OMRON

Multi-range, Multi-mode Timer
H3DK-M/H3DK-S

- **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 the H3DK-M.**

Ordering Information

■ List of Models

Supply voltage	Control output		Eight-mode Timer	Four-mode Timer
24 to 240 VAC/DC	Contact output, DPDT (time-limit DPDT, or time-limit SPDT + instantaneous SPDT) Changed using a switch.	Model	**H3DK-M2**	**H3DK-S2**
	Contact output, SPDT (time-limit SPDT)	Model	**H3DK-M1**	**H3DK-S1**
12 VDC	Contact output, DPDT (time-limit DPDT, or time-limit SPDT + instantaneous SPDT) Changed using a switch.	Model	**H3DK-M2A**	**H3DK-S2A**
	Contact output, SPDT (time-limit SPDT)	Model	**H3DK-M1A**	**H3DK-S1A**

■ Accessories (Order Separately)

Item	Specification	Model
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**

■ Model Structure

Model	Operating modes	Terminal block	Input type	Output type	Mounting method	Safety standards	Accessories
H3DK-M2	A: ON Delay B: Flicker OFF start B2: Flicker ON start C: Signal ON/OFF Delay D: Signal OFF Delay E: Interval G: Signal ON/OFF Delay J: One-shot Output	9 terminals	Voltage input	Relay, DPDT	DIN Track mounting	cURus (UL 508 CSA C22.2 No. 14) EN 61812-1 IEC 60664-1 4 kV/2 EN 50274	User label
H3DK-M1				Relay, SPDT			
H3DK-S2	A: ON Delay B2: Flicker ON start E: Interval J: One-shot Output		---	Relay, DPDT			
H3DK-S1		6 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 • 12 VDC *2
Allowable voltage fluctuation range		• 24 to 240 VAC/DC: 85% to 110% of rated voltage • 12 VDC: 90% 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 High level: 20.4 to 264 VAC/DC, Low level: 0 to 2.4 VAC/DC • 12 VDC High level: 10.8 to 13.2 VDC, Low level: 0 to 1.2 VDC
Power consumption *3	H3DK-M2/-S2	At 240 VAC: 6.6 VA max. *4
	H3DK-M1/-S1	At 240 VAC: 4.5 VA max. *4
	H3DK-M2A/-S2A	At 12 VDC: 0.9 W max.
	H3DK-M1A/-S1A	At 12 VDC: 0.6 W max.
Control output		Contact output, 5 A at 250 VAC with resistive load (cosϕ = 1), 5 A at 30 VDC with resistive load *4, *5
Ambient operating temperature		–20 to 55°C (with no icing)
Storage temperature		–40 to 70°C (with no icing)
Ambient operating humidity		25% to 85%

*1. When using a 24-VDC power supply voltage, there will be an inrush current of approximately 0.25 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 mode A after the Timer times out.
For the H3DK-M□, the maximum power consumption is given, including the current consumed by the input circuit.
*4. Refer to *DC Power Consumptions (Reference Information)* on page 27 for DC power consumptions.
*5. The control output ratings are for one H3DK operating alone. If you operate two or more Timers side by side, refer to *Installation Pitch and Output Switching Capacity (Reference Values)* on the next page.
*6. 125 VDC: 0.15 A max. with resistive load, 125 VDC: 0.1 A with L/R of 7 ms.
Minimum load: 10 mA at 5 VDC (P level, reference value)

■ 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 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		24 to 240 VAC/VDC: 3 kV between power terminals, 4.5 kV between current-carrying metal parts and exposed non-current-carrying metal parts 12 VDC: 1 kV between power terminals, 1.5 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	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/s² 3 times each in 6 directions
	Malfunction	100 m/s² 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. 120 g

* With the H3DK-M□, if the voltage exceeds 26.4 VAC/DC in mode C, D, or G, the OFF trigger signal characteristics are as follows:
Accuracy of operating time: ±1% ±50 ms max.
Setting error: ±10% $^{+100\ ms}_{-50\ ms}$ max.
Minimum input signal width: 100 ms

