minimum signal input time is 0.05 s.
 2. The letter "t" in the timing charts stands for the set time and "t-a" means that the period is less than the time set.
 3. There is no start input with H3DE-S□ models. Operation starts when the power is turned ON.
 4. There is no instantaneous output with H3DE-M1/-S1 models.

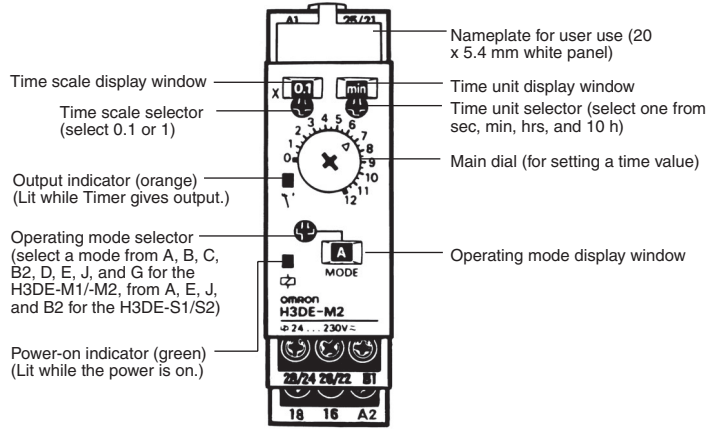
| Operating mode | Timing chart | |
|---|--------------|--|
| A: ON-delay Power (A ₁ and A ₂) Start (B ₁ and A ₂) (see note) Time-limit contacts: NC 15 and 16 (25 and 26) Time-limit contacts: NO (output indicator) 15 and 18 (25 and 28) Instantaneous contacts: NC 25 and 26 Instantaneous contacts: NO 25 and 28 Power indicator | | <p>Basic operation</p> <p>* For power-on operation, impose voltage to the Start input. The Timer starts operating at the moment the power is turned on. ** Start input is invalid while the Timer is in operation.</p> |
| B: Flicker OFF start Power (A ₁ and A ₂) Start (B ₁ and A ₂) (see note) Output relay: NC 15 and 16 (25 and 26) Output relay: NO (output indicator) 15 and 18 (25 and 28) Instantaneous contacts: NC 25 and 26 Instantaneous contacts: NO 25 and 28 Power indicator | | <p>Basic operation</p> <p>* For power-on operation, impose voltage to the Start input. The Timer starts operating at the moment the power is turned on. ** Start input is invalid while the Timer is in operation.</p> |
| B2: Flicker ON start Power (A ₁ and A ₂) Start (B ₁ and A ₂) (see note) Output relay: NC 15 and 16 (25 and 26) Output relay: NO (output indicator) 15 and 18 (25 and 28) Instantaneous contacts: NC 25 and 26 Instantaneous contacts: NO 25 and 28 Power indicator | | <p>Basic operation</p> <p>* For power-on operation, impose voltage to the Start input. The Timer starts operating at the moment the power is turned on. ** Start input is invalid while the Timer is in operation.</p> |
| C: Signal ON/OFF-delay Power (A ₁ and A ₂) Start (B ₁ and A ₂) (see note) Output relay: NC 15 and 16 (25 and 26) Output relay: NO (output indicator) 15 and 18 (25 and 28) Instantaneous contacts: NC 25 and 26 Instantaneous contacts: NO 25 and 28 Power indicator | | <p>Basic operation</p> <p>* Start input is valid and retriggerable while the Timer is in operation.</p> |

Note: The start input of the H3DE-M1 or H3DE-M2 model is activated by applying a voltage to B1 and A2 terminals. The voltage can be applied by turning on the contact between B1 and A1 (Refer to *Terminal Arrangement* on page 6)

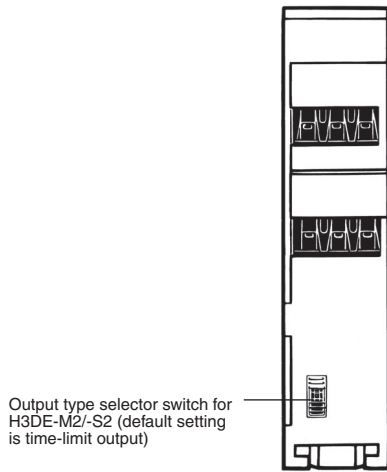
| Operating mode | Timing chart | |
|--------------------------------------|--------------|--|
| D: Signal OFF-delay | | <p>Basic operation</p> <p>* Start input is valid and retriggerable while the Timer is in operation.</p> |
| E: Interval | | <p>Basic operation</p> <p>* For power-on operation, impose voltage to the Start input. The Timer starts operating at the moment the power is turned on. ** Start input is valid and retriggerable while the Timer is in operation.</p> |
| G: Signal ON/OFF-delay | | <p>Basic operation</p> <p>* Start input is valid and retriggerable while the Timer is in operation.</p> |
| J: One-shot output (ON delay) | | <p>Basic operation</p> <p>* For power-on operation, impose voltage to the Start input. The Timer starts operating at the moment the power is turned on. ** Start input is valid and retriggerable while the Timer is in operation.</p> |

Note: The start input of the H3DE-M1 or H3DE-M2 model is activated by applying a voltage to B1 and A2 terminals. The voltage can be applied by turning on the contact between B1 and A1 (Refer to *Terminal Arrangement* on page 6).

Nomenclature



(Front View)



(Bottom View)

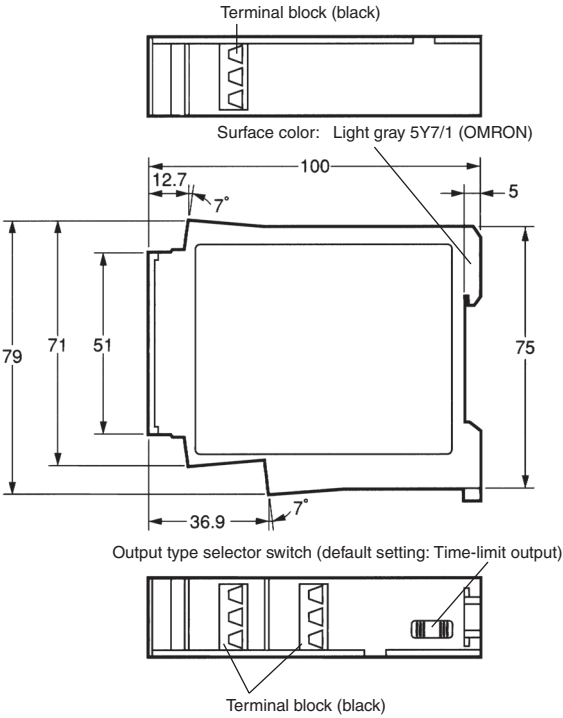
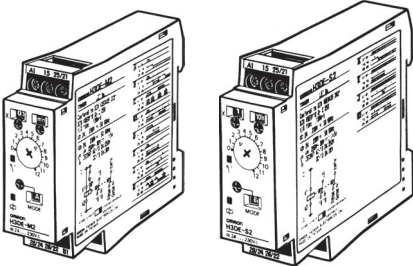
Output Type Selector Switch Settings

| Setting | Output type |
|---------|--|
| | Time-limit output (terminal numbers 25, 26 and 28) (default setting) |
| | Instantaneous output (terminal numbers 21, 22 and 24) |

Dimensions

Note: All units are in millimeters unless otherwise indicated.

H3DE-M/-S



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
 To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Solid-state Twin Timer H3DE-F

- Operates in flicker-OFF or flicker-ON start mode with one Unit.
- Independent ON- and OFF-time settings.
Combinations of long ON- or OFF-time and short OFF- or ON-time setting are possible.
- Long time range from 0.1 s to 12 h for both ON and OFF time settings.



Model Number Structure

Model Number Legend

H3DE -
1

1. F: Twin timers

Ordering Information

List of Models

| Operating mode | Supply voltage | Model |
|------------------------------|-------------------|--------|
| Flicker-OFF/Flicker-ON start | 24 to 230 VAC/VDC | H3DE-F |

Accessories (Order Separately)

| | | |
|----------------|------------------------|-----------|
| Mounting Track | 50 cm (l) x 7.3 mm (t) | PFP-50N |
| | 1 m (l) x 7.3 mm (t) | PFP-100N |
| | 1 m (l) x 16 mm (t) | PFP-100N2 |
| End Plate | PFP-M | |
| Spacer | PFP-S | |

Specifications

■ General

| Item | H3DE-F |
|----------------------------------|--|
| Operating mode | Flicker-OFF/Flicker-ON start |
| Operating/Reset method | Time-limit operation/Time-limit reset or self-reset |
| Terminal block | Clamps two 2.5 mm ² max. bar terminals without sleeves |
| Terminal screw tightening torque | 0.98 N·m max. {approx. 10 kgf·cm max.} |
| Output type | Relay: SPDT |
| Mounting method | DIN track mounting (see note) |
| Attachment | Nameplate |
| Approved standards | UL508, CSA 22.2 No.14 Conforms to EN61812-1, IEC60664-1 4 kV/2, VDE0106/P 100 Output category according to IEC60947-5-1 (AC-13; 250 V 5A/AC-15; 250 V 3 A/DC-13; 30 V 0.1 A) |

Note: Can be mounted to 35-mm DIN track with a plate thickness of 1 to 2.5 mm.

■ Time Ranges

| Time scale display (see note 1) | Time unit display | | | |
|------------------------------------|-------------------|-------------|----------------|--------------|
| | sec | 10 s | min | hrs |
| x 0.1 | 0.1 to 1.2 s | 1 to 12 s | 0.1 to 1.2 min | 0.1 to 1.2 h |
| x 1 | 1 to 12 s | 10 to 120 s | 1 to 12 min | 1 to 12 h |

Note: 1. Time scale display is applied commonly for ON and OFF time.

2. When the main dial is set to "0" for all settings, the output will operate instantaneously.

■ Ratings

| | |
|---------------------------------|---|
| Rated supply voltage (see note) | 24 to 230 VAC/VDC (50/60 Hz) |
| Operating voltage range | 85% to 110% of rated supply voltage |
| Power reset | Minimum power-off time: 0.1 s |
| Reset voltage | 2.4 VAC/DC max. |
| Power consumption | AC: Approx. 3.1 VA (1.8 W) at 230 VAC DC: Approx. 0.8 W at 24 VDC |
| Control output | Contact output: 5 A at 250 VAC with resistive load ($\cos\phi = 1$) 5 A at 30 VDC with resistive load ($\cos\phi = 1$) |
| Ambient temperature | Operating: -10°C to 55°C (with no icing) Storage: -25°C to 65°C (with no icing) |
| Ambient humidity | Operating: 35% to 85% |

Note: DC ripple rate: 20% max.

■ Characteristics

| | |
|-----------------------------------|---|
| Accuracy of operating time | ±1% max. of FS (±1% ±10 ms max. at 1.2-s range) |
| Setting error | ±10% ± 0.05 s max. of FS |
| Influence of voltage | ±0.5% max. of FS (±0.5% ±10 ms max. at 1.2-s range) |
| Influence of temperature | ±2% max. of FS (±2% ± 10 ms max. at 1.2-s range) |
| Insulation resistance | 100 MΩ min. at 500 VDC |
| Dielectric strength | Between current-carrying metal parts and exposed non-current-carrying metal parts: 2,000 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 voltage | 3 kV (between power supply terminals) 4.5 kV (between current-carrying metal parts and exposed non-current-carrying metal parts) |
| 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 | Malfunction: 0.5-mm single amplitude at 10 to 55 Hz Destruction: 0.75-mm single amplitude at 10 to 55 Hz |
| Shock resistance | Malfunction: 100 m/s ² Destruction: 1,000 m/s ² |
| 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) |
| EMC | (EMI) Emission Enclosure: EN61812-1 Emission AC Mains: EN55011 Group 1 class B Harmonic Current: EN55011 Group 1 class B Voltage Fluctuation and Flickering: EN61000-3-2 (EMS) Immunity ESD: EN61000-3-3 EN61812-1 EN61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power port and output port (level 3) 1 kV control port with capacitive clamp (level 3) Immunity Surge: EN61000-4-5: 2 kV common mode (level 3) 1 kV differential mode (level 3) |
| Degree of protection | IP30 (IP20 for terminal block) |
| Weight | Approx. 110 g |

Note: For reference:

A maximum current of 0.15 A can be switched at 125 VDC (cosφ=1).

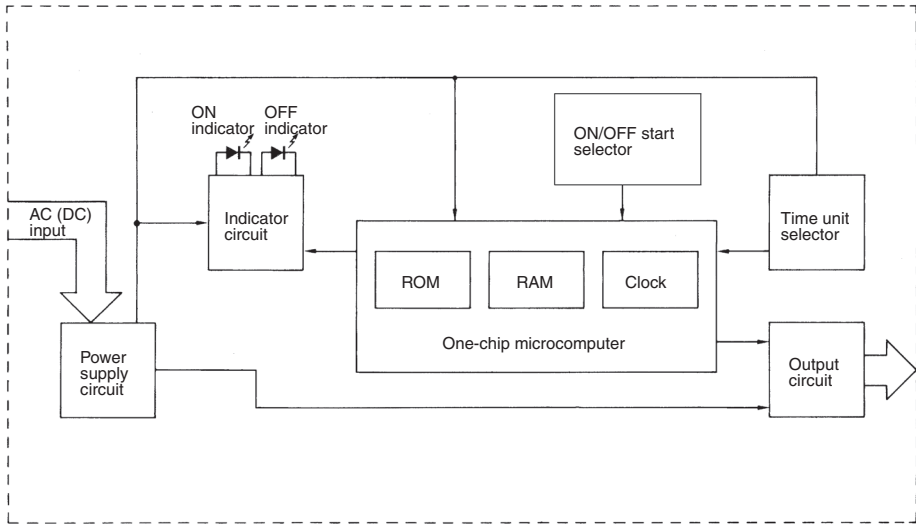
A maximum current of 0.1 A can be switched if L/R is 7 ms.

In both cases, a life of 100,000 operations can be expected.

The minimum applicable load is 10 mA at 5 VDC (failure level: P).

Connections

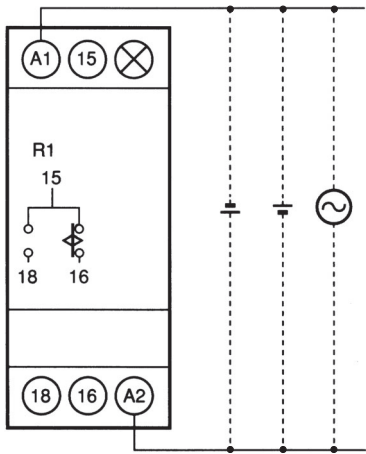
■ Block Diagram



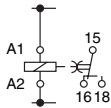
■ I/O Function

| | | |
|---------|----------------|--|
| Inputs | --- | |
| Outputs | Control output | Outputs are turned ON/OFF according to the time set by the ON-and OFF-time setting dial. |

■ Terminal Arrangement



(DIN notation)



Note: DC supply voltage does not require the designation of polarity.

Operation

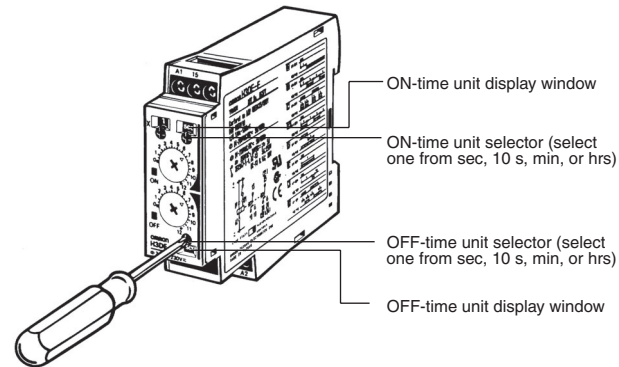
Basic Operation

Time Unit Selection

The time unit display window for output ON is located on the upper-right side of the front panel above the corresponding time unit selector.