■ Applicable standards

Safety standards	cURus: UL 508/CSA C22.2 No. 14 EN 50274: Finger protection, back-of-hand proof EN 61812-1: Pollution degree 2, Overvoltage category III CCC: Pollution degree 2, Overvoltage category II, section DB14048.5-2008 part 5-1 LR: Test Specification No. 1-2002 Category ENV 1.2	
EMC	(EMI)	EN61812-1
	Radiated Emissions:	EN 55011 class B
	Emission AC Mains:	EN 55011 class B
	Harmonic Current:	EN 61000-3-2
	Voltage Fluctuations and Flicker:	EN61000-3-3
	(EMS)	EN61812-1
	ESD Immunity:	EN 61000-4-2: 6 kV contact discharge, 8 kV air discharge
	Radiated Radio-Frequency Electromagnetic Field Immunity (AM Radio Waves):	
		EN 61000-4-3: 10 V/m (80 MHz to 1 GHz)
	Burst Immunity:	EN 61000-4-4: 2 kV power line, 1 kV I/O signal line
	Surge Immunity:	EN 61000-4-5: 2 kV common mode, 1 kV differential mode

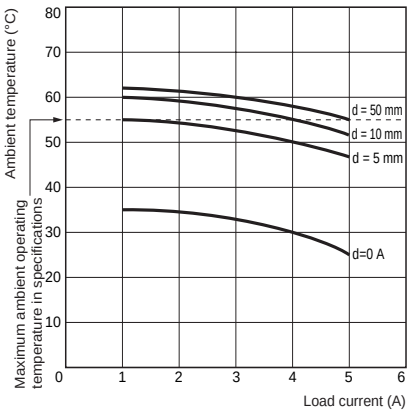
■ I/O

Item	Model	H3DK-M1/-M2	H3DK-S1/-S2
Input	Start	Functions to start timing.	There is no start input.
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. *	

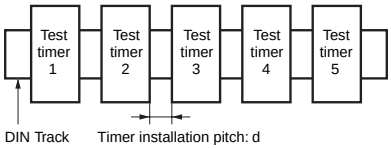
* If the INST/TIME switch on the front of the Timer is set to INST on the H3DK-M2/-S2, relay R2 will operate as instantaneous contacts and will turn ON/OFF in synchronization with the power supply.

● Installation Pitch and Output Switching Capacity (Reference Values)

The relation between the installation pitch and the load current is shown in the following graph. (Except for the H3DK-GE)
If Timer is used under load conditions that exceed the specified values, the temperature inside the Timer will increase, reducing the life expectancy of internal parts.



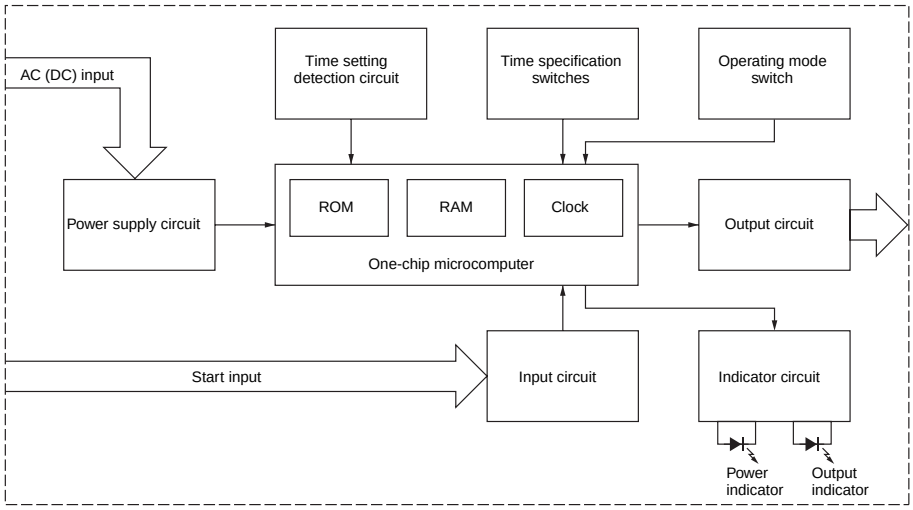
Testing Method
Tested Timer: H3DK-M/-S
Applied voltage: 240 VAC
Installation pitch: 0, 5, 10, and 50 mm