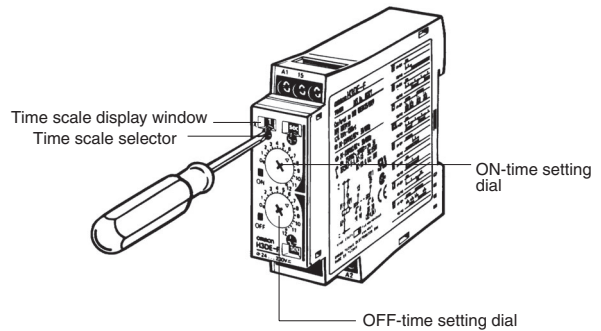
The time unit display window for output OFF is located on the lower-right side of the front panel below the corresponding time unit selector.

According to the setting of each time unit selector, "sec" for seconds, "10s" for 10 seconds, "min" for minutes, or "hrs" for hours will appear in the corresponding time unit display window.



Time Scale Selection

The time scale selector on the upper-left side of the front panel can be set to 0.1 or 1 as a magnification coefficient.



Time Setting

Use the ON/OFF-time setting dial to set the ON/OFF time.

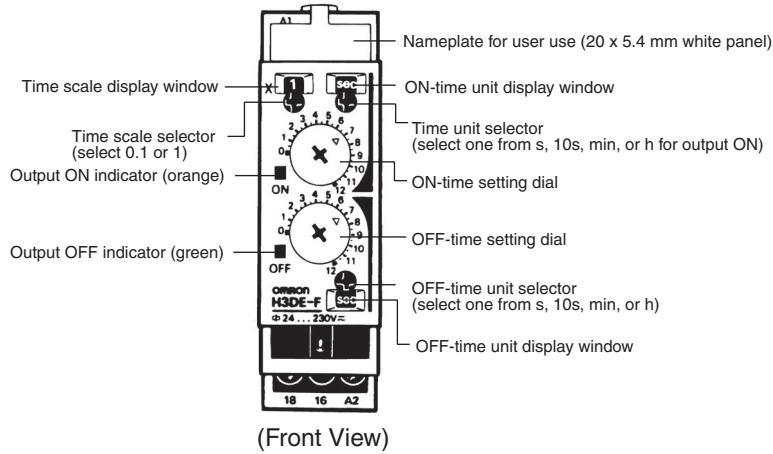
Timing Charts

| Operating mode | Timing chart |
|-------------------|---|
| Flicker-OFF start | <p>Power (A₁ and A₂) ON OFF</p> <p>Output relay: NO 15 and 18 (ON indicator) ON OFF</p> <p>Output relay: NC 15 and 16 ON OFF</p> <p>OFF indicator ON OFF</p> <p>t_{ON}: ON set time t_{OFF}: OFF set time</p> |
| Flicker-ON start | <p>Power (A₁ and A₂) ON OFF</p> <p>Output relay: NO 15 and 18 (ON indicator) ON OFF</p> <p>Output relay: NC 15 and 16 ON OFF</p> <p>OFF indicator ON OFF</p> <p>t_{ON}: ON set time t_{OFF}: OFF set time</p> |

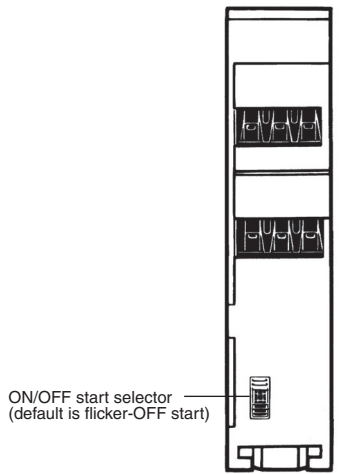
Note: 1. The reset time requires a minimum of 0.1 s.

2. When power is supplied in flicker-ON start mode, the OFF indicator lights momentarily. This, however, has no effect on the performance of the Timer.

Nomenclature



(Front View)



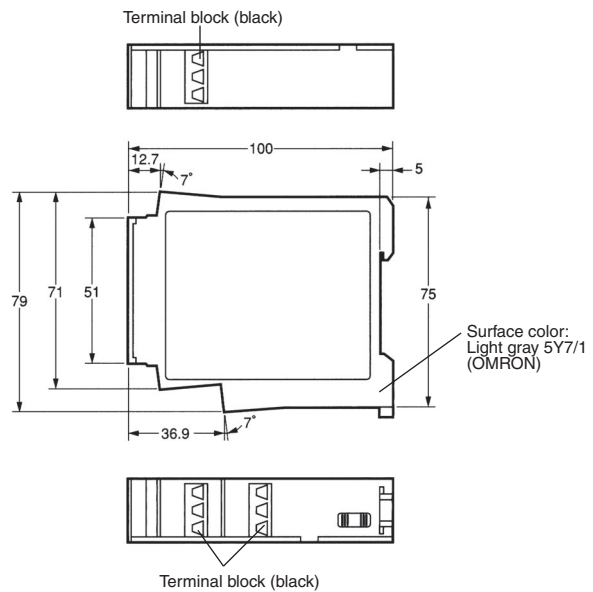
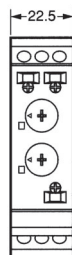
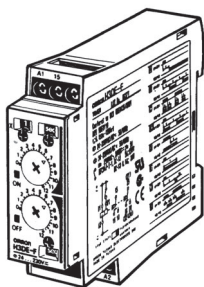
(Bottom View)

ON/OFF Start Selector Switch Settings

| Setting | Operating mode |
|---------|-------------------|
| | Flicker-ON start |
| | Flicker-OFF start |

Dimensions

H3DE-F



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
 To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Solid-state Star-delta Timer

H3DE-G

- A wide star-time range (up to 120 seconds) and star-delta transfer time range (up to 0.5 seconds)



Model Number Structure

Model Number Legend

H3DE -
1

1. G: Star-delta timer

Ordering Information

List of Models

| Supply voltage | Model |
|-------------------|--------|
| 24 to 230 VAC/VDC | H3DE-G |

Accessories (Order Separately)

| | | |
|----------------|------------------------|-----------|
| Mounting Track | 50 cm (l) x 7.3 mm (t) | PFP-50N |
| | 1 m (l) x 7.3 mm (t) | PFP-100N |
| | 1 m (l) x 16 mm (t) | PFP-100N2 |
| End Plate | PFP-M | |
| Spacer | PFP-S | |

Specifications

■ General

| Item | H3DE-G |
|----------------------------------|---|
| Operating mode | Star-delta operation |
| Operating/Reset method | Time-limit operation/Self-reset |
| Terminal block | Clamps two 2.5 mm ² max. bar terminals without sleeves |
| Terminal screw tightening torque | 0.98 N·m max. {approx. 10 kgf·cm max.} |
| Output type | (Star operation circuit) Relay: SPDT (Delta operation circuit) Relay: SPDT |
| Mounting method | DIN track mounting (see note) |
| Attachment | Nameplate |
| Approved standards | UL508, CSA 22.2 No.14 Conforms to EN61812-1, IEC60664-1 4 kV/2, VDE0106/P100 Output category according to IEC60947-5-1 (AC-13; 250 V 5A/AC-15; 250 V 3 A/DC-13; 30 V 0.1 A) |

Note: Can be mounted to 35-mm DIN track with a plate thickness of 1 to 2.5 mm.

■ Time Ranges

| Time scale display | Star operation time ranges |
|--------------------|----------------------------|
| x 1 | 1 to 12 s |
| x 10 | 10 to 120 s |

| | |
|--------------------------|--|
| Star-delta transfer time | Programmable at 0.05 s, 0.1 s, 0.25 s or 0.5 s |
|--------------------------|--|

■ Ratings

| | |
|---------------------------------|---|
| Rated supply voltage (see note) | 24 to 230 VAC/VDC (50/60 Hz) |
| Operating voltage range | 85% to 110% of rated supply voltage |
| Power reset | Minimum power-off time: 0.5 s |
| Reset voltage | 24 VAC/DC max. |
| Power consumption | AC: Approx. 3 VA (1.8 W) at 230 VAC DC: Approx. 0.8 W at 24 VDC |
| Control output | Contact output: 5 A at 250 VAC with resistive load ($\cos\phi = 1$) 5 A at 30 VDC with resistive load ($\cos\phi = 1$) |
| Ambient temperature | Operating: -10°C to 55°C (with no icing) Storage: -25°C to 65°C (with no icing) |
| Ambient humidity | Operating: 35% to 85% |

Note: DC ripple rate: 20% max.

■ Characteristics

| | |
|---|---|
| Accuracy of operating time | ±1% max. of FS |
| Setting error | ±10% ± 0.05 s max. of FS |
| Total tolerance of transfer time | ± (25% FS + 5 ms) max. |
| Influence of voltage | ±0.5% max. of FS |
| Influence of temperature | ±2% max. of FS |
| Insulation resistance | 100 MΩ min. at 500 VDC |
| Dielectric strength | Between current-carrying metal parts and exposed non-current-carrying metal parts: 2,000 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 voltage | 3 kV (between power supply terminals) 4.5 kV (between current-carrying metal parts and exposed non-current-carrying metal parts) |
| Noise immunity | Square-wave noise generated by noise simulator (pulse width: 100 ns/1 ms, 1-ns rise) ±1.5 kV |
| Static immunity | Malfunction: 4 kV Destruction: 8 kV |
| Vibration resistance | Malfunction: 0.5-mm single amplitude at 10 to 55 Hz Destruction: 0.75-mm single amplitude at 10 to 55 Hz |
| Shock resistance | Malfunction: 100 m/s ² Destruction: 1,000 m/s ² |
| 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) |
| EMC | (EMI) Emission Enclosure: EN61812-1 Emission AC Mains: EN55011 Group 1 class B Harmonic Current: EN55011 Group 1 class B Voltage Fluctuation and Flickering: EN61000-3-2 (EMS) Immunity ESD: EN61000-3-3 EN61812-1 EN61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) Immunity RF-interference from AM Radio Waves: EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) Immunity Burst: EN61000-4-4: 2 kV power port and output port (level 3) 1 kV control port with capacitive clamp (level 3) Immunity Surge: EN61000-4-5: 2 kV common mode (level 3) 1 kV differential mode (level 3) |
| Degree of protection | IP30 (IP20 for terminal block) |
| Weight | Approx. 120 g |

Note: For reference:

A maximum current of 0.15 A can be switched at 125 VDC (cosφ=1).

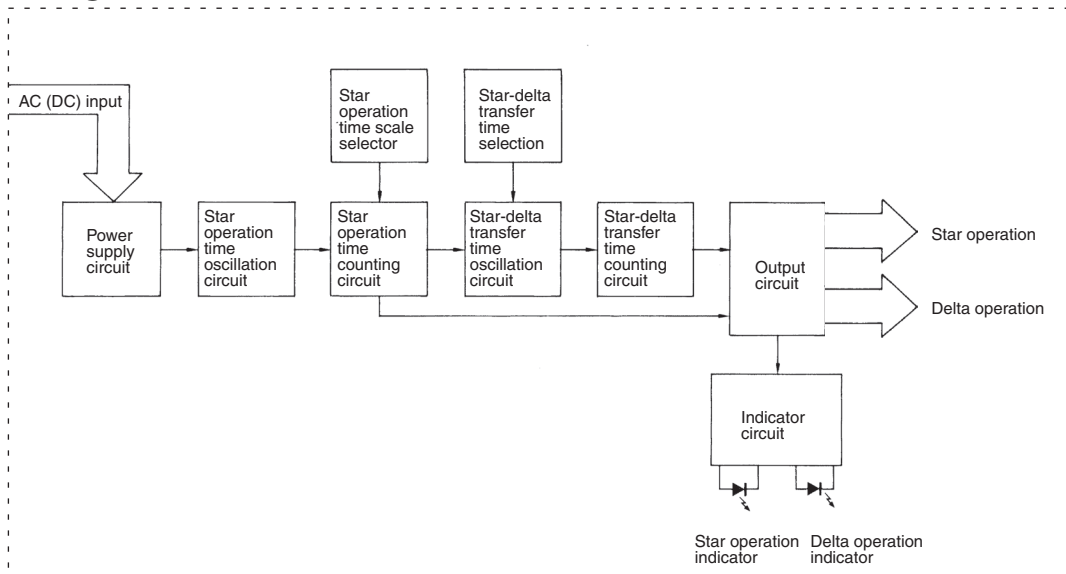
A maximum current of 0.1 A can be switched if L/R is 7 ms.

In both cases, a life of 100,000 operations can be expected.

The minimum applicable load is 10 mA at 5 VDC (failure level: P).

Connections

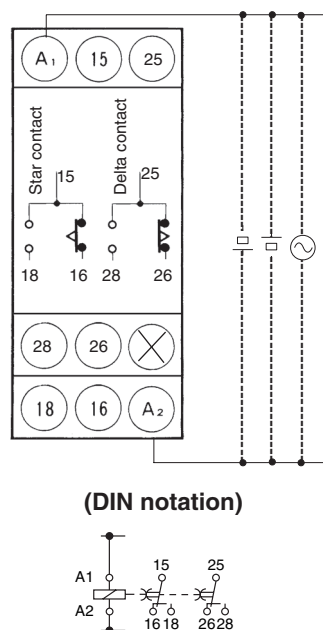
■ Block Diagram



■ I/O Functions

| | | |
|---------|----------------|--|
| Inputs | --- | |
| Outputs | Control output | Star output is turned OFF when the dial set value is reached and delta output is ON after the preset transfer time elapses |

■ Terminal Arrangement



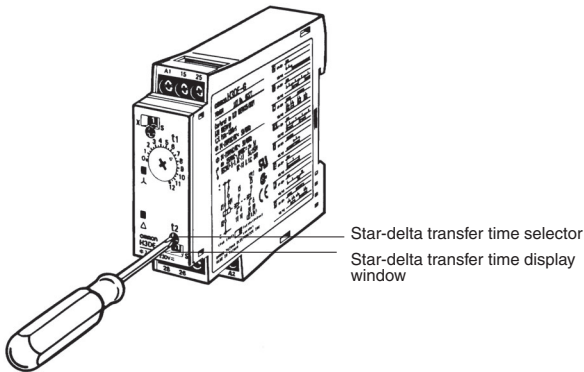
Note: DC supply voltage does not require the designation of polarity.

Operation

Basic Operation

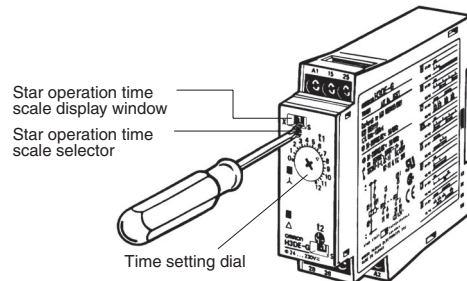
Time Unit Setting

The star-delta transfer time is set to 0.05, 0.1, 0.25 or 0.5 with the star-delta transfer time selector on the lower-right side of the front panel and the set value appears in the star-delta transfer time display window below the selector.