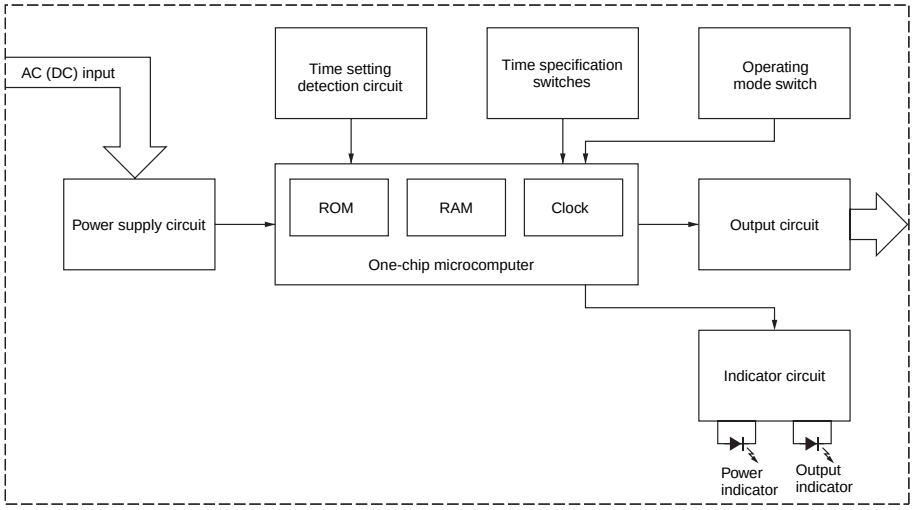
Connections

■Block Diagrams

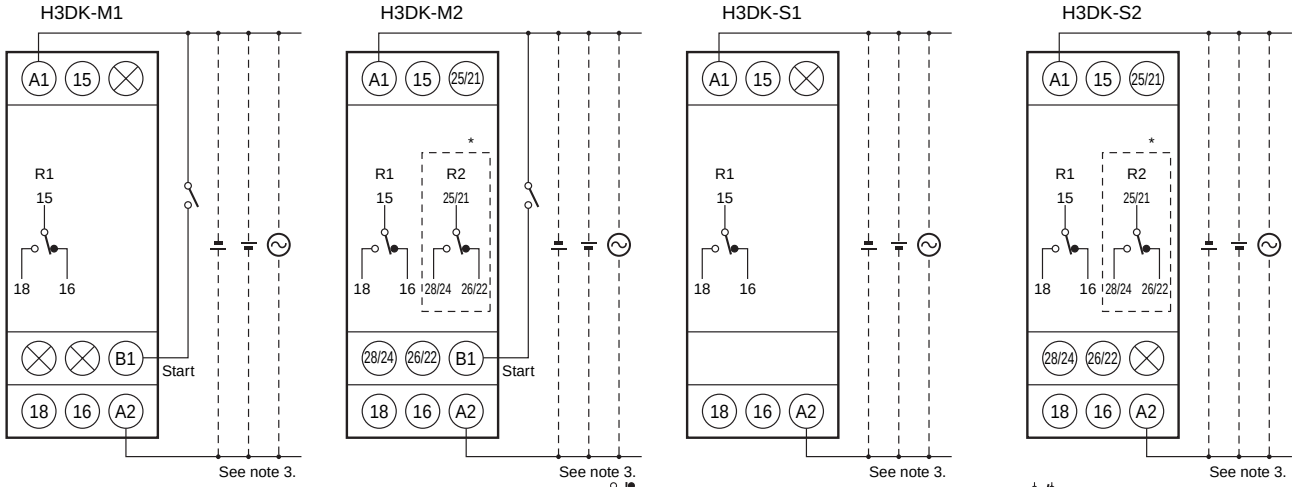
H3DK-M1/-M2



H3DK-S1/-S2



■ Terminal Arrangement



Note 1: The time-limit contact symbol for previous models of Timers was . The time-limit contact symbol for the H3DK is . A different symbol is used because the H3DK supports multiple operating modes.

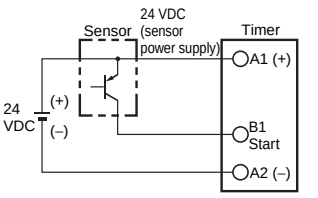
Note 2: *The relay R2 can be set to either instantaneous or time-limit contacts using the switch on the front of the Timer.

Note 3: The power supply terminals do not have polarity.

■ Input Connections

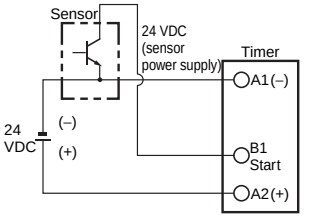
The start input of the H3DK-M1/-M2 is a voltage input.

PNP Transistor Input



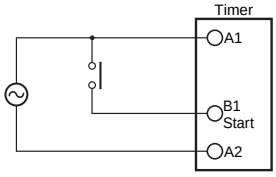
Operates when PNP transistor turns ON.

NPN Transistor Input



Operates when NPN transistor turns ON.

Relay Input



Operates when relay turns ON.

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

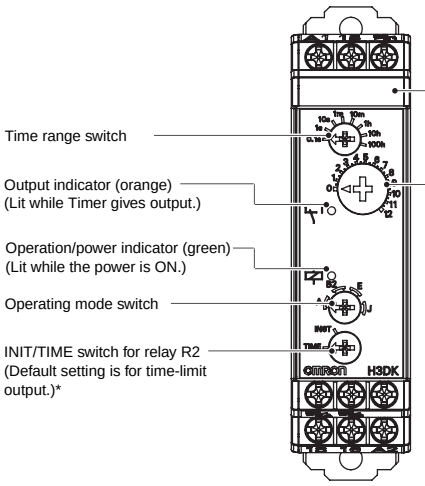
Voltage Input Signal Levels

Transistor input	1. Transistor ON • Residual voltage: 1 V max. 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 • Leakage current: 0.01 mA max. 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. When the relay is ON or OFF, the voltage between terminals B1 and A2 must be within the following ranges: • 24 to 240 VAC/DC When relay is ON: 20.4 to 264 VAC/DC When relay is OFF: 0 to 2.4 V • 12 VDC When relay is ON: 10.8 to 13.2 V When relay is OFF: 0 to 1.2 V

Nomenclature

H3DK-M2
H3DK-S2

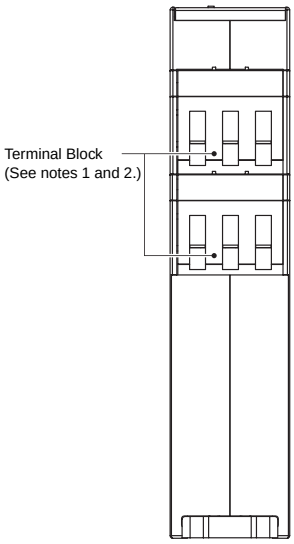
Front View



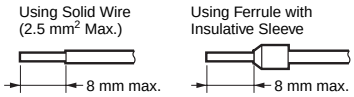
*If the switch is left between settings, proper operation may not be possible. Make sure that the switch is set properly.

Note: The default settings are for 0.1 s in mode A.

Bottom View



Note 1. Use solid wire (2.5 mm² max.) or ferrules with insulative sleeves to connect to the terminals.
To maintain the withstand voltage after connecting the terminals, insert no more than 8 mm of exposed conductor into the terminal.