Time Scale Selection

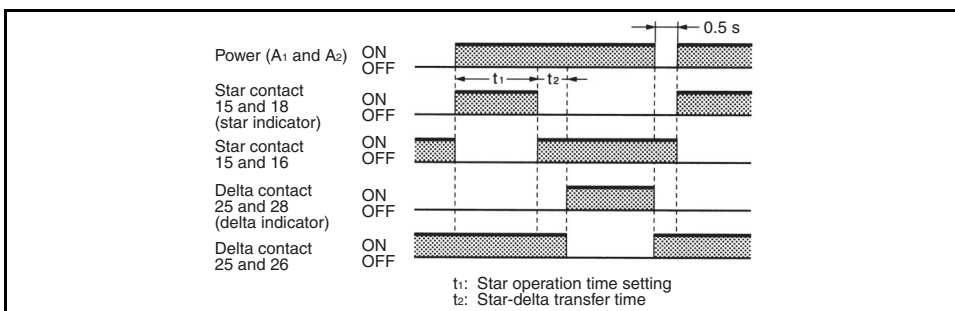
The star operation time scale selector on the upper-left side of the front panel can be set to 1 or 10 as a magnification.



Time Setting

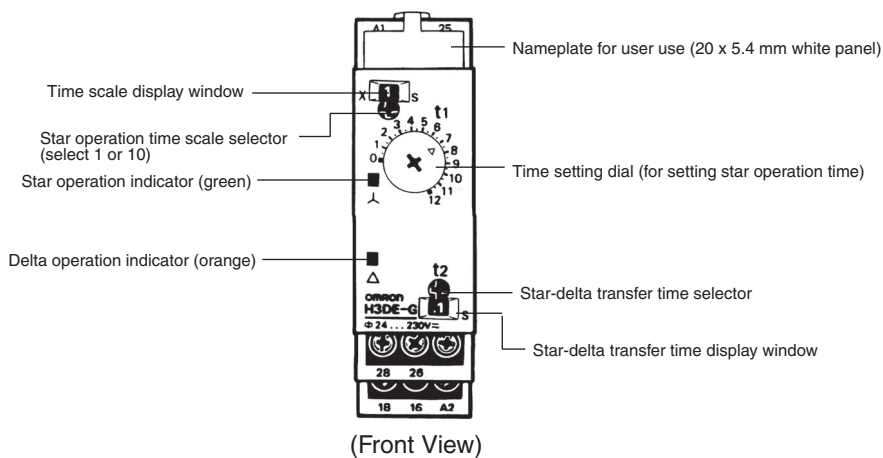
The operation time of the Timer is set with the time setting dial.

Timing Charts



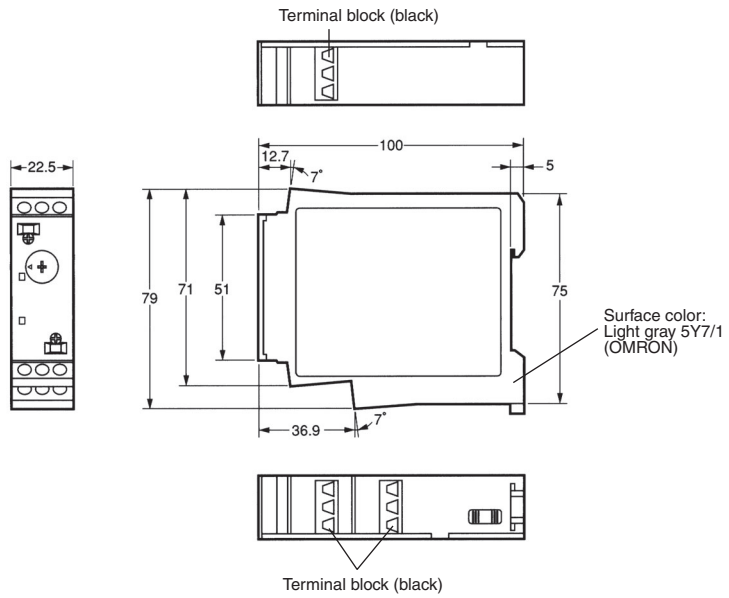
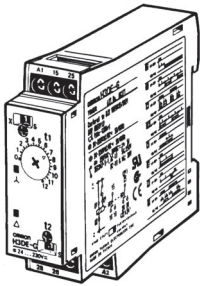
Note: The reset time requires a maximum of 0.5 s.

Nomenclature



Dimensions

H3DE-G



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Solid-state Power OFF-delay Timer

H3DE-H

- Two delay-time models available.
0.1 to 12 seconds (S Series)
1 to 120 seconds (L Series)
- Covers wide range of supply voltage.



Model Number Structure

Model Number Legend

H3DE -
1

1. H: Power OFF-delay timer

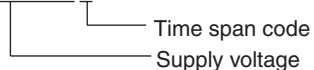
Ordering Information

List of Models

| Supply voltage | Model | |
|----------------|------------------------------------|-----------------------------------|
| | S Series (time range: 0.1 to 12 s) | L Series (time range: 1 to 120 s) |
| 100 to 120 VAC | H3DE-H | H3DE-H |
| 200 to 230 VAC | | |
| 24 VAC/VDC | | |
| 48 VAC/VDC | | |

Note: Specify both the model number and supply voltage when ordering.

Example: H3DE-H 24 VAC/DC S



Accessories (Order Separately)

| | | |
|----------------|------------------------|-----------|
| Mounting Track | 50 cm (l) x 7.3 mm (t) | PFP-50N |
| | 1 m (l) x 7.3 mm (t) | PFP-100N |
| | 1 m (l) x 16 mm (t) | PFP-100N2 |
| End Plate | PFP-M | |
| Spacer | PFP-S | |

Specifications

■ General

| Item | H3DE-H |
|----------------------------------|---|
| Operating mode | Power OFF-delay |
| Operating/Reset method | Instantaneous operation/Time-limit reset |
| Terminal block | Clamps Two 2.5 mm ² max. bar terminals without sleeves |
| Terminal screw tightening torque | 0.98 N·m max. {approx. 10 kgf·cm max.} |
| Output type | Relay: SPDT |
| Mounting method | DIN track mounting (see note) |
| Attachment | Nameplate |
| Approved standards | UL508, CSA 22.2 No.14 Conforms to EN61812-1, IEC60664-1 4 kV/2, VDE0106/P100 Output category according to IEC60947-5-1 (AC-13; 250 V 5A/AC-15; 250 V 3 A/DC-13; 30 V 0.1 A) |

Note: Can be mounted to 35-mm DIN track with a plate thickness of 1 to 2.5 mm.

■ Time Ranges

| Time scale display | | Time ranges | Min. power ON time |
|--------------------|---------|--------------|--------------------|
| S series | x 0.1 s | 0.1 to 1.2 s | 0.1 s minimum |
| | x 1 s | 1 to 12 s | |
| L series | x 1 s | 1 to 12 s | 0.3 s minimum |
| | x 10 s | 10 to 120 s | |

Note: The Timer will not operate if the specified power-on time is not kept. Be sure to supply power for at least the period specified.

■ Ratings

| | | |
|---------------------------------|---------------------|---|
| Rated supply voltage (see note) | | 100 to 120 VAC (50/60 Hz) 200 to 230 VAC (50/60 Hz) 24 VAC/VDC (50/60 Hz) 48 VAC/VDC (50/60 Hz) |
| Operating voltage range | | 85% to 110% of rated supply voltage |
| Power consumption | 24 VAC/VDC Type | AC: Approx. 0.3 VA (0.2 W) at 24 VAC DC: Approx. 0.2 W at 24 VDC |
| | 48 VAC/VDC Type | AC: Approx. 0.5 VA (0.5 W) at 48 VAC DC: Approx. 0.5 W at 48 VDC |
| | 100 to 120 VAC Type | AC: Approx. 0.8 VA (0.7 W) at 120 VAC |
| | 200 to 230 VAC Type | AC: Approx. 1.6 VA (1.0 W) at 230 VAC |
| Control output | | Contact output: 5 A at 250 VAC with resistive load ($\cos\phi = 1$) 5 A at 30 VDC with resistive load ($\cos\phi = 1$) |
| Ambient temperature | | Operating: -10°C to 55°C (with no icing) Storage: -25°C to 65°C (with no icing) |
| Ambient humidity | | Operating: 35% to 85% |

Note: The ripple in DC power supply must be 20% max. A single-phase, full-wave rectifying power supply can be connected if the ripple output of the power supply is a maximum of 20% of the whole output.