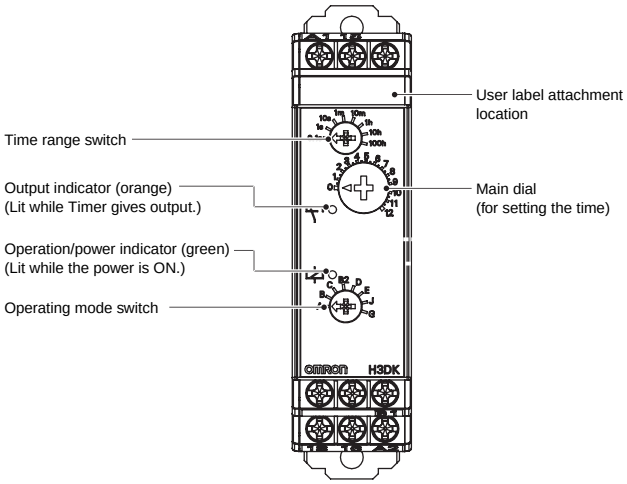


Recommended Ferrules
Phoenix Contact
- AI□□□ Series
- AI-TWIN□□□ Series

Note 2. Screw Tightening Torque
Recommended torque: 0.49 N·m
Maximum torque: 0.98 N·m

H3DK-M1

Front View

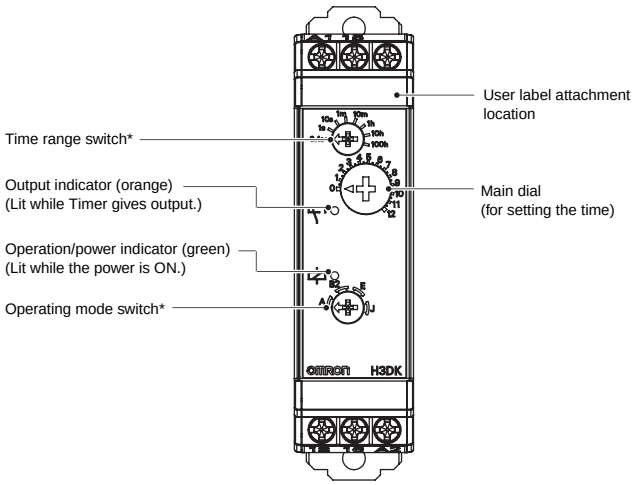


*If the switch is left between settings, proper operation may not be possible. Make sure that the switch is set properly.

Note: The default settings are for 0.1 s in mode A.

H3DK-S1

Front View



*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 A.

Dimensions

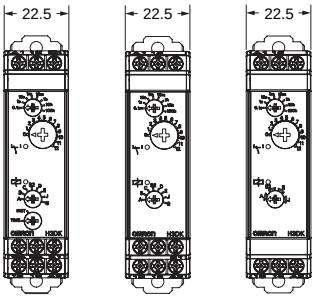
(Unit: mm)

■ Timers

H3DK-M
H3DK-S

H3DK-M2
H3DK-S2

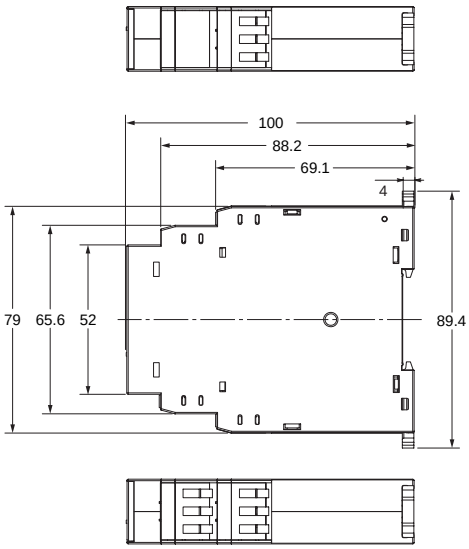
H3DK-M1
H3DK-S1



H3DK-M2
H3DK-S2

H3DK-M1

H3DK-S1



■ Track Mounting Products (Sold Separately)

Refer to page 28 for details.

Operating Procedures

■ Basic Operation

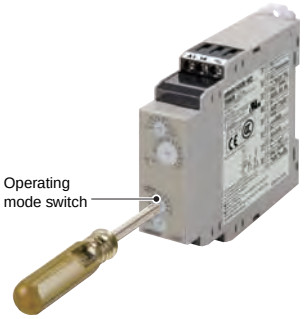
● Setting Switches

- 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

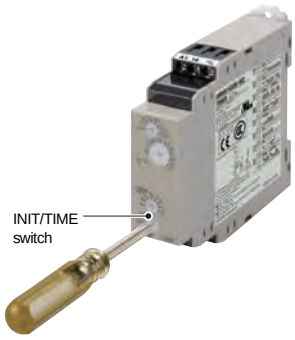
The H3DK-M can be set to any of eight operating modes. The H3DK-S can be set to any of four operating modes. Turn the operating mode switch with a flat-blade or Phillips screwdriver. The H3DK-M can be set to any of eight modes; the H3DK-S, to any of four modes.



Setting the INIT/TIME Switch

● Switching Relay R2 between Instantaneous and Time-limit Contacts (H3DK-M2/-S2 Only)

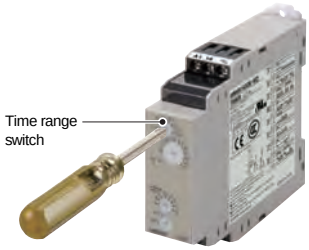
The INIT/TIME switch can be used to switch relay R2 between instantaneous and time-limit operation.



Setting the Time Range

● Setting the Time Range

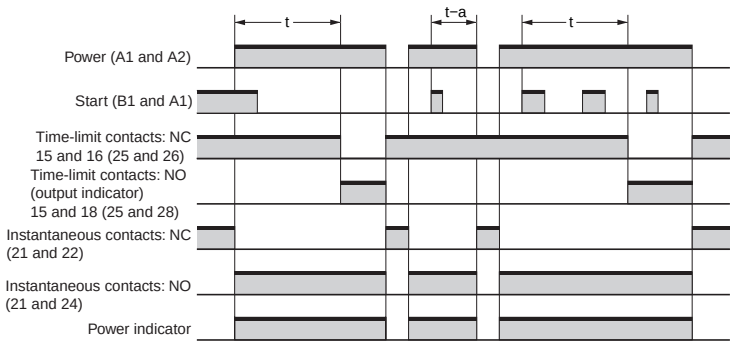
The time range switch can be used to set the time range. Turn the switch with a flat-blade or Phillips screwdriver.



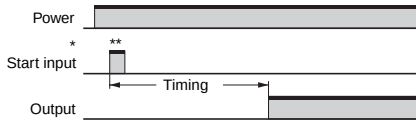
■ Timing Charts

- There is no start input with the H3DK-S. Timer operation starts when the power is turned ON.
- There is no instantaneous output with the H3DK-□1.

A: ON Delay

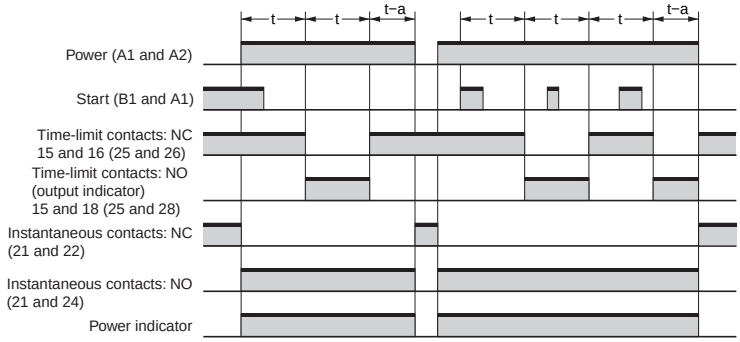


Basic Operation

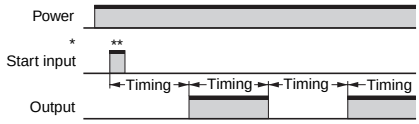


* For power ON-delay operation, connect start input terminals B1 and A1. The Timer starts operating as soon as the power turns ON.
** The start input is ignored while the Timer is in operation.