■ Characteristics

| | | |
|-----------------------------------|---|---|
| Accuracy of operating time | ±1% max. of FS (±1% ±10 ms max. at 1.2-s range) | |
| Setting error | ±10% ± 0.05 s max. of FS | |
| Influence of voltage | ±0.5% max. of FS (±0.5% ±10 ms max. at 1.2-s range) | |
| Influence of temperature | ±2% max. of FS (±2% ± 10 ms max. at 1.2-s range) | |
| Insulation resistance | 100 MΩ min. at 500 VDC | |
| Dielectric strength | Between current-carrying metal parts and exposed non-current-carrying metal parts: 2,000 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 voltage | 3 kV (or 1 kV for 24/48 VAC/VDC models) (between power supply terminals) 4.5 kV (or 1.5 kV for 24/48 VAC/VDC models) (between current-carrying metal parts and exposed non-current-carrying metal parts) | |
| Noise immunity | Square-wave noise generated by noise simulator (pulse width: 100 ns/1 ms, 1-ns rise) ±1.5 kV (between power supply terminals) | |
| Static immunity | Malfunction: 4 kV Destruction: 8 kV | |
| Vibration resistance | Malfunction: 0.5-mm single amplitude at 10 to 55 Hz Destruction: 0.75-mm single amplitude at 10 to 55 Hz | |
| Shock resistance | Malfunction: 100 m/s ² Destruction: 1,000 m/s ² | |
| Life expectancy | Mechanical: 10 million operations min. (under no load at 1,200 operations/h) Electrical: 100,000 operations min. (5 A at 250 VAC, resistive load at 1,200 operations/h) | |
| EMC | (EMI) | EN61812-1 |
| | Emission Enclosure: | EN55011 Group 1 class A |
| | Emission AC Mains: | EN55011 Group 1 class A |
| | Harmonic Current: | EN61000-3-2 |
| | Voltage Fluctuation and Flickering: | EN61000-3-3 |
| | (EMS) | EN61812-1 |
| | Immunity ESD: | EN61000-4-2: 6 kV contact discharge (level 3) 8 kV air discharge (level 3) |
| | Immunity RF-interference from AM Radio Waves: | EN61000-4-3: 10 V/m (80 MHz to 1 GHz) (level 3) |
| | Immunity Burst: | EN61000-4-4: 2 kV power port and output port (level 3) 1 kV control port with capacitive clamp (level 3) |
| | Immunity Surge: | EN61000-4-5: 2 kV common mode (level 3) 1 kV differential mode (level 3) |
| Degree of protection | IP30 (IP20 for terminal block) | |
| Weight | Approx. 120 g | |

Note: For reference:

A maximum current of 0.15 A can be switched at 125 VDC (cosφ=1).

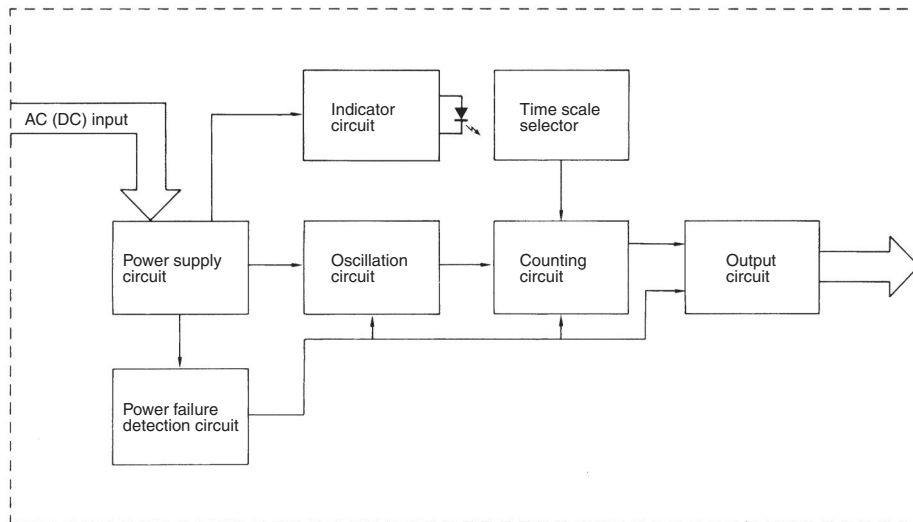
A maximum current of 0.1 A can be switched if L/R is 7 ms.

In both cases, a life of 100,000 operations can be expected.

The minimum applicable load is 100 mA at 5 VDC (failure level: P).

Connections

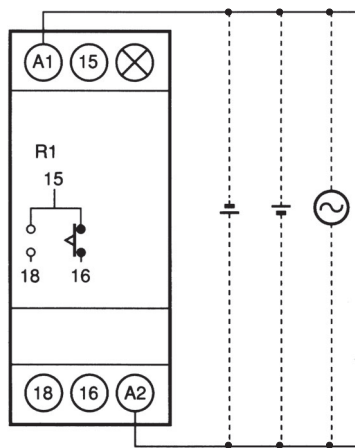
■ Block Diagram



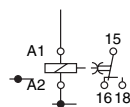
■ I/O Functions

| | | |
|---------|----------------|--|
| Inputs | --- | |
| Outputs | Control output | The Timer operates instantaneously when the Timer is turned ON. The Timer is in counting operation after the Timer is turned OFF and the output of the Timer is turned OFF when the preset time elapses. |

■ Terminal Arrangement



(DIN notation)



Note: DC supply voltage does not require the designation of polarity.

Operation

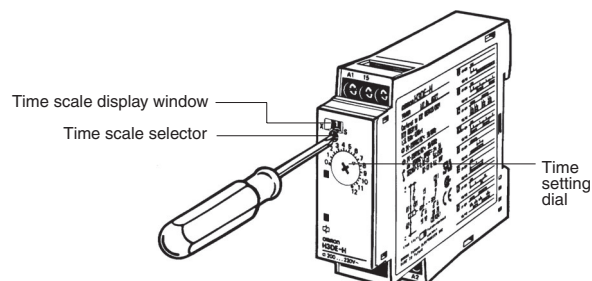
Basic Operation

Time Scale Selection

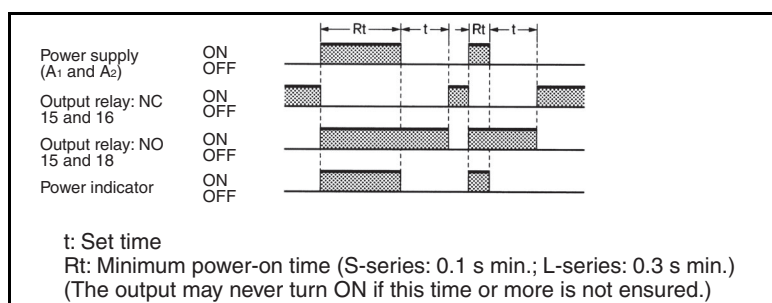
The time scale selector on the upper left-hand side of the front panel of the S Series can be set to 0.1 or 1 and that of the L Series can be set to 1 or 10 as magnification coefficients.

Time Setting

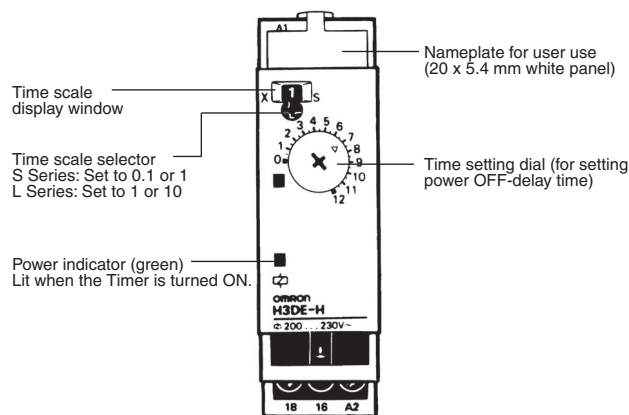
The operating time of the Timer is set with the time setting dial.