B: Flicker OFF Start

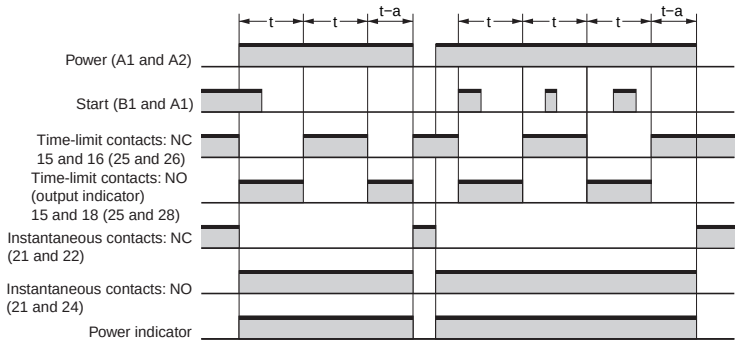


Basic Operation

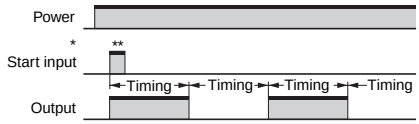


* To start with the power supply, connect start input terminals B1 and A1. The Timer starts operating as soon as the power turns ON.
** The start input is ignored while the Timer is in operation.

B2: Flicker ON start

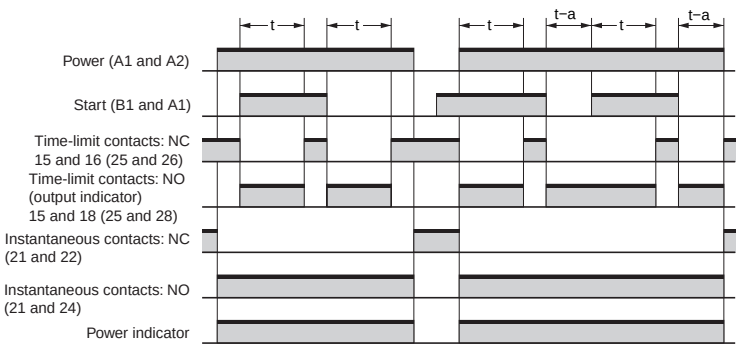


Basic Operation

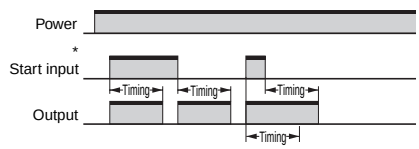


* To start with the power supply, connect start input terminals B1 and A1. The Timer starts operating as soon as the power turns ON.
** The start input is ignored while the Timer is in operation.

C: Signal ON/ OFF Delay



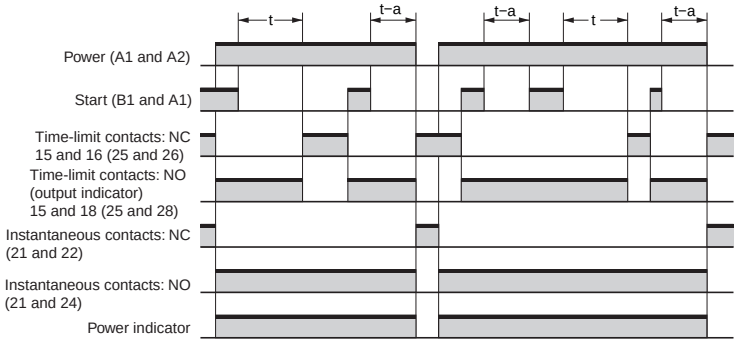
Basic Operation



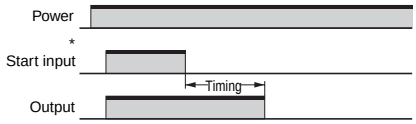
* The start input is valid while the Timer is in operation.