Timing Charts



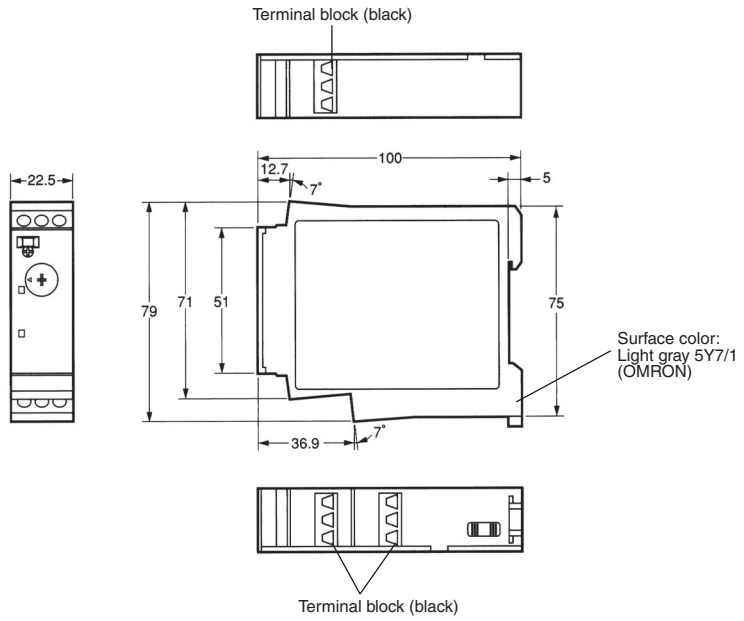
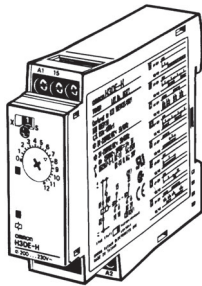
Nomenclature



(Front View)

Dimensions

H3DE-H



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Accessories (Order Separately) (Common)

Note: The following is common for all H3DE models.

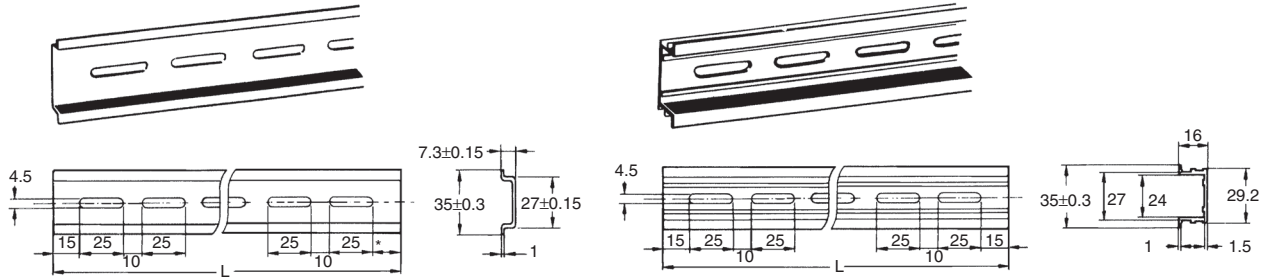
Note: All units are in millimeters unless otherwise indicated.

■ Dimensions

Mounting Track

PFP-100N, PFP-50N

PFP-100N2



L: Length

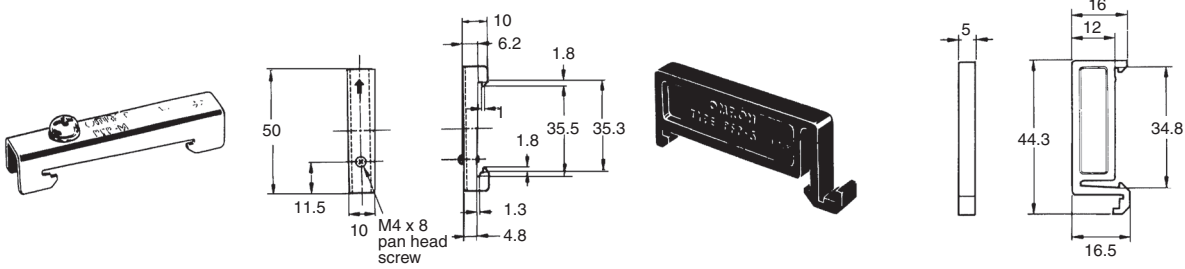
| | |
|-------|-----------|
| 1 m | PFP-100N |
| 50 cm | PFP-50N |
| 1 m | PFP-100N2 |

End Plate

PFP-M

Spacer

PFP-S



Safety Precautions (Common)

Refer to *Safety Precautions for All Timers*.

Note: The following is common for all H3DE models.

■ Changing of Setting

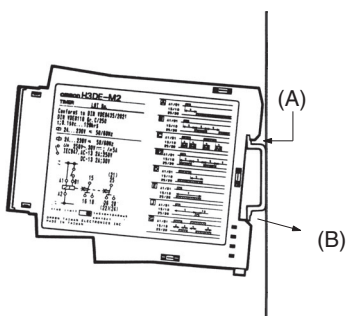
⚠ CAUTION

Do not change the time unit, time scale, operating mode, or output type selector switch while the Timer is in operation or malfunction could result.

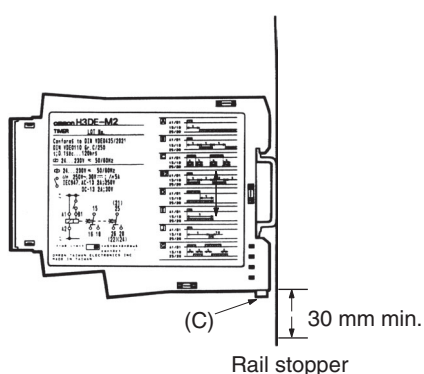
■ Mounting and Dismounting

The H3DE should be mounted as horizontally as possible.

When mounting the H3DE on a socket mounting track, hook portion (A) of the Timer to an edge of the track first, and then depress the Timer in the direction of (B).



When dismantling the H3DE, pull out portion (C) with a flat-blade screwdriver and remove the Timer from the mounting track.



The H3DE can be mounted and dismantled with ease if a distance of 30 mm or more is kept between the H3DE and the top surface of other equipment located below the H3DE.

■ Power Supplies

The H3DE Series is provided with a transformerless power supply system. An electric shock may be received if the input terminal or the output type selector switch is touched while power is being supplied.

Use the bar terminal for wiring the H3DE. Using a stranded-wire terminal may cause a short-circuit due to a stray wire entering into the Timer.

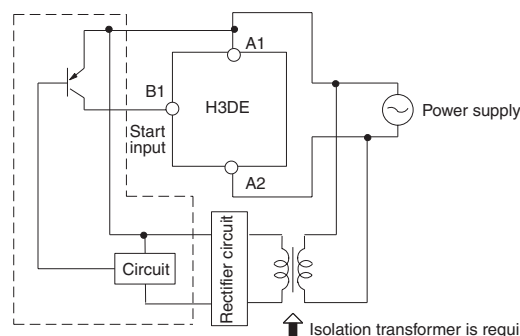
Both AC and DC power supplies can be connected to the power input terminals without regarding polarity.

With the H3DE only, a DC power supply must be connected to the power input terminals as designated according to the polarity of the terminals.

A DC power supply can be connected if its ripple factor is 20% or less and the mean voltage is within the rated operating voltage range of the Timer.

Connect the power supply voltage through a relay or switch in such a way that the voltage reaches a fixed value at once or the Timer may not be reset or a timer error could result.

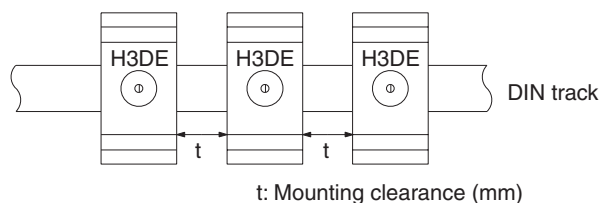
For the power supply of an input device, use an isolating transformer, of which the primary and secondary windings are mutually isolated and the secondary winding is not grounded.



The H3DE-H has a large inrush current; provide sufficient power supply capacity. If the power supply capacity is too small, there may be delays in turning ON the output.

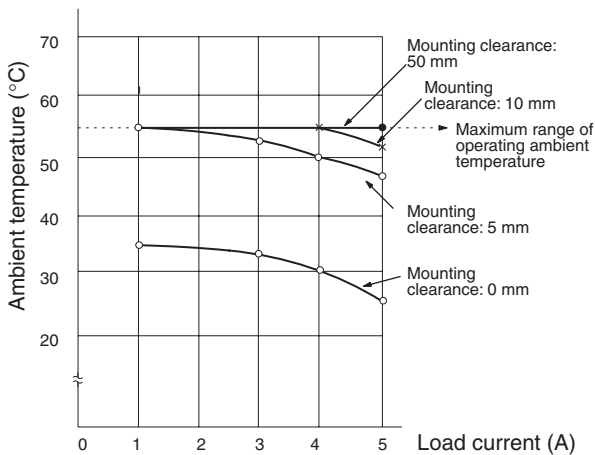
■ Installation

If the load current is continuously being supplied to the Timer for a long period of time, be sure to provide the mounting clearance as shown in the figure below. If used under the conditions other than those specified below, the life of internal components may be shortened due to an excessive rise in the internal temperature.



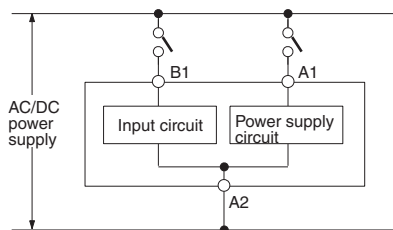
t: Mounting clearance (mm)

Switching Current vs. Ambient Temperature (When Mounting Two or More H3DE Units Side-by-Side)



Input/Output

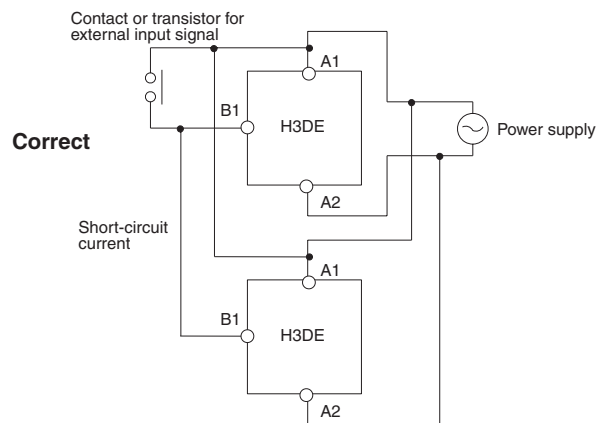
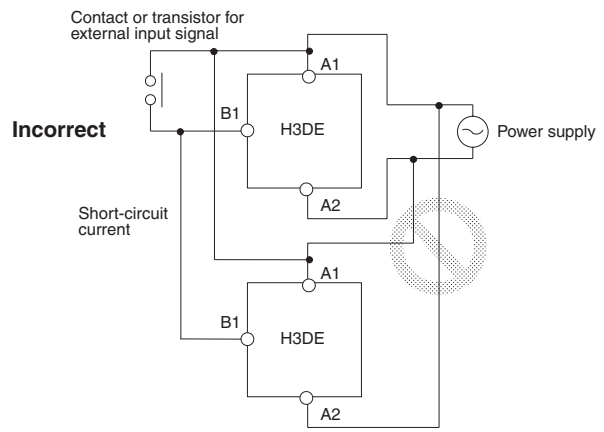
Relationship between Input and Power Supply Circuits



Since the input circuit and the power supply circuit are configured independently, the input circuit can be turned on or off irrespective of the on/off state of the power supply. It must be noted that a voltage equivalent to the power supply voltage is applied to the input circuit.

When connecting a relay or a transistor as an external input device, pay attention to the following points to prevent short-circuiting due to a sneak current to the transformerless power supply.

If a relay or transistor is connected to two or more Timers, the input terminals of those Timers must be wired properly so that they will not be different in phase or the terminals will be short-circuited to one another (refer to the figures below).



The H3DE Series is provided with a transformerless power supply system.

Input Wires

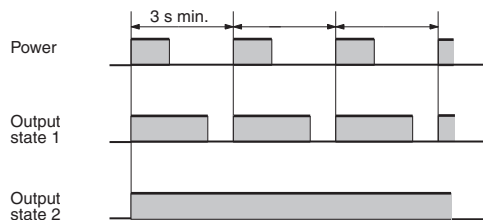
The input wires must be as short as possible. If the floating capacity of wires exceeds 2,000 pF (approx. 17 m for cables with 120 pF/m), the operation will be affected. Pay particular attention when using shielded cables.

Wiring (H3DE-H)

The H3DE has a high impedance circuit. Therefore, the H3DE may not be reset if the H3DE is influenced by inductive voltage. In order to eliminate any influence of inductive voltage, the wires connected to the H3DE must be as short as possible and should not be installed alongside power lines. If the H3DE is influenced by inductive voltage that is 30% or more of the rated voltage, connect a CR filter with a capacitance of approximately 0.1 μ F and a resistance of approximately 120 Ω or a bleeder resistor between the power supply terminals. If there is any residual voltage due to current leakage, connect a bleeder resistor between the power supply terminals.

■ Operation (H3DE-H)

An interval of 3 s minimum is required to turn on the H3DE after the H3DE is turned off. If the H3DE is turned on and off repeatedly with an interval of shorter than 3 s, the internal parts of the H3DE may deteriorate and the H3DE may malfunction.



If it is required that the output be turned on repeatedly with an interval of shorter than 3 s, consider use of the H3DE-M2/M1 in mode D (signal OFF-delay).

■ Precautions for EN61812-1 Conformance

The H3DE as a built-in timer conforms to EN61812-1 provided that the following conditions are satisfied:

The output section of the H3DE is provided only with basic isolation. To ensure reinforced isolation required by the EN61812-1, provide supplementary basic isolation on the load side connected to the output.

The H3DE itself is designed according to the following:

- Overvoltage category III
- Pollution degree 2

On the above basis:

Operation parts on the front and bottom: Reinforced isolation

- With clearance of 5.5 mm and creepage distance of 5.5 mm at 230 VAC

Output: Basic isolation

- With clearance of 3 mm and creepage distance of 3 mm at 230 VAC

■ Environment

When using the Timer in an area with excess electronic noise, separate the Timer, wiring, and the equipment which generates the input signals as far as possible from the noise sources. It is also recommended to shield the input signal wiring to prevent electronic interference.

Organic solvents (such as paint thinner), as well as very acidic or basic solutions can damage the outer casing of the Timer.

Do not use the Timer in places where it is exposed to dust, corrosive gas, or direct sunlight.

When storing the Timer, make sure that the ambient temperature and humidity are within the rated values. Leave the Timer at room temperature for at least three hours before using the Timer if it has been stored at an ambient temperature of -10°C or below.

■ Others

If the Timer is mounted on a control board, dismount the Timer from the control board or short-circuit the circuitry of the power board before carrying out a voltage withstand test between the electric circuitry and non current-carrying metal part of the Timer, in order to prevent the internal circuitry of the Timer from damage.

It must be noted that although the electrical life expectancy of the H3DE Timer shown in the catalog is the same as the H3DR Timer shown in the catalog, the actual performance varies because the built-in relays are different as follows:

Built-in relay for the H3DR: G2R; 100,000 operations min.
(10 A for SPDT and 5 A for DPDT at 250 VAC, resistive load at 1,800 operations/h.)

Built-in relay for the H3DE: G6RN; 50,000 operations min.
(8 A at 250 VAC, resistive load at 360 operations/h.)

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Read and Understand This Catalog

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- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

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Disclaimers

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Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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2008.11

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