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

D: Signal OFF delay

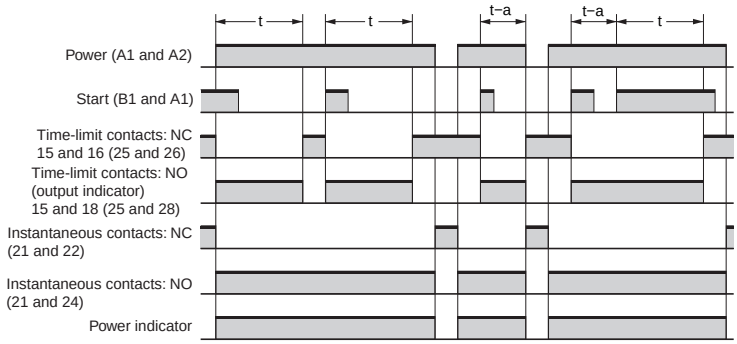


Basic Operation

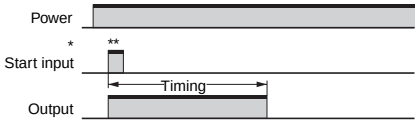


* The start input is valid while the Timer is in operation.

E: Interval

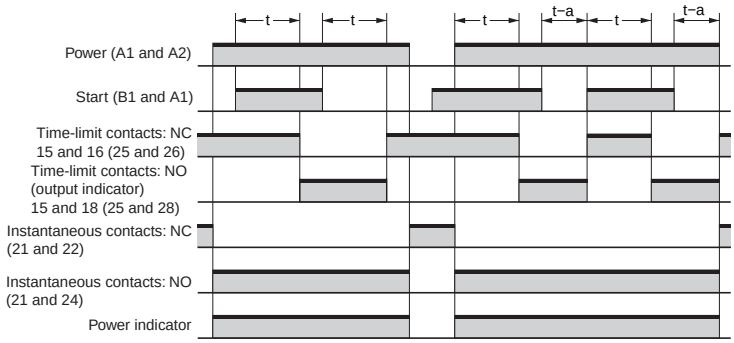


Basic Operation

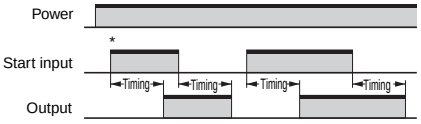


* For power ON-delay operation, connect start input terminals B1 and A1. The Timer starts operating as soon as the power turns ON.
** The start input is valid while the Timer is in operation.

G: Signal ON/ OFF Delay

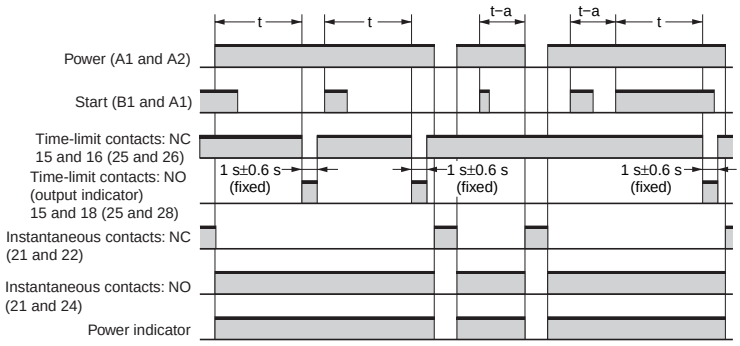


Basic Operation

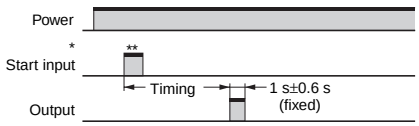


* The start input is valid while the Timer is in operation.

J: One-shot Output (ON delay)



Basic Operation



* To start with the power supply, connect start input terminals B1 and A1. The Timer starts operating as soon as the power turns ON.
** The start input is valid while the Timer is in operation.

